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The state of the art of co-designing distributed ledger technologies for commons and common good

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Summary

This report presents an overview of two initiatives that propose new business, cooperation and interaction models through the use of digital distributed ledger technology[1]. These initiatives are: ECSA (Economic Space Agency) and Metacurrency.

The focus of this report is on the socio-economic aspects of these initiatives and their functioning as ecosystems. These aspects are presented from the perspective of their product offer, technological solutions and ideology – vision, mission and core themes. The choice for these initiatives has been made for their affinity with the concept of commons and digital commons that relates to Co City[2] vision and objectives.

Parallels with existing financing mechanisms, economic paradigms or existing initiatives have been drawn. These parallels are not meant to challenge or reduce the notions, concepts, vision, and ideology proposed; they are meant to allow the reader to establish benchmarks that could provide a guiding line through the sometimes, semantically charged landscape of these ecosystems.

[1] 'A distributed ledger is a database that is consensually shared and synchronized across network spread across multiple sites, institutions or geographies. It allows transactions to have public "witnesses," thereby making a cyberattack more difficult. The participant at each node of the network can access the recordings shared across that network and can own an identical copy of it. Further, any changes or additions made to the ledger are reflected and copied to all participants in a matter of seconds or minutes. Underlying the distributed ledger technology is the blockchain, which is the technology that underlies bitcoin' (Investopedia, n.d.)

[2] Co City is an EU funded project that intends 'to break the self-reinforcing circle of poverty, social segregation in deprived neighborhoods and lack of participation […] by supporting a polycentric "commons-based urban welfare" composed of generative communities centered on urban commons, low-cost service co-production, social mixing, and care of public spaces.' (firstlife.org, 2018). The tools used by Co City to achieve its goals are a legal framework (called 'pacts for commons') and a blockchain platform.

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INTRODUCTION

The following paragraphs present an explanation of the main concepts and the theoretical framework that has been used in mapping ECSA and Metacurrency e.g. - distributed ledger technology, common good, commons, and commons commodification, relational work and embeddedness. At the end, it presents a brief explanation for the choice of ECSA and Metacurrency and of the data collection methods.

Distributed ledger technology (DLT)

A distributed ledger (also called a shared ledger, or distributed ledger technology - DLT) is a consensus of replicated, shared, and synchronized digital data geographically spread across multiple sites, countries, or institutions (Walport, 2015). The 'consensus' refers to the fact that the technology functions by facilitating the connection of different digital storage devices (from powerful servers to mobile devices such as tablets or smartphones) in a peer-to-peer (P2P) network through a consensus algorithm; this algorithm allows data replication and transfers among the members of the network and at the same time provide data traceability e.g. who originated a transaction[3], how data has been aggregated in blocks, what subsequent alternations have been done, by whom, when, etc. The distributed aspects of the DLT comes from the fact that a peer-to-peer network does not require central administrator or centralized data storage (Scardovi, 2016). In contrast to traditional client-server networks, in a peer-to-peer network the members of the network (the peers) make available to other network participants a portion of their resources (e.g. processing power, disk storage, network bandwidth). Hence, peers are both suppliers and consumers of resources and there is no need for central coordination by servers or stable hosts (Schollmeier, 2001).

Distributed ledger technology is often assimilated with the Blockchain. In fact, Blockchain is a type of distributed ledger technology (World Bank, 2018). In a peer-to-peer network using a distributed ledger architecture data could be exchange using different transformative interchange formats such as Open Document Format that allows peers to work in the same time on spreadsheets, charts, presentations and word documents - similar to what in a centralized network would be for instance, Google docs. On Google docs data is stored on a server while on a P2P DLT network data is stored on the devices of the network.

Working on an Open Document does not require transfer of high volumes of data among peers. However, when high volumes of data are transferred, for faster and reliable transfer, data could be 'packed' according to established criteria into blocks. The transfer of these blocks of data within the network could be seen as chains of blocks of 'packed' data wherefrom, the name of blockchain.

[3] in this context 'transaction' does not refer only to commercial transaction – e.g. buying goods or sending money online, but also to queries, searches, access of online content, etc.

Making a parallel between data and food we could say that one person could go to buy some potatoes for a farm and take them in a bag – this would be similar to low transfer of data like, the case of working on an Open Document. If the farmer sells the potatoes to a retailer, for logistic efficiency, will put the potatoes on a container - this would be similar to higher transfer of data like, in the case of purchasing items online - activity that involves the use of identification data for the parties involved, quantities, prices, etc. The data that refers to the transactions between the farmer and the retailer would be grouped together in something that could be seen as a 'block' of data – data that has similar characteristics, in this case, the same product from the same seller (the farmer) and to the same buyer (the retailer). If the retailer buys potatoes or other products for – let's say – other farmers in the same region, for logistic efficiency, he would prefer to wait till the goods are loaded in separate containers that would eventually be loaded on a train. The same way as the goods are loaded on containers and then send by train the data that refers to the transactions between all farmers in the region and the retailer form 'blocks' of data (for each farmer a block). Similar with shipping the containers with the same train the 'blocks' of data will be linked to each other (as the wagons) hence, forming a chain of blocks of data - or a blockchain. When the train with the containers from the farmers of a certain region arrives at a destination where the containers are further transfer to a ship a custom officer will check the origin certificates of the goods in the containers. In a Blockchain network the custom officer is the 'miner', respectively an algorithm able to (cryptographically) read and validate the origin certificates of the blocks is verifying – e.g digital identity of the parties in the transaction (in this case the retailer and the other farmers), date and place of when they input the data in the network, etc. In a DLT network every storage device (PC, server, smartphone, etc.) that has the mining algorithm installed could do the mining – cryptographic validation of data in a block. Currently, the 'mining' operation requires high IT storage and processing capacity and leads to high electricity consumption, therefore not all members of a peer-to-peer network can do it. This raised criticism for the 'true' distributed nature of a Blockchain architecture.

The idea of packing the data into blocks could be tracked back to the early 1990's (Haber and Stornetta, 1991). The Blockchain technology gained increasing widespread notoriety since it has been coupled with the use of the bitcoin algorithm. The bitcoin algorithm has successfully facilitated the issuance and circulation of bitcoins, the first cryptocurrency issued using the distributed ledger technology. The shortcomings of Blockchain – high energy conception, slow data processing capacity, etc. – had lead to the situation where distributed ledger technology systems such as IOTA, Tangle Network, Hashgraph, peaq and RaiBlocks (now NANO), even though are part of the growing cryptocurrency landscape, have renounced to the idea of using Blockchain altogether (Thake, 2018).

Common good

'The term common good may refer either to the interests that members have in common or to the facilities that serve common interests. For example, people may say, "the new public library will serve the common good" or "the public library is part of the common good"'(Hussai, 2018). In the context of digital ecosystem presented further on common goods refers primarily to the interest that members of the ecosystem have in common.

Commons and commons commodification

Even though commons exist for millennia[4] currently there is not a generally agreed definition of commons. Digital Library of the Commons defines commons as 'a general term for shared resources in which each stakeholder has an equal interest' (Hess, 2006). Michel Bauwens, sees commons as any common resource that is available to all; he divides them into two types: physical resources and man-made. (Bauwens, 2017). There are many other definitions or interpretations of the commons however, the feature that is shared by most definitions of commons is the absence of individual or private ownership of commons. Commoners have the right to use the commons however, they have not ownership on the commons; they can not sell, concession or rent them out without the agreement of other commoners.

The man-made commons encompass herbal medicines, social customs and local traditions, spiritual beliefs, folk tales, ethnic cuisines, crafts, history, scientific knowledge, artistic traditions, blood banks, the airwaves, the internet, wikipedia, blogosphere, government-funded research, wind power, etc. The most relevant man-made commons to the scope of this report are the digital commons defined as 'information and knowledge resources that are collectively created and owned or shared between or among a community and that tend to be non-exclusivedible, that is, be (generally freely) available to third parties. Thus, they are oriented to favor use and reuse, rather than to exchange as a commodity. Additionally, the community of people building them can intervene in the governing of their interaction processes and of their shared resources.' (Fuster Morell, M. 2010). As digital commons the one probably most known is Wikipedia. The creation and governance of digital commons have been facilitated and supported by initiatives such as open content, copyleft, open source, etc. These initiatives set the framework for free access to digital content such as codes and code banks, systems' architecture, etc. Some of these aspects will be detailed in the digital ecosystems presented further on.

Among most quoted authors that have been referring to commons' governance (more precisely lack of it) is the 19th. century author William Forster Lloyd whose ideas were further developed by the

[4] In many ancient culture but also in contemporary primitive societies the concept of individual property is either inexistence or loose; natural resources and often personal items belong to the transcendental entities (e.g. God) or are pool together in a common pool of community resources (Eisenstein, 2011, Litaer, 2008).

ecologist Garret Hardin in the book 'The tragedy of commons'. They highlighted the situation generated by the overuse of commons - in reference mostly to natural commons such as pasture land, forests, waters, etc. As Hardin himself acknowledged his book did not refer to commons in general but to unregulated commons and remarked that the titled of his book should have been "The Tragedy of the Unregulated Commons" (Hardin, 1998). Although Elinor Ostrom work on commons is often seen as opposed to Hardin's her eight "design principles"[5] of stable local common pool resource management (Ostrom, 1990) could be in fact, the solution to Hardin's 'tragedy'.

Hardin's thesis that the use of natural resources as commons leads to their 'tragedy' – e.g. overgrazing, overfishing, deforestation, etc. - has often been used as an argument for commons commodification - their sell or concession on a long period of time to private entities, individuals or organizations. Seen in a very simplistic way the commodification mechanism could be described as follows. Commons are generally seen as a common good (self)ascribed or assigned to a group of people or community. Every member of the group or community has equal rights and duties in regard to the use and governance of commons. However, from reasons such as commons' abuse (overgrazing, fishing, deforestation, etc.), safety, political alliances, etc. at a certain point an administrator is appointed (or self-appointed). The administrator is mostly meant to monitor and enforce the rules the commoners agreed upon. In some cases, for his or her services, the administrator receives a fee – in money or in kind. Over time, a heightened sense of responsibility, power struggle, pecuniary or other reasons lead to the situation where some administrators acquire a sense (and attitude) similar to that of ownership. He or she establishes unilaterally or with the support of a minority new rules of governance that would eventually, give the freedom to administer the commons as own property –e.g. concession them, give them in the administration to a third party, use them as collateral, etc.

The impact of commons commodification on commoners has been both devastating and beneficiary – case by case. The rampant privatization of commons in 18th. and 19th. century Europe have lead to a rapid decrease of farmers living conditions and the exodus to the urban areas that fuel the industrialization with cheap labour. One recent example of the negative impact of commons commodification is the privatization in 1999 of Cochabamba (Bolivia) city's municipal water supply infrastructure. Cochabamba's water supply infrastructure needed ample refurbishment works that the

[5] 1. Group boundaries are clearly defined. 2. Rules governing the use of collective goods are well matched to local needs and conditions. 3. Most individuals affected by these rules can participate in modifying the rules. 4. The rights of community members to devise their own rules is respected by external authorities. 5. A system for monitoring member's behavior exists; the community members themselves undertake this monitoring. 6. A graduated system of sanctions is used. 7. Community members have access to low-cost conflict resolution mechanisms. 8. For CPRs that are parts of larger systems: appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises. (Ostrom, 1990)

municipality could not afford. The solution to this situation was a public-private partnership in which the Bolivian government signed a contract of forty years to transfer the operation and distribution of Bolivia's water reserves from the municipal services in charge with the water supply and sewerage to a multinational group owned by International Water, of which the American company La Bechtel, was the main shareholder. In only a few months the utility bill for water and sewerage recorded a spike. Furthermore, privatization agreement also included the rainwater, one of most illustrative natural commons. According to the privatization contract citizens were not allowed to collect rain water anymore event though this was the main water source for some neighbourhoods. This situation led to a wave of anger and revolt that escalated to a civil war. Eventually, the Municipality took back the administration of the water supply and had to pay Bechtel compensation for breaching the agreement hence, having even less money to repair the water supply infrastructure (The Corporation, 2004).

The commons commodification (often referred as commons privatization) could also bring benefits to commoners. For instance, the concession of mineral springs to a bottling company could add an extra revenue for the community while the members of the community and passers by will still have free access to them. The bottling company would bottle only the surplus water, the water that otherwise would return to the ground.

Commons governance

Commons and common good governance could be drafted, implemented, observed and mediated through laws and a punitive system, peer pressure, customs and traditions and other types of formal and informal mechanisms. In the context of the digital ecosystems presented further on governance has been approached from the perspective of embeddedness of economic phenomena in social processes, and relational work proposed by Viviana Zelizer in 'How I Became a Relational Economic Sociologist and What Does That Mean?' (2012). A particular attention has been paid to the question she asks herself respectively, 'can a relational work agenda translate into policy, and if so, how?' (Zelizer, 2012). She refers to relational work as the sum of processes where people differentiate meaningful social relations. For each of these social relations people 'erect a boundary, mark the boundary by means of names and practices, establish a set of distinctive understandings that operate within that boundary, designate certain sorts of economic transactions as appropriate for the relation, bar other transactions as inappropriate, and adopt certain media for reckoning and facilitating economic transactions within the relation.' (Zelizer, 2012). Zelizer takes distance from the mainstream economic sociology's theoretical apparatus for its continues privileging of firms and market as research sites. Instead she considers other research sites such as households' consumption, informal economies, gift exchanges and others. She also considers what else than equalizing resources, maximizing advantage, or reducing risk are people doing when they engage in the economic activities of production, consumption, distribution, and transfer of assets.

Further, she incorporates Mark Granovetter concept of embeddedness, respectively how 'the economic action of individuals as well as larger economic patterns, like the determination of prices and economic institutions, are very importantly affected by networks of social relationships.' (Zelizer, 2012). Zelizer illustrated the concept of embeddedness with the practice of monetary earmarking, respectively the monetary differentiation in which people manage their social ties to others – e.g. assign emotional values to an amount of money[6]. Zelizer also identifies four elements that could be found in all economic activities: '1) distinctive social ties: connections among individuals or groups involved in the economic activity. 2) a set of economic transactions: interactions and social practices conveying goods and services (e.g. compensation, gift, loan, bribe, theft). 3) media for those transactions: representations of rights to goods and services, often in the form of concrete tokens, ranging from state-issued legal tender or electronic monies, to more restricted forms such as credits in baby-sitting pools, casino chips, or food stamps. Media can also include such items as time, in-kind goods, or favors. 4) negotiated meanings: participants' understandings concerning the meanings of relations, transactions, and media including their moral valuation, combined with constant negotiation, modification, and contestation of those meanings.' (Zelizer, 2012).

As it will be further detailed ECSA and Metacurrency relate to the concept of commons, digital commons, common contribution for the common good and relational work. They also propose some direction for governance of these ecosystems supported by their platforms.

Choice and Data Collection

ECSA and Metacurrency have been chosen for their stated affinity with commons and common good and digital commons. Both projects propose a DLT platform based ecosystem that foster co-production, open content and co-ownership. They are presented in a descriptive way. At the end of each description there are few notes referring to the general understanding of commons and common goods and the meaning assigned by each of the ecosystems. The four elements that could be found in all economic transactions according to Zelizer (see above) have also, been considered. The description of these ecosystems had an implicit focus on how embeddedness leads to relational work, how relational work could produce organizational structures similar to commons and how the DLT could facilitate governance within these structures.

The methodology for data collection scanned mostly secondary sources respectively, internal sources provided by the mapped ecosystems eg. web pages, blogs, white papers, etc. For the accuracy of terms and definitions an effort for using their *ad litteram*, literary transcription, has been made.

[6] this could be seen as the situation where would be considered acceptable to use the money meant for paying rent for an impulse shopping and delay the rent payment but would be unthinkable to use the same amount from a saving account meant to cover tuition fees.

Given the span and design of research no interviews with stakeholders have been conducted; this would explain why some terms and definitions are not explained in detail, apparent contradictions could be identified while some concepts and perspective are not developed sufficiently.

Finally, the purpose of this report is to open the perspective of fluid governance of emerging forms of organization on DLT platform ecosystems with a particular focus on digital ecosystems functioning as commons. Their stated or implied similarities with commons and aim for common good indicates the opportunity for sourcing inspiration and benchmarking from theoretical models and past experiences for a sound, sustainable and constantly updating forms or organization and governance.

METACURRENCY

INTRODUCTION

'MetaCurrency is the name for the infrastructure and protocols necessary for an open source economy[7], and free currencies[8] to flow in an interoperable and standardized[9] way.' (Harris-Braun, 2018). The open source economy and free currencies are meant to function in a non-monopolizable manner e.g. no central authority for currencies issuance and economic governance.

Metacurrency operational proposal is a platform called Holochain; its architecture is based on digital distributed ledger technology – similar with Blockchain (for a comparison between Blockchain and Holochain see Appendix 1). Holochain could host an ecosystem of distributed, interconnected, interoperable applications (by contrast with for instance, Facebook ecosystem where Facebook, Facebook Messenger and Instagram are interconnected but not distributed - Facebook is a centralized ecosystem, data is stored on servers, not on users' devices). The interconnectivity among participants on the platform provided by Holochain could be compared to that of the cells of an organism – they have a life and function on themselves but through their receptors they are part and interconnect with the whole organism and with the surrounding environment.
The participants on this ecosystem are the End Users, the Hosts, Application Providers, Application Developers and Infrastructure Providers. End-users are those who are not part of the Holochain P2P network but can access it via a standard web browser. They have not installed Holochain protocol and do not provide hosting services of Holochain application on their devices. The hosts are those providing processing and storage capacity of their devices for the apps hosted on the Holochain platform. App Providers are responsible for the maintenance and security of apps they publish on Holochain. Application Developers are those developing the applications that are further published and hosted by Holochain. Infrastructure providers are those providing the Holochain platform infrastructure and makes it accessible for end users through standard web browsers. On Holochain any of the participants could be a host (Harris-Braun et al., 2018). The technical specifications for hosting will be presented further on.

[7] 'An open source economy is defined as an economy in which the development of goods and services happens via open collaboration between independent stakeholders on the global level.' (Opensourceecology.org, 2018)
[8] 'free currencies' refers to right of any citizen, community and/or organization to create tools that facilitate the transfer or the flow of wealth unless they have opted for tools such as the monopolistic and private currencies. (Noubel, 2010)
[9] The 'interoperability and standardization' refer to cryptographic double entry accounting currency issuance and circulation model explained more in detail in the 'Operationalization' paragraph.

Holochain 'light' architecture facilitates up to 10.000 transactions/second (compared to 1000+/second by Neo, a few/second by Bitcoin and Ethereum and 56.000/second by Visa) (Harris-Braun et al., 2018). The 'light' architecture refers to the fact that, unlike Blockchain where copies of the ledgers are hosted by network's nodes, on Holochain the ledgers are sharded (are split in small pieces). Each node holds only a portion of the whole ledger data (a shard). The sharding is designed such way that one participant in this ecosystem could access the node with the useful and relevant data for him or her; therefore, there is no need for each node to keep a copy of the whole system. Also, unlike on Blockchain architectures where the integrity is ensured by transactions' validation by 'miners', on Holochain data integrity is ensured by cryptographic validation of people (peers) validated against an immutable cryptographic record of those peers' actions. In other words, the data transmitted is validated every time it is transferred from a storage device to another. Holochain 'light architecture' make it feasible to run full nodes on low-power computers or cell phones. For a comparison between Blockchain and Holochain see Appendix 1.

Holochain protocol is called Ceptr. Ceptr facilitates data management, storage and transfer within Holochain. Ceptr design is inspired from biomimicry – it mimics the receptors from living organisms/cells that have the capacity to identify and connect with other relevant living organisms/cells while ignoring or paying little attention to the rest of stimuli.

The hosting fees for apps and related data, research and development and platform maintenance expenses will be covered by Holochain own issued tokens called Holo Fuel or Holo (similar with Gas[10] on Ethereum[11] platform). Holo Fuel is not meant for speculation. Its construct is based on currency issuance through credit and the use of double entry principles of accounting – e.g. participants could benefit of credits for the services they use or accumulate debits; at any moment the aggregated value of credit and debits on the system will be equal. One could buy Holo Fuel with fiat money or crypto currencies and pay with it for Holochain's hosting services or other fees. End users should always have a positive balance – they would not benefit of credits. However, for the App Providers and App Developers a credit (overdraft) could be extended according to the amount of Holo Fuel hold, volume of transactions and fees to pay; this means that they could benefit by the services provided by Holochain even if they don't have Holo Fuel on their account; they will pay later when they have it. Holo Fuel can be bought by any participant in the ecosystem however, it could be redeemed for fiat money or other crypto currencies only by the hosts. This operation could be done through the Reserve Account (presented in detail on the Holo paragraph). The purchasing/selling of Holo is summarized in Fig. 1.

[10] 'Gas" is the name for a special unit used in Ethereum. It measures how much " work" an action or set of actions takes to perform.' (Badea, 2018)

[11] 'Ethereum is an open-source, public, Blockchain - based distributed computing platform and operating system featuring smart contract (scripting) functionality'. (CoinDesk, 2018)

Fig. 1 – Holo Fuel Cycle

* End Users, Apps Provideres and Developers, Infrastrucutre Providers
**allows the conversion of fiat/crypto currencies into Holo and the conversion of Holo into fiat/crypto currencies (only for Hosts). (Harris-Braun et al., 2018).

FORM OF ORGANIZATION

The Metacurrency Project is registered on East Chatham, NY (Qivc.org, n.d.). Among its sub-entities (projects under the Metacurrency umbrella) the most notable is Holo (already mentioned) and Ceptr 'a not a profit-driven organization, with no short-term revenue, where most people participate as volunteers' (Brock, 2017). These and the other Metacurrency sub-projects will be presented further on.

PURPOSE

The Metacurrency project main purpose is to build protocols and platforms to 'open source' the next economy (Brock, 2009) respectively 'Building the core infrastructure for open sourcing[12] money & currencies and developing projects that embody the values of Deep Wealth Design' (Harris-Braun et al., 2018). The meaning of Deep Wealth Design it is explained further in the 'Core Themes' section. Metacurrency main projects are: Ceptr as Protocol for Pluggable Protocol, Holochains for Distributed Data Integrity, Sovereign Accountable Commons, Neural Internetworking and Ceptr Core. The purpose of these projects is further highlighted.

The purpose of Ceptr as Protocol for Pluggable Protocols is 'Complete interoperability: No more silos and brittle APIs[13]. Self-Describing protocols and a universal parsing system allows anything to talk to anything'. (Ceptr, n.d.a). Ceptr, as Protocol for Pluggable Protocols allows interoperable apps to connect with each other. This fosters a connectivity among the actors in the network on a multitude of levels – personal, professional, as IT interface, etc. In simpler words this could be summarized as the example given earlier with the ecosystem that consists of silos such as Facebook, Instagram and Messenger that are connected with each other. The notable difference from Facebook ecosystem is that Metacurrency uses a distributed ledger architecture – e.g. the access to the platform is equally free to any app developer, provider or user.

The purpose of Holochains for Distributed Data Integrity is to 'Go beyond Blockchain bottlenecks and global consensus ledgers for scalability which ensures data integrity and distributed sharing.' (Ceptr, n.d.b). As presented earlier this refers to the 'light' structure of Holochain that allows processing a higher number of transaction than blockchain DLTs.

[12] The concept of open source is rooted in the concept of open source software development that encourages peer production; the open source software means that the source code is made available with a license in which the copyright holder provides the rights to study, change, and distribute the software to anyone and for any purpose (St. Laurent, 2008).

[13] API (Application Programming Interface) 'is the part of the server that receives requests and sends responses.' (Gazarov, 2016)

The purpose of Sovereign Accountable Commons (SAC) is to foster the apparition of 'Organizations incorporated in distributed app code instead of legal codes enabling new patterns of self-governance and mutual sovereignty' (Ceptr, n.d.e).

The purpose of Neural Internetworking is 'By supporting sticky requests which send data whenever conditions are matched, we enable neural-like behavior across all applications.' (Ceptr, n.d.d). Neural Internetworking could be seen as the mind frame used in designing the architecture of Holochain; it mimics the connections between neurons.

The Ceptr Core is the vision under which the technical IT structure is built; a general-purpose framework that can load code from different distributed applications.

VISION AND MISSION

The vision of Metacurrency could be seen as creating the environment that fosters the emergence of a decentralized, collaborative and constantly improving and self-organizing digital ecosystem based on distributed computing. This would be possible as Holochain architecture and protocols enable users not only to interact with an integrated system of apps, but also allows apps to interact with apps on a model similar with that of neurons interaction.

STAGE

At the date of writing (April 2018) the sources checked (Metacurrency own site and other own online media) indicated that the fundraising campaign has been closed; the total amount of funds risen is EUR 2.5m. The fundraising campaigned – called Internal Community Offer – consisted in issuance of the own cryptocurrency and sell against fiat money or other cryptocurrencies.

Out of Metacurrency projects some are in phasing out and re-design stage whereas others are on the pilot testing or in development – e.g. Source Tree Commons is under construction. In November 2017 Holochain was in Alfa 0 (Harris-Braun, 2017). Ceptr is in the stage of re-building (Ceptr. n.d.a). The delivery roadmap for Holo and Holochain perhaps, the most relevant Metacurrency projects at this moment, are presented in Appendix 2.

BACKGROUND

Metacurrency proposal steams out of three main themes: Deep Wealth, Currencies (spelled as Current-Sees) and Living Systems.

Deep Wealth

It could be considered that one of the main outcomes of Metacurrency project is creating Deep Wealth. The Deep Wealth refers to 'design symbol systems to make value visible and also for the

creation of new forms of value' (Ibarra, 2016). Wealth is seen as provisioning for the material needs that every human being has a right to access: food, clean water, health, clothing, shelter, education. It also considers the immaterial level: love, care, free time, art, beauty, acknowledgment, self-development. Synthetically, wealth is seen as 'whatever brings us closer to what is true, good, and beautiful.' (The MetaCurrency Project, n.d.b) and leads to well-being. The concept of Deep Wealth shifts the focus from accumulating wealth (more precisely material wealth) to experiencing wealth through elements such as beautiful surroundings, friendship, capacity of being generous, leisure, travel, family and fun and perhaps, most importantly, deep connection (Brock, 2009)

In the view of Metacurrency there are three forms of wealth: tradable wealth: food, time, energy, services, material resources, etc.; measurable wealth: performance, sustainability, physiological health, quality, etc. and acknowledgeable wealth: fun, love, care, trust, beauty etc. Each of these three forms of wealth is a subset of the other – e.g. time is tradable wealth as well as measurable and acknowledgeable wealth; together they create integral wealth (The MetaCurrency Project, n.d.b). While tradable wealth could be expressed in money non-tradable forms of wealth should be expressed in a more universal, more encompassing language of flows – explained further. Starting from this concept Metacurrency makes the distinction between money associated with tradable wealth and currencies (spelled current-sees) associated with all type of wealth (including money).

In the view of Metacurrency Deep Wealth 'is the heart of a thrivable future' (The MetaCurrency Project, n.d.a), a future where individuals acknowledge the wealth forms they possess or aim at possessing for achieving a state of well-being.

Currencies (spelled as Current-Sees) and Cryptocurrencies[14]

MetaCurrency seeks to empower communities of all shapes, flavours, and sizes to organize themselves and their flows of resources more effectively. Therefore, instead of one global, anonymous, digital cash it proposes a rich ecosystem of interoperable currencies, possibly more resilient than the global digital cash[15].

In Metacurrency view currencies have a broader dimension than the three functions ascribed to them by the textbooks – unit of account medium of exchange and store of value. Matacurrency sees currencies as the tools that shape, enable, and measure flows of resources and value. From this perspective Matacurrency aims at identifying the patterns, principles, and protocols that would allow currencies to assist in sharing, measuring and enabling these flows (The MetaCurrency Project, n.d.b).

[14] The spelling of currency as current-sees is inspired by the common Latin origin of "currency" and "current" – the verb, currere, 'to run'. This parallel is made to emphasis the role of currencies to run, to circulate, to flow, feed and nurture the same as currents in a sea or blood in an organism. (The MetaCurrency Project, n.d.a)

[15] The benefits of a rich ecosystem of currencies has been described by Bernard Lietaer in his book 'The Future Of Money', 2012 and further emphasis by European Commission imitative SPREAD (https://www.sustainable-lifestyles.eu/)

Metacurrency considers that monetary and non-monetary value-metrics and reputation systems are interoperable and coexisting currencies that could run on the same architecture (Brock and Harris-Braun, 2018a). In this context non-monetary metrics refer to values other than money or material wealth – e.g. values such as trust, connectivity, reputation, data used for applications, measurements, feedback, sensors, identity, etc. These non-monetary metrics do not have to be stored in a synchronized global ledger and protect the anonymity of users, although it may. They do not have to be cryptographic tokens or coins and should not be needed system wide consensus for two people to do a transaction using these metrics (Brock and Harris-Braun, 2018a).

As a currency design principle Metacurrency uses mutual credit. Metcurrency's mutual credit cryptocurrency system is inspired by the Hawala[16]. In Hawala a new member of the network needs to be vouched by several already established members of the network. They will also decide the credit limit and time for payment. In case of fraud – go over the credit set, have overdue payments, etc. - the transaction is flagged, a warning is issued, and the fraudulent party is not able to transact with any other party in the network until the incident is cleared.

The mutual credit uses double accounting principles where units of currency are issued when a participant extends credit to another user in a standard spending transaction. Every credit has an offsetting debit. When two people settle a transaction they only need to audit their counterpart's account balance than one party's balance goes up and the other party's balance goes down, in equal measure. There is no need for permission nor consensus from anyone who is not a party to the transaction. (Harris-Braun, E, 2018). The double accounting principles could be illustrated as this: Anne buys a service from Bill. She could pay him EUR 10 immediately or in 30 days; she chooses to pay in 30 days. In this case the system records that Anne has a credit of EUR 10 (or she has to give Bill EUR 10) while Bill has a debit of EUR 10 (he expects to receive EUR 10 from Anne). If Anne has a credit limit higher than EUR 10 she could buy more things within the system. Moreover, Bill could purchase goods and services of EUR 10 (the money he expects from Anne) + his own credit limit – say, EUR 10. After 30 days EUR 10 are transferred from Anne account to Bill's and the debit and credit between Anne and Bill are cancelled. The delay in payment is what creates money and allows goods and services to circulate (Appendix 3 presents an anecdote illustrative of how credit creates liquidity and allows goods and services to circulate).

Since all valid transactions are double-entry accounting entries, Holo's internal crypto-accounting functions just like a balance sheet where every transaction keeps the sheet in balance – total credits equal total debits, every credit has an offsetting debit. This system does not require issuance of crypto coins or cryptographic validation of transactions (mining) (Harris-Braun et al., 2018).

[16] Hawala is a network of merchants and businessmen, which has been operating since the middle ages, performing money transfers on an honour system and typically settling balances through merchandise instead of transferring money (Brock and Harris-Braun, 2018a).

The double accounting and Hawala mutual credit system are a transitioning phases from the use of monetary metrics and fiat money to the use of currencies as current-sees – e.g. enablers of flows. They aim to facilitate the creation of Holochain and Holo ecosystem[17] that will provide the foundation for a crypto-economy.

Living Systems

The design of Metacurrency's proposals is done using the same organizational patterns as living systems. By 'living systems' it is comprised Earth's biotope but also atoms, languages and other continuously transforming systems. They are the source of inspiration for governance, where governance is seen as the methods of self-regulation that provide the coherence and continuity of the system.

In this context currencies are seen as 'current-sees', like currents in a fluid that bring change, nourish and nurture, make and change shapes and landscapes and have the potential of equally create and destroy. Holochain protocols, codes, algorithms and architecture design is inspired by cells' receptors, neurons functioning and how atoms and electrons interact. Holochain ecosystem is designed to use fractal computing receptors and self-describing protocols that enable information to flow in new distributed patterns of coherence similar with those encountered in nature, in particles or in the functioning of the universe.

CORE THEME

The core themes of Metacurrency projects are connectivity and quantum leap.

Connectivity

Connectivity is the centre of Metacurrency main value proposition. Its platform Holochain, aims at facilitating interconnectivity among direct and indirect participants on the platform - those who installed Holochain on their devices and provide hosting space and those who access Holochain through a web browser. Additionally, Holochain, aims at facilitating interconnectivity among all applications it hosts; Ceptr, Holochain's protocol, function as a receptor that scans data shared on Holochain network and collects the information that is relevant for each app hence, allowing apps to connect to other apps. For achieving this purpose Metacurrency uses receptors that are 'lightweight virtual machine[18], which can run processes, manage its state, and most importantly RECEIVE (and send) signals.' (Ceptr. (n.d.g)

[17] Holo Ecosystem includes Holochain members as well as the end users that connect to Holochain through a web browser

[18] A virtual machine is an efficient, isolated duplicate of a real commuter machine (Popek and Goldberg, 1974). Current use includes virtual machines that have no direct correspondence to any real hardware.

Quantum Leap

In the context of Metacurrency the concept of quantum leap refers to the transition from the industrial society collective social organisms – e.g. corporations, institutions and governments to the information society. This translates into the 'quantum leap' from a society with a focus on industrial production to a society where information technology plays the major role and fosters creation of large-scale collective intelligence. For facilitating this quantum leap Metacurrency proposes 'the same kind of architectures of intelligence that makes it possible for trillions of cells to work together in an organism.' Within this architecture 'communication is virtually instantaneous (electronic), peered, decentralized, semantic and designed to evolve in response to rapidly changing needs' (Harris-Braun and all, 2018). Such communication parameters lead to effective, large scale, decentralized collaboration that would remove 'most of the power structures that underpin the social barriers to change and could make formerly intractable problems (such as climate change, species extinction, resource depletion, or poverty) quite readily solvable.' (Harris-Braun and all, 2018).

PRODUCTS/ PROPOSITION

Metacurrency's main propositions are the following projects: Source Tree Commons, Deep Wealth Workshop Currencies and Design Principles for your Community, Agile Learning Centers, Emerging Leader Labs Wealth Stewardship and Ceptr. On its turn Ceptr has a number of subprojects, respectively: Protocol for Pluggable Protocols, Holochains for Distributed Data, Sovereign Accountable Commons, Neural Internetworking and Ceptr Core.

1. Source Tree Commons is an open participatory model for governing the Metacurrency's ecosystem that aims to provide a democratic lunch of Ceptr network technology[19]. This model implies that those involved in developing Ceptr network technology will be 'writing code, establishing legal structures, and gathering the framework to start receiving commoners.' (Sourcetreecommons.org, 2018). Source Tree Commons is currently under construction.
2. Deep Wealth Workshop Currencies and Design Principles for your Community aims to identify the mechanisms that would facilitate recognition of multiple value regimes – e.g. material value, social value, ecological value, etc. - design symbol systems to make these value regimes visible and create new forms of value (Ibarra, 2016).
3. Agile Learning Centers (ALS) are an expanding network of micro-schools leveraging agile tools to support self-directed learning reinforced by Agile Management Tools. The Agile Management Tools provide visible feedback, effective self-management, clarity of purpose,

[19] Ceptr network technology refers to the core and extended Metacurrency ecosystem that would emerge using Ceptr protocol. The core ecosystem refers to Holochain participants; the extended ecosystem includes, aside the Holochain participants, those who are accessing Holochain through a web interface – eg. the end users.

and easy integration of new patterns as needs change. The self-directed components allow participants to identify and pursue their own interests. The ALSs would facilitate attendants to identify topics they are interested in and develop a learning program accordingly. ALCs fosters an 'Intentional Culture', respectively an environment where 'children feel they are heard, they belong, and they make a difference.' (Agile Learning Centers, 2017).

4. Emerging Leader Labs (ELL) is a Social Enterprise Incubator operating in the Gift Economy. ELL offer to participants the opportunity to come together in physical spaces, refine their visions, grow their skills and competencies, and gather the resources and support needed to translate their visions into projects. (Emergingleaderlabs.org. 2012).
5. Wealth Stewardship is a new model for generating, investing and sharing wealth; it is the umbrella term for VillageLab's Consulting Team that offers consulting services in project design and development for "communities of intent" through a whole systems design framework that integrates the social, ecological and economic dimensions. This framework is called Regenerative Whole Systems Design. (VillageLab, 2017). VillageLab offers visioning and strategic planning, process and team facilitation, network intelligence and partner strategy services to residential communities, communities of practice and communities of purpose. Residential communities are those co-housing and co-householding intentional communities, social service communities and ecovillages. Communities of practice are transformational learning communities, permaculture design programs, ecovillage design programs, spiritual and indigenous communities. Communities of purpose are transition town initiatives, environmental projects, social justice projects, relocation and disaster relief projects services (VillageLab, 2017).
6. Ceptr - A Next Generation Distributed Operating System. Ceptr is designed by learning from nature's blueprints – e.g. biomimicry. The name Ceptr is the abbreviation for 'receptor' in relation to leaving organisms receptors that facilitate their integration within an ecosystem and connection with the most relevant aspects of that ecosystem – e.g. a bee receptor that allows it to identify only one kind of flower out of dozens or a fish temperature sensor that would indicate where are the highest chances to find food. Ceptr design is inspired by nature's ability to replicate the same processes across all nodes; empower every node with full agency (the ability to execute processes to transform itself); hold this transformed state locally and reliably and establish protocols for interaction (which trigger the shared processes that in turn produce expected transformations) (Brock, 2016).

   Compared to the Blockchain protocol that 'is about managing a consensus about what was "said" Ceptr is about distributing a consensus about how to "speak."'(Harris-Braun et al., 2018) as it is a 'pluggable protocol that let everything talk to everything' (Ceptr, 2018d).

   Ceptr Sub-Projects are: Protocol for Pluggable Protocols, Holochains for Distributed Data, Sovereign Accountable Commons, Neural Internetworking and Ceptr Core (Ceptr, 2018d).

a. Protocol for Pluggable Protocols is the part of the Ceptr project that relates with the protocols code development and writing. These protocols are meant to connect (plug into) all different aspect of the Holochain platform (Ceptr, n.d.a).

b. Holochains for Distributed Data. Holochain is designed as a data integrity engine for distributed applications. It could be compared to a BitTorrent-like distributed hash table (DHT); the BitTorrent protocol allows users access to shards of data from a range of storage devices – e.g. when downloading a file using BitTorrent the protocol finds other storage devices (PCs, servers, etc.) that have that file in storage and start transferring bits of it from all the other storage devices to the one of the users. More PCs are accessed, faster the download goes. A distributed hash table could be seen as a distributed database with the extra future that it is using validation algorithms to certify the origin of the data. This prevents tempering with the data when it moves from one computer to other (GitHub, n.d.).

c. Holo is a broad term that encompasses 1) the organization acting as infrastructure provider - e.g. facilitate end users access to decentralized apps hosted on Holochain platform by just typing in a URL, 2) the technology created to enable shared hosting on top of Holochain – hosting could be provided by the storage devices of users; also, as part of IndiGoGo fundraising campaign, Metacurrency provides hosting 'boots' for those interested 3) the primary reserve account for the Holo Ecosystem, 4) the crypto-credit used to purchase hosting in the shared Holo Ecosystem – also referred as Holo fuel. (Harris-Braun et al., 2018).

   Holo Ecosystem (see Appendix 4 - Overview of Holo Ecosystem) is intended to be scalable, secure, and stable enough to be the foundation for a new crypto-economy (Harris-Braun et al., 2018).

   Holo's most significant function is to provide access to Holochain platform through a web based interface. Holo's role is to enable and manage the access to the services provided by the Holochain from a large variety of devices (mobile phone, etc.) through a web based interface. This is realized by using cloud computing.

d. Sovereign Accountable Commons (SAC) have some similarities with Decentralized Autonomous Organizations (DAO)[20] on Ethereum. The term Sovereign refers to the fact that SAC runs as a collectively distributed application. The accountability of these organizations is given by the fact that every contribution, communication, or action is signed by its initiator hence, leaving a trail of own actions. The term

[20] A decentralized autonomous organization, or just DAO, is a business or organization whose decisions are made electronically by a written computer code or through the vote of its members. In essence it is a system of hard coded rules that define which actions an organization will take. (Medium, 2018c)

'commons' refers to the fact that all data and assets shared into the SAC are held in common – this implies common ownership of intangible assets within the ecosystem.

e. Neural Internetworking is the design concept used to power Ceptr. It is inspired by how neurons connect, communicate and collaborate with each other. The 'neural internetworking' is mimicking the neural system and is creating synaptic patterns of learning neural networks – e.g. developing protocols and algorithms that recognize humans learning and reasoning patterns and adapt accordingly in order to facilitate the 'human – machine' interaction. This would concretize into applications that receive relevant data when changes happen elsewhere on the network without needing to send a constant stream of requests – e.g. self informing and self actualizing apps where the interwoven data dependencies are automatically generated, without human intervention.

f. Ceptr Core – is the code writing project within the Ceptr. Inspired by the 'same kind of architectures of intelligence that makes it possible for trillions of cells to work together in an organism.' (Ceptr, n.d.g). Ceptr Core 'implements a Grammatic Capacity robust enough to be a "language" for expressing new forms of social organizations at scale.' (Ceptr, n.d.g). By Grammatic Capacity it is meant the informational infrastructure that appears concomitantly with new complex adaptive systems, as well as fundamental changes within those systems. Metacurrency makes a parallel between these systems and human society assumes that a new Grammatic Capacity could catalyze the fundamental change required by our society.

OPERATIONALIZATION

Metacurrency issued its own cryptocurrency – Holo Fuel - with the aim of facilitating transition from a semi-centralized system - Holo - to a completely decentralized system - Holochain. Holo Fuel is meant to cover the costs for data storage and Holochain development and maintenance. Holo Fuel is not a crypto-token or cryptocoin, but a mutual credit issued within a double accounting system where one party holds a debit (the provider of goods and services) and the other party holds a credit (a debt to the provider of goods and services).

On Holochain every transaction is countersigned on the local chains of both counterparties. This is the reason why Holo Fuel could be purchased as a token or receive as a credit. Metacurrency issuance of own cryptocurrency is done either by exchange of money or other cyrptocurrency into Holo Fuel or by setting credit limits – Holo Fuel to be paid to a later moment. The exchange of money and cryptocurrencies into Holo Fuel and the allocation of credit limits is done through the 'Reserve Accounts' – a facility provided by Holo (Harris-Braun et al., 2018). The difference between Holo Fuel and other Cyrptocurrency is presented in Appendix 4.

App providers and End-users can publish respectively, use the apps on Holochain either for free or pay for it with Holo purchased against money or cryptocurrencies or received for their hosting[21] services. Holochain could be used for free if 1) the hosts of the apps (for App providers) or the app providers (in the case of End-users) do not require any payment, 2) the App providers and End-users provide enough hosting space on their devices so they always receive more Holo than spend.

The Holo Fuel earned by hosts could be redeemed in crypto or national currency through the Reserve Account. The provision of hosting and the Holo Fuel earned by hosts is confirmed by auditing hosts' Proof-of-Service entries and transaction histories. Any user of Holo or Holochain could provide hosting services; once they do so they can also have credit limits. After three months of hosting hosts receive credit limits proportional to their revenue. Hosts have the freedom to set the hosting price or allow to be set automatically by the system; they can also host for free. Hosts can also configure their app selection preferences and provide hosting services function of age, accumulation of unpaid invoices or other criteria. This agent centric approach allows human interaction within the system.

The Infrastructure Providers[22] acquires credits (receive Holo Fuel or credit limits) through fees; these fees are no more than 1% taken from all Holo transactions.

The value of Holo Fuel is backed by the computing power of the ecosystem and it is priced in computing units: processing time, bandwidth, and storage. Therefore, more hosts come online and share computing power more valuable the network becomes hence, giving Holo more purchasing power (Harris-Braun et al., 2018).

To finance further development of Holo and Holochain Metacurrency has conducted a crowdfunding campaign in IndiGoGO, a private sale and an Initial Community Offering (ICO). The proceeds are meant to fund the manufacture of hardware nodes required for hosting and processing data on Holo network. Holo provided these devices and offer training for building Holochain applications (through hackathons) and the necessary hardware to run the Holochain. The private sale of non-transferable (before the lunch of Holo) hosting credits targets primarily team members, friends, family, and Holo users who have already established themselves as application developers or Holo hosts. These sales are limited to $1M. Also, qualified investors will have access to a limited pre-purchase of hosting credits. They will receive a non-transferable digital receipt for their purchase, which will be credited to their account when Holo launches.

The ICO — Initial Community Offering is the pre-sale of Holo hosting credits in the form of transferable ERC20 tokens on the Ethereum public blockchain. Investors were able to buy the equivalent of €2.5M in transferable ERC20 tokens on the Ethereum public blockchain. When the

[21] Estimated 2017 revenue for cloud hosting is $264 billion dollars (Harris-Braun et al., 2018)

[22] The Infrastructure Provider represent The Holo organization that runs the Holo Application Delivery Network and also runs the asset-backed, mutual-credit currency and manages value flows between various parties (including allowing Hosts to convert Holo fuel to other currencies). (Harris-Braun et al., 2018)

Holo network goes live, these tokens can be exchanged for the corresponding credit balance on the Holo network and destroyed upon exchange.

Remark

Metacurrency vision on how Holochain platform works respectively, the role of Ceptr algorithm could be compared with Kuhn's (1974) theory about how information is sensed, and changes are effected in response to the information by the detector, selector, and effector functions of the system[23].

[23] The detector is concerned with the communication of information between systems. The selector is defined by the rules that the system uses to make decisions, and the effector is the means by which transactions are made between systems. (Walonick, 1993)

ECSA – ECONOMIC SPACE AGENCY

INTRODUCTION

'The Economic Space Agency is a distributed and decentralized research and development organization with satellites in Oakland, Berlin, Helsinki, Lisbon, Montreal, and New York City.' (economicspace.agency, 2018). The distributed and decentralized dimension of ECSA is supported by its operational proposal: an online platform with a distributed ledger technology architecture. This platform facilitates the creation of an ecosystem of lucrative and non-lucrative (for profit and non for profit) initiatives and their funding and further cooperation, collaboration and co-creation. These initiatives taken apart or as interconnected entities and networks resulting from their interaction are what ECSA calls 'economic spaces - flexible, modular little DAOs'. (Medium, 2018c). By connecting all these initiatives through the use of smart contracts[24] ECSA aims to open the possibility of a decentralized, open source, programmable economy that considers a multitude of value regimes – e.g. money, other material possessions, trust, knowledge, commitment, etc. The concept of open source economic space is rooted in the concept of open source software development that encourages peer production; the open source software means that the source code is made available with a license in which the copyright holder provides the rights to study, change, and distribute the software to anyone and for any purpose (St. Laurent, 2008). In the case of open source economic spaces the source code is replaced by the design and codes of smart contracts.

An individual or group of individuals who have an initiative could post it on ECSA platform; these initiatives range from a start up business, social or environmental projects, political initiatives, etc. Other interested parties could join it. ECSA platform would provide the templates that frame their collaboration – something that could be seen similar to the legal templates provided to frame contractual relations. These templates are meant to facilitate the collaboration between parties joining an initiative, between different initiatives and between initiatives and third parties. The third parties are the actors external to the ECSA such as suppliers, public administration, etc. These templates also provide the framework for the valuation process respectively the conversion on ECSA self-issued currency called DPOs (the short version from cDPOs - commons-oriented decentralized programmed organizations) to different value regimes. These value regimes could be seen as value brought by participants in order to start, continue or develop an initiative and value emerging as result of the success of such initiative. The value regimes ECSA considers are both material and immaterial; in many aspects the material and immaterial value can be compared with the notion of tangible and

[24] smart contracts are self executing protocols embedded into a blockchain transaction. In the ECSA context the use of smart contract leads to a programmable economy in the sense that the interaction among participants on the platform can be 'programmed', respectively supported by the use of smart contracts; currently the only distributed ledger technology that allows creation of smart contract is the Etherum blockchain

intangible assets. From a textbook perspective tangible assets are assets such land, real estate, money, long-term investments, equipment whereas intangible assets are brands, patents, goodwill, list of clients, know how, etc. (Brealey, Myers and Allen, 2008; Kieso et al., 2012). ECSA associates material value regimes with assets such as money, goods, equipment, etc.; immaterial value regimes are knowledge, reputation, network, services, trust, etc.

In terms of the funding process, the initiatives supported by ECSA are divided on those that require a small amount of assets and those requiring a high amount of assets. For initiatives that require a small amount of assets those who join would pool their tangible and intangible assets into the initiative. The value they attribute to their contribution would be converted into ECSA tokens (DPOs). These tokens would represent their stakeholdership on that initiative; those who join the initiative are also directly involved in making it up and running. They will keep these tokens to be used in future transactions within the ecosystem. For initiatives that require a high amount of assets those who are interested to join would pool their tangible and intangible assets into an escrow pool (similar to an escrow account[25]) hosted by the ECSA platform. It could be assumed that the escrow pool is *de facto* a digital distributed ledger hosted by ECSA platform. Those who join these initiatives could be directly involved in making the initiatives up and running; also, third parties such as investors, speculators, etc. are welcome to contribute. The value those attribute to their contribution would be converted into ECSA tokens (DPOs). These tokens would represent their stakeholdership on that initiative and they could keep or sell them. The rate of exchange of these tokens into fiat money or other types of currency would change in time function of ECSA ecosystem capacity to thrive, or not. This process could be summarized as it follows: (Fig. 1)

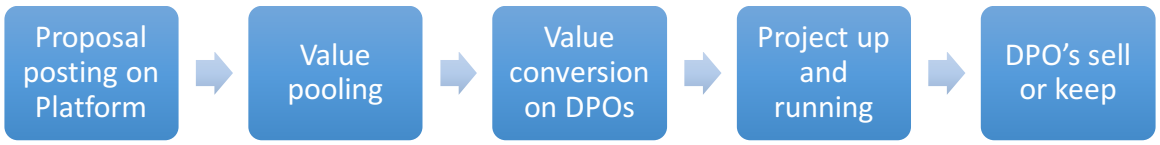


Figure 3 – DPOs tokens cycle

[25] 'Escrow is a legal concept in which a financial instrument or an asset is held by a third party on behalf of two other parties that are in the process of completing a transaction. The funds or assets are held by the escrow agent until it receives the appropriate instructions or until predetermined contractual obligations have been fulfilled. When parties are in the process of completing a transaction, there may come a time when it is only interesting to move forward for one party if it knows with absolute certainty that the other party will be able to fulfill its obligations. This is where the use of escrow comes into play.' (Staff, 2018)

Making a parallel with the market economy the 1st. situation could be seen as bootstrapping whereas the second as venture capital[26]; the stakeholdership acknowledged by the possession of DPO tokens is somehow similar with that of shares in a company. In the 1st situation the focus is on production whereas in the 2nd. situation the focus is both on production and speculation.

The use of a distributed ledger technology allows ECSA platform to function as a channel of advertising for new initiatives and eliminate the 'middle man' in this case institutions such as banks, investment funds, public attorneys and lawyers, fundraisers and advertisers, clearinghouses, etc. On ECSA platform the DPO's, as well as the stakeholdership on a company, can be exchanged for fiat money. The value of DPOs fluctuates on time. Unlike shares DPOs could be exchanged for value regimes other than fiat money – e.g. other digital currencies, know-how, collaboration, etc. - without the need for a preliminary conversion of these value regimes into fiat money. The DPO's, as well as the stakeholdership in a company, have embedded into their design rights and obligations. Unlike shares their bounding effect and accuracy in execution is not guaranteed by third parties such as lawyers and public attorneys but by the architecture of the platform.

[26] 'Venture capital is financing that investors provide to start-up companies and small businesses that are believed to have long-term growth potential. Venture capital generally comes from well-off investors, investment banks and any other financial institutions. However, it does not always take just a monetary form; it can be provided in the form of technical or managerial expertise.' (Staff, 2018)

FORM OF ORGANIZATION

ECSA is an Oakland (US) based start-up Internet company, a spin-of of the Robin Hood Asset Management (for profit cooperative hedge fund, legally registered in Helsinki, Finland)[27] (Money Lab Reader 2, 2018). ECSA defines its team as a group of radical economists, finance theorists, software architects, game designers, artists, lawyers, peer production experts and decentralized application engineers (economicspace.agency, 2018).

PURPOSE

'ECSA platform is a hub (including a company) for developing the application space for the underlying software on post-Blockchain technology and build up cases on the platform.' (Medium, 2018d). This differentiates ECSA from other initiatives that offer either only technical support (e.g. the codes and protocols from code libraries) or the interface that facilitates interaction among its users but does not provide access to platform's 'black box' – e.g. algorithms, codes, data storage, privacy and extraction, targeted advertising and so on (e.g. facebook, google, etc.). ECSA proposes both.

VISION AND MISSION

ECSA vision is 'to open the possibility of a programmable economy with open source economic spaces that allows the design of new systems of value creation and distribution, enabling the users to set the rules for their own economic spaces' (Medium, 2018g).

ECSA defines economic space as 'protocols of economic, financial and social interaction, of value and risk creation, of sharing and distribution of resources' (Medium, 2018g) resulting from projects or initiatives of an individual or group of people. The concept of protocols of economic, financial and social interaction refers to the fact that within these economic spaces participants 'find different ways than the mainstream, monetary value economic paradigm to govern themselves, to belong and interact, to share stakes and ownerships, to recognize and offer value, to open joint opportunities, to risk and speculate together' (Medium, 2018c).

ECSA mission is to transform finance by building up the tools to open source finance for the new economic spaces (initiatives) hosted on its platform (Medium, 2018g). In providing a framework for the tools to open source finance ECSA aims to create the premises for a collective economy, respectively an economic paradigm accessible to everyone in terms of governance. This economic paradigm would be the source of a new generation of non-exploitative financial arrangements (MoneyLab 2 reader, 2018). The tools provided for an open source finance are the templates for the smart contracts that regulate the interaction within ECSA ecosystem and the fundraising mechanisms facilitated by ECSA platform.

[27] Robin Hood Asset Management places the money accumulated in the fund on Wall Street stock exchange (Money Lab Reader 2, 2018)

BACKGROUND

ECSA proposal steams out of three main themes: Economy, Finance and Money.

Economy

ECSA sees economy at large as a game within a network of family resemblance (Medium, 2018g) where the rules agreed upon different actors create new behavioural patterns and tendencies within them. The notion of family resemblance comes in reference to overlapping similarities that connect things (in this case participants on ECSA platform) that would have initially been thought to connect by one essential future (Sluga, 2006). For instance, market economy could also be seen as a game within a network of family resemblance. Even though in a market economy the essential future that would connect the participants is the aim of maximization of self-interest they are also connected through a multitude of ties other than solely maximisation of self-interest – e.g. loyalty, friendship, mutual interests, political views and believes, etc.

In the context of ECSA the mainstream economic paradigm, the neo-liberal paradigm, is seen as dominated by the concept of private ownership. Consequently, value is seen as the payment of salary to workers and the distribution of the share of financial gains (or losses) to shareholders - as dividends and increase (or decrease) on the value of shares. This economic paradigm employs financial tools such as loans, futures - commitments to provide or buy commodities from each other at a certain price and certain date - and other financial tools (Medium, 2018e).

As an alternative to mainstream economic paradigm ECSA proposes a programmable economy in the context of a commons economic paradigm. Within this economic paradigm actors set their own rules of interaction that further become programmable through the use of smart contracts. Also, this economic paradigm displays no private ownership. The commoners who propose and ignite a project will benefit from the support of other members of ECSA ecosystem in money, know-how, emotional support, network, sharing of assets, etc. Through its DLT platform ECSA will provide the financial tools to make this support possible. From the materials published by ECSA at date it could be inferred that these financial tools are the smart contract templates that acknowledge, regulate, monitor and execute agreements among the participants on ECSA platform. One of this financial tools could be seen the possibility given to participants on ECSA platform to estimate the value of their contribution (financial, emotional, social, etc.) and convert it on ECSA internal currency (DPOs).

This programmable economy in the context of a commons economic paradigm aims to give the possibility to the commons-oriented production to incorporate a vision/ideal of the commons to be produced/contributed (commons here being seen as co-creation and co-production within a cooperative

ownership structure). Regardless if the outcomes of common-oriented production have a lucrative or non-lucrative purpose the value generated (material and immaterial value) would accumulate into the common escrow account hence, increasing the value of DPOs and the resilience of ECSA ecosystem. This accumulation of value will also increase DPO's liquidity; in the context of ECSA liquidity is seen DPO's convertibility into other cryptocurrencies or fiat money.

The use of DLT architecture for the ECSA platform will provide the possibility of creating new forms of organization specific to a programmable economy in the context of a commons economic paradigm. They are called cDPOs - commons-oriented decentralized programmed organizations and are hierarchically horizontal organization with a decentralized business model, respectively a platform-based business model (without a central network operator as in the case of centralized platform business models such Amazon, AliBaba, etc.). These organizations would support the common-oriented production and would provide the frameworks to bootstrap, develop and sustain commons projects. (Medium, 2018f).

Finance

In the context of ECSA finance is seen as an ally of the elites, those who have substantial power to shape its tools and mechanisms in their favour. Individuals, start-ups or small and medium size companies do not have the negotiation power that allows them to have a substantial saying into the design of the financial products they buy, the terms of the incentives they provide and the value regimes they support[28]. Thus, ECSA considers that finance should be reinvented as a collective practice of crafting futures and rethinking value and should emphasize decentralization, disintermediation and interoperability. For this purpose, it should be approached with a 'hacker attitude and a poetics of experimentation' (Medium, 2018g). In this context decentralization refers to the idea that there should be no central authority like the state or public – private entities such as central banks, reserve funds, etc. interfering into the financial relations among parties. The disintermediation implies that those involved in supporting an initiative shouldn't need the intermediary of institutions such as banks, investment funds and such. The interoperability refers to the situation in which finance should foster the possibility of different initiatives to create the relationships they found more effective to interrelate without externally imposed rules and regulations.

Money

In the context of ECSA money is seen not as 'an artificial (and potentially creative) medium - precisely, a technology, a technical object of social design, that is, something that can and needs to be re-engineered to serve our collective aspirations' (Medium, 2018f). ECSA proposes as re-engineered

[28] The subjectivity of value regimes could be illustrated in the context of SRI (Socially Responsible Investment) by a situation where social, confessional, historic or other value regimes would forbid, for instance, investments in companies producing spirits but would raise no objections to companies producing weapons of mass destruction.

money the own issued cryptocurrency, the DPOs tokens (Medium, 2018g). DPOs carry the traditional functions of a currency (unit of account, means of transfer, storage of value) but also have a decentralized value assignment (as it will be further explained). The DPOs tokens could also have carry smart contracts in their code hence, contributing to the creation of a programmable economy.

CORE THEME

ECSA core theme is the transition from a centralized governance and issuance of value (mono-value regimes – e.g. fiat currency) to a decentralized governance and issuance of value. In the context of ECSA value refers to use/access rights, voting/curating rights, liquidity (which in financial terms would translate as DPO's increase in the conversion rate against other crypto currencies or fiat money); these value regimes are considered socially and financially liquid. (Medium, 2018f).

The concept of centralized governance and issuance of value and the mono-value regimes refer to the 'paradigm of the industrial farm' where value is mostly seen in relation to money that is issued and governed by a central authority (Medium, 2018g) such as the state through public, private-public or private financial institutions. These central authorities manipulate the value of money through mechanisms such as minimum interest rate, exchange rates, laws, rules and regulation, etc.

The decentralized governance and issuance of value and the multi-value regimes refers to value self-issuance and value self-governance (Medium, 2018g) respectively, the possibility of any agent (in the case of ECSA platform individual or group of people proposing an initiative or project) to issue value by assigning a subjective value to their offering and propose it to other agents. This value issuance and proposition could be converted and express as DPOs. The value assigned to their offering would be further adjusted on case-by-case bases. DPOs could be converted into crypto and fiat currencies as well as into use/access rights, voting/curating rights, liquidity the value proposition contains, governance proposition. From this point of view DPOs can be compared with shares in a company – they have a monetary value that fluctuates function of the performance of the company; they can also have ascribed broad range of functions and agreements decided among parties on case-by-case bases – e.g. voting rights, veto right, level of decision rights, perks and privileges, etc.

PRODUCTS/ PROPOSITION

The main products proposed by ECSA are Gravity and Space. Gravity is a protocols creation tool that enables the creation of smart contracts with a set of ready-made organizational-financial templates. Space is the portal/interface between ECSA online platform and its users. Space portal/interface is designed as an easily usable launch pad for 'rapid creation, deployment, sharing, customizing, copying and remixing of modular, interoperable and self-governing economic spaces' (Medium, 2018c) meant

to facilitate the creation of an open sourcing finance[29]. It could be inferred that Gravity allows open access to the codes that facilitate the creation of smart contracts and that can be customised according to the needs and requirements of all parties involved.

STAGE

At the date of writing (March, 2018) the sources checked indicated that the products and services offered by ECSA are in the stage of pilot (in development).

OPERATIONALIZATION

ECSA Blockchain architecture platform is powered by Agoric, an Ethereum based protocol. Agoric has been developed in 1988, the year after the 1987 financial crash often attributed to program trading[30], and was meant to optimize computer memory storage space, processor response time 'in ways that enable both conventional computation and market-based decision making'(Miller and all, 1988). ECSA CTO (chief technical officer) and the Agoric lead developer have architected Agoric into a 'fully-fledged protocol and open collaborative smart contract ecosystem creation tool, with a wide array of possible uses but also with financial and economic applications as a focus area' (Library.ecsa.io, 2018).

Agoric tokens are ECSA self-issued cryptocurrency meant to be used for paying platform's maintenance expenses (hosting, running, block validation, administration, etc.). The only way to acquire Agoric tokens is by contributing to Agoric development (Medium, 2018d). Over the sources reviewed there are not further details explaining how the Agoric token will be minted and distributed; however, ECSA suggests they are similar with the Gas[31] (Medium, 2018d) therefore it could be inferred that the same mechanism applies.

Aside Agoric tokens ECSA proposes an ICO (Initial Coin Offering) in the form of DPO tokens. The DPO would be issued by p2p network or institutions affiliated to ECSA platform, would be tradable,

[29] Making a parallel with the open source software the open sourcing finance could be seen as a financial system where every player has free and universal access to the codes and the protocols that enable the creation and circulation of the smart contracts and are the building blocks of the system. This would further enable communities and individuals to make their own offers, issue their own programmable tokens and set their own value systems (Medium, 2018c).

[30] 'program trading is trading on international stock exchanges using a computer program to exploit differences between stock index futures and actual share prices on world equity markets (program trading. (n.d.).' (Dictionary.com, 2018)

[31] Gas - Etherum internal cryptocurrency is designed to cover the costs required by miners to validate transactions and for Etherum Blockchain infrastructure and maintenance. Gas can be converted into Etherum tokens (Ether) a cryptocurrency that can be further traded and speculated against other cryptocurencies or money. Both Gas and Ether are fiat cryptocurencies (issued 'out of nowhere' (fiat) through the use of an algorithms similarly to fiat currencies such as euro, dollars, etc. The difference in terms of issuance between Gas and Ether and fiat currencies is that they are issued on a decentralized network while the fiat currencies are issued by a centralized authority.

can be used to pay for the services on the platform (convertible into Agoric tokens) and can be convertible into fiat money or other value regimes. As DPO's are backed by the success of the launched economic spaces, and only by this, their exchange rate (rate of conversion) depends on the value created and accumulated within the ECSA ecosystem – e.g. the DPOs appreciate (increase in value) as the economic relations in ECSA ecosystem flourish. DPO's liquidity and tradability (internal and external to economic space) is determined case-by-case – e.g. according to value assigned by participants in a project to their material or immaterial contribution, 3rd. parties recognition of an economic space proposition, market as large recognition of ECSA ecosystem value[32], etc. (Medium, 2018f).

ECSA proposes two mechanisms for launching economic spaces and creating a networked ecosystem: Emerging valuation (production) and Pre-issuance of value (bootstrapping) (Medium, 2018f).

Emerging valuation (production) is meant for projects that need no initial assets**.** It could be assumed that this refers to small amount of assets or project that could be initiated only by using intangible assets such as know how, lists of clients, ideas, knowledge, etc. This is closer to the general meaning of bootstrapping respectively, initiating a start-up or starting a project solely on tangible and intangible assets brought by the founding members. The participants on a such imitative could ascribe a certain value to their contribution and convert it on DPO's - 'tokens are issued to peers participating in production and could be kept by those' (Medium, 2018f).

Pre-issuance of value (bootstrapping) refers to projects that need a significant amount of assets to get the organization up and running. In ECSA context, bootstrapping also include practices similar with venture capital finance as it opens the possibility to attract external investors who would be involved only financially and not operationally. Therefore, the bootstrapping network can consist of speculators, developers and other agents who see value in the operational organization; bootstrappers are people who want to enable the production based on its value promise and gain liquidity for some or all of the investments in the future. They would pool resources on an escrow pool, these resources would be converted on case-by-case valuation into DPO tokens that could be sold or kept.

The liquidity (or conversion on monetary metrics – e.g euro, dollars, cryptocurrencies, etc.) of DPO's relates to the value attributed or perceived for the common liquidity pool that is shared among all token holders (e.g. the common escrow account for all initiatives supported by ECSA online platform). The liquidity of DPO tokens is also fluctuating function of the amount of fiat money generated by 3rd. party commercial use or remixing of the project's results – e.g. money received by those starting an initiative on ECSA platform for selling their offer outside the platform. Another parameter that influences the liquidity of DPO tokens is the exchange rate (value perceived) by another organization interacting with those supported by ECSA platform – e.g. fiat money, other cryptocurrencies than DPO, other value

[32] The market recognition of ECSA ecosystem value in relation to DPO's liquidity could be seen comparable with market recognition of the economic strength and stability (economic, politic, etc.) of a country; this recognition leads to an appreciation of that country currency against other currencies.

regimes such as knowledge, reputation, etc. external actors of ECSA are ready to exchange for DPOs (Medium, 2018f).

The DPO token could be compared with the shares into a start-up or other type of business initiative as the holders of DPO tokens share stakes (a term that could be inferred represents voting and decision rights) and ownerships; DPO tokens have a value that corresponds to the value of assets of a certain initiative; their value is also related to the market value respectively the value perceived by 3rd parties such as investors, valuators, traders, etc. Their value fluctuates mostly function of 3rd parties' perception; they can be bought and sold (Medium, 2018f).

NOTES

Metacurrency sees commons as 'Resources belonging to or affecting the whole of a community. (Harris-Braun et al., 2018) as well as 'building or sharing resources inside peer groups or communities' (Brock, A. and Harris-Braun, E.,2018c). As an alternative to the platforms with a central corporation in the middle (Uber, Lyft, CouchSurfing.com, AirBnB, Craigslist, Freecycling, etc) Metacurrency proposes Sovereign Accountable Commons (SAC), as a form of organization for the decentralized evolution that enables deployment and use of many currencies as well as of distributed applications that could be launched, hosted, and maintained by their participants. Through the use of DLT SAC would allow authors (contributors, signors, or parties to a transaction) to keep copies of whatever has been published and validated on the platform. (Brock, 2016).

The SAC conflict resolution, negotiation process and other such organization management practices will emerge through the expected standards of behaviour. As the full complement of social agreements cannot be encoded into smart contracts Metacurrency proposes control mechanisms that would detect unexpected or unpredictable cheating and fraud. These mechanisms also propose correctional measures ranging from flagging suspect transactions, cutting the culprits of some privileges (e.g. credit limits) to banning the access to the platform. The conflict resolution will be done algorithmically – e.g. blocking all transactions from a participant that has been flagged – but also on case-by-case bases.

For instance, if a smart contract could not be executed because of lack of funds the system will flag the incident leading to a hold of all transactions of the debtor; however, this will not immediately result into correctional action. The parties involved will have the possibility to identify the causes of the incident and come to a common agreement. If the payment is delayed because, on its turn, the payer didn't receive the necessary funds from a third party – possible from outside the system – his or her credit limit could be extended in common agreement between debtor and creditor. However, if the situation perpetuates the debtor credit limits could be reduced, cancel or he or she could be suspended or banned from using the platform. The DLT architecture allows every action of every participant to be recorded, published and openly accessible to all the members of the system.

This resolution mechanism is seen as an 'immune system' that aims to facilitate better collective intelligence and healthy feedback loops that would enhance people's ability to choose who they trust.

This 'immune system' applies preventively to a number of possible misconducts that could occur. It applies to anti-gaming mechanisms by detecting fake transactions. A participant in the system could generate a high number of transactions (as in the case of testing an app scalability) or transactions with high amounts that would inflate one's credit limit. In order to not generate wasteful, automated, or artificial traffic (to boost one's own or a conspirator's hosting fees) if developers needs to test an app scalability they must do that on Holochain or on a distinct Holo testing network where test nodes

(likely supplied by app providers and developers) agree to provide each other free computing space purely for the purposes of testing their apps for vulnerabilities and scalability. Also, if a user or group of users create fake transactions in order to prof high traffic and benefit for higher credit limits the audit component of Metacurrency 'immune system' will flag them for further resolution. Other conflict resolution mechanism refers to content that it is illegal to be in possession of, consensus attacks, fraudulent high value transaction with low confirmation, network congestion, human errors and others such cases. At the moment of writing the Metacurrency team is aware of such contingencies and that further optimization is required over time. (Harris-Braun et al., 2018).

Unlike on other blockchain platforms where a small group of people can launch a hard fork (which raises questions in regard to the decentralized aspect and governance of these platforms), Metacurrency proposes both pluggable governance[33] for versioning of applications and protocols, as well as individual autonomy to fork to versions of own choosing. In other words, if 'Blockchain was designed for that one app. Holochain is designed for all the others.' (Harris-Braun et al., 2018)

ECSA approach on commons focuses on co-creation, co-production, co-ownership. The organizational construct of economic spaces has a resemblance to cooperative form of organization where the rules and agreement among participants would be tailored made by using the smart contracts templates provided by ECSA.

No information on conflict resolution, negotiation process and other such organization management practices have been found on the sources reviewed

In terms of human dimension ECSA considers that 'Currently, every mechanism of value eventually plugs into a core system that will never value our actual, affective existence—our real values. Yet, from households to cities, from software to trade, *the work and very being of people are what backs the underlying value of finance'* (Medium, 2018g). In ECSA view economy is seen as a game with rules that create behaviours. Therefore, the initiatives that will form the economic spaces on ECSA platform will sett the rules of 'game' and construct the behaviour pattern of how people create and interact with resources, assets, values and their different modes of expression and representation.

One could notice that there is a certain similarity between the Sovereign Accountable Commons and the Economic Spaces (proposed by ECSA). Both intend to facilitate human interaction using digital platform and both intend to facilitate IT to IT (protocols to protocols) interaction within the platform. For the later ECSA proposes smart contracts that 'talk' to other smart contracts; Metacurrency proposes apps that 'talk' to other apps. In the view of both these forms of interaction generate new forms of organization – in the case of ECSA they are called 'economic spaces'; in the case of Metacurrency they are called 'Sovereign Accountable Commons'.

[33] Pluggable governance refers to the option provided by Holo to use any of its versions as long as there is at least one user using one of them.

Considering Zelizer's four elements that could be found in all economic activities applied to the describe ecosystem one could observe that:

1) distinctive social ties: both ecosystems, Metacurrency and ECSA, stress the importance of connectivity among the members of their ecosystems. They emphasis the possibility of creating a virtual space where the ties between participants go beyond the transactional dimension characteristic to market economy.

2) a set of economic transactions: both ecosystems, Metacurrency and ECSA, facilitate economic transactions. ECSA's economic spaces are the result of bootstrapping and venture capital. Metacurrency proposes a hosting platform for interconnected apps that function as a micro-economic system connected to the market economy through Holo. However, both ecosystems stress the importance of adding to the transactional dimension characteristic to market economy new social practices, other value regimes than material wealth, decentralization and autonomy.

3) media for those transactions: both ecosystems propose the use of their own issued cryptocurrency - Metacurrency's the Holo Fuel and ECSA DPO's tokens. However, both ecosystems assign a broader acceptation to these tokens. They are seen not only as a currency but also as a facilitator of interaction and carrier of material as well as other value regimes – trust, reputation, favours, bandwidth, etc.

4) negotiated meanings: the peer validation system proposed by Metacurrency and the fluid governance where actors could agree upon credit limits and payment delays and other forms of interaction also create the space of assigning and negotiating meanings of relations, transactions, and media that facilitate them. The smart contract templates proposed by ECSA leave space for constant negotiation, modification, and contestation of value and meanings assigned to assets and actions

'Living systems on every scale have governance—methods of self-regulation to manage the coherence and continuity of the system. Also, for steering toward goals or away from dangers.' (Russell, 2018). These forms of governance are both conserving continuity and making progress, being conservative and progressive. In this context progressive refers to the capacity of adapt or die, evolve to improve and thrive whereas conservative refers to maintaining integrity of falling apart respectively, the pattern of self-regulation that establishes feedback loops, dynamic balances, flows which nourish all the parts of whole, so the whole can function (Russell, 2018). Both ecosystems consider the importance of creating new forms of governance adapted to new forms of economy. Metacurrency is inspired by biomimicry – taking models of governance from the living systems and applying them in the context of the forms of organization emerging on its ecosystem. ECSA proposes a rather anarchic form of governance where actors create their own rules and patterns of interaction mediated or steered by the smart contract templates it provides. As both ecosystems are still in the stage of project no data about how this forms of governance could be collected.

APPENDIXES

Appendix 1: comparison between Blockchain and Holochain (Harris-Braun, E., at all, 2018)

	blockchain	Holochain
Hash-chain approach	Data-centric, a single global data set - one shared reality across all nodes.	Agent-centric, allows nodes to act independently, or in tight coordination only with counterparties, and then share independently evolving data realities that come to agreement over time.
Energy Use	Bitcoin consumes more than 0.1% of the world's electricity[3] [4] to power less than 0.0001% of the world's money.	Since no mining is required, no specialized processors[5] are needed, making it feasible to run full nodes on low-power computers or cell phones.
Transaction Volume	Neo currently processes ~1000 transactions per second. Bitcoin and Ethereum considerably less at a handful per second.	Expected to surpass financial exchange backbones like the Visa network which has a max of 56,000 transactions per second.
Scalability	Even ignoring proof-of-work, there are serious scalability limits on synchronizing a global ledger across many nodes.[6]	With a sharded DHT, the transaction load per node gets lighter as the network grows [7] .

Appendix 2: Holo and Holochain delivery roadmap (Harris-Braun, E., at all, 2018)

	Holo	Holochain	Apps
Q1 2018	Crowdfunding campaign and ICO to raise capital for Holo, grow Holo network, and attract initial developers..	More Alpha 0 releases First Alpha 1 release. New Features: publishing headers, transaction bundling, better debugging, gossip refactor, application bridging, performance benchmarking, upgrade error handling	Refactor Core Service Apps: Anchors, DPKI, Personas. Holodex,App Store. Enhance Demo Apps: Clutter, HoloChat, Coin Toss, Wiki, Chess, DAO/voting
Q2 2018	Holo Alpha software testing release to Indiegogo early adopters.	Alpha 2 including new dev API Refactor in Rust & Web Assembly pluggable governance.	Integrate pluggable governance for easier app updates
Q3 2018	Indiegogo HoloPort boxes shipped to hosts. First test transaction on Holo using Holo fuel. Reaching 2000 hosts.	Alpha 3 includes security audit and the ability to adjust DHT parameters and behavior.	Core app services available: - Holochain Directory (as pkg mgr) - DPKI & Identity Services - Holochain Index - Smart Caching.
Q4 2018	100M test transactions per hour on Holo using Holo fuel. Test net of Holo running on 10,000 host device.	Holochain Beta Release. Commitment to backward compatibility and more security audits.	Holochain App Store / Package Manager is live 50+ Holochain based applications that have been created to date. Partnerships established for other asset-backed currencies (energy, food, housing, etc.).
Q1 2019	Holo running on 20,000 host devices. Number of Holochain nodes has surpassed number of bitcoin nodes. Approaching production level sophistication.	Peer-to-Peer applications on Holochain reach 50 apps and 10,000 users (with apps that don't require paid hosting to smooth out imbalanced production/consumption). Approaching production level sophistication.	Replacement for gmail / gdocs / collaboration tools app available as beta on Holochain.

Appendix 3

'It is a slow day in the small Saskatchewan town of Pumphandle, and streets are deserted. Times are tough, everybody is in debt, and everybody is living on credit. A tourist visiting the area drives through town, stops at the motel, and lays a $100 bill on the desk saying he wants to inspect the rooms upstairs to pick one for the night. As soon as he walks upstairs, the motel owner grabs the bill and runs next door to pay his debt to the butcher.

The butcher takes the $100 and runs down the street to retire his debt to the pig farmer. The pig farmer takes the $100 and heads off to pay his bill to his supplier, the Co-op. The guy at the Co-op takes the $100 and runs to pay his debt to the local prostitute, who has also been facing hard times and has had to offer her "services" on credit.

The hooker rushes to the hotel and pays off her room bill with the hotel owner. The hotel proprietor then places the $100 back on the counter so the traveller will not suspect anything. At that moment, the traveller comes down the stairs, states that the rooms are not satisfactory, picks up the $100 bill, and leaves.

No one produced anything. No one earned anything. However, the whole town is now out of debt and looking to the future with a lot more optimism.

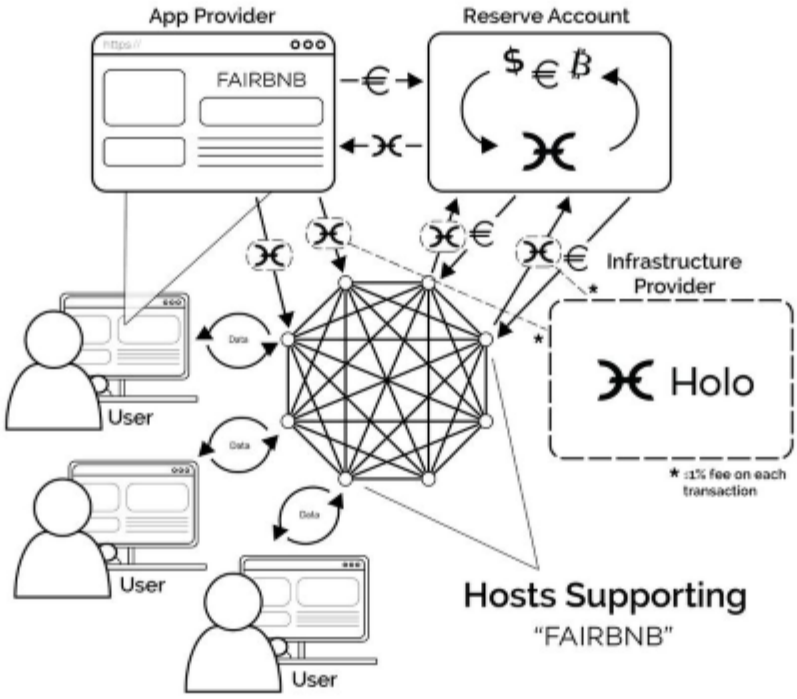
This amusing anecdote, circulated around the Internet, illustrates the effects of a stimulus package. Apparently, the first iteration appeared during the Great Depression, when local stamp scrip currencies were created to address the crisis. In the earlier version, the kicker is when the salesman who deposited the $100 note on the desk picks it up and lights his cigar with it.

"Counterfeit," he said. "A fake gift from a crazy friend."

So, what is money? What makes it real? Or perhaps more important, what makes it legal?

Despite its paramount role in our lives, ordinary people and experts alike seldom question or think about what money really is, which suggests that a deep collective blindness is at work.' (Dunne, J and Lietaer, B., 2012)

Appendix 4 - Overview of Holo Ecosystem (Harris-Braun, E., at all, 2018)



Appendix 5 - The difference between Holo Fuel and other Cyrptocurrency (Harris-Braun, E., at all, 2018)

	Crypto-coins	Holo's Fuel
Issuance method	Fiat (by randomized authority from Proof-of-Work or Proof-of-Stake)	Mutual credit. Never created from nothing — always an offsetting debit for any credit
Shared "Ledger"	A Single Global Blockchain	Sharded Validating DHT
Value	Fluctuating (not asset-backed)	Stable (asset-backed)
Ontology	Data-Centric: requires consensus typically achieved by Inefficient proof-of-work or proof-of-stake	Agent-Centric: No consensus required. Mutual counter-audit + randomized validation to build CALM[11] shared DHT

Annex 1: Metacurrency Team

(source https://metacurrency.org/team/)

Arthur Brock - Culture hacker, software architect, and alt.Currency geek who spends too much time on working on things that don't yet exist.

Matthew Schutte - Political Philosopher and privacy advocate that focuses on creating tools and guidance for helping communities (and other organizations) adapt and thrive in a fast changing world.

Jarod Holtz - Marketplace of ideas analyst, tinkerer, relentless seeker of greater global collaboration.

Jean-François Noubel - Expert on collective intelligence, consciousness, and evolution of social organisms. Guide, coach and speaker for global leaders and big companies to become enlightened players in the next integral economy. Living life for the last 5 years 100% in the gift economy.

Eric Harris-Braun - Code monkey, lover of all things meta, grammars, expressions, receptors, current-sees and more.

Ferananda Ibarra - Culture crafting, collective intelligence and new paradigm economics geek in love with experience design and facilitation. Currency designer in the making.

Nicholas Perrin - Media and Communication Analyst, Culture Hacker working towards more equitable interfaces that express our most diverse potentials.

Annex 2: ECSA Team

(source: https://economicspace.agency/team)

ECSA defines its team as a group of radical economists, finance theorists, software architects, game designers, artists, lawyers, peer production experts and decentralized application engineers**.**

Akseli Virtanen CEO. PhD, Political economist and finance theorist.

Tere Vaden COO. PhD, Distributed social architectures specialist.

Pekko Koskinen CPO. Game and interaction strategist.

Jorge Lopez CTO. Software architect.

Vienna Rae Looi Operations, Finance & Engagement Lead. Network catalyst.

Alpen Sheth CSO. Risk management, PhD candidate at MIT.

Duke Jones Gravity Tech Lead. Software engineer of large-scale distributed systems.

Harlan Wood Space Tech Lead. Developer of decentralized systems, trust graphs, 3D visualizations.

James W. Uhlmann Chief of Staff - Crew Chief, Organizational Development, Stewardship, Green Beret.

Zachary Larson Formal Verification R&D.

Alex Alekseyenko Software engineer.

Mark Haferkamp Mathematician.

Fabian Bruder Protocol & algorithm architect.

Ana Fradique Aesthetics Engineer. Artist.

Harri Homi Interaction designer.

Laura Lotti Laura Lotti Economic engineer. PhD, software studies and financial technology.

Skye Bougsty-Marshall Economic engineer. Attorney and activist.

Erik Bordeleau Economic engineer. PhD, Philosophy and cultural theory.

Scott Beibin Technical Advisor, Strategic Director, Communications, ICO Advisor

Joel Mason Economic engineer. PhD candidate at the SenseLab, Concordia University.

George Samman Token architect.

Jay Blas Jacob Cabrera Legal architect. Designer of Distributed Legal Infastructures within traditional and digital space.

Andrew Dunscomb Communications, network catalyst.

Chris Bradicich Communications, engagement, NYC meetup.

Korinna Patelis Communications. An internet pioneer, data analytics obsessive and a communication strategist.

Jonathan Beller Socio-cybernetic Design. Financial Media. Director, Graduate Program in Media Studies, Pratt Institute.

Advisors

// Legal Counsel

Lowell Ness Partner at Perkins Coie LLP. Core member of the Blockchain Technology and Digital Currency industry group.

Thomas Linder HSG, Partner at MME Switzerland, specialist in digital assets, protocol tokens, Blockchain crypto property, token generation events and their regulatory issues.

// Distributed Technologies

Mark S. Miller Computer Scientist. Object capabilities pioneer. Main designer of E, Caja and Dr. SES programming languages. Project Xanadu architect.

Jonas Karlsson PhD, Distributed scalable systems and database implementer. Co-founder of Noisebridge. Google Wave & Megastore core team.

Ian Grigg Financial cryptographer. Inventor of Ricardian Contracts and Triple Entry Accounting.

George Danezis Prof. of Security Engineering, Head of Information Security Group, University College London. Specialist in anonymity, privacy & distributed systems.

// Mediascape

Vinay Gupta Founder, Hexayurt Capital. Inventor of Hexayurt. Resilience guru. Ethereum release coordinator. Dubai Blockchain strategy designer.

Tom Serres Co-Founder of Animal Ventures, Host of Tech on Politics, Founder of Rally.org

David Wachsman Founder of Wachsman PR. Specialist in financial technology and Blockchain communication.

// AI & Algorithms

Ben Goerzel Chief Scientist, Hanson Robotics. Founder, Aidyia. Lead Architect, OpenCOG AI Platform.

Luciana Parisi Director of the Digital Culture Unit, Goldsmiths. Thinker of algorithmic architectures as constituting modes of thought and behavior.

Erin LeDell Founder of DataScientific Inc. and Machine Learning Scientist at H2O.ai

// Financial Technologies

Robert Meister Prof. of Social and Political Thought, Dept. of the History of Consciousness, UCSC. Director, Bruce Initiative on Rethinking Capitalism.

Dick Bryan Prof. of Political Economy, University of Sydney. A key theorist of derivative value form, the author of *Capitalism with Derivatives*.

Robert Wosnitzer Prof. of Management Communication, NYU, Stern. Cultures of finance, credit instruments and derivatives specialist.

Benjamin Lee Prof. of Anthropology, The New School. Anthropologist of volatility and derivatives, author of*Derivatives and Wealth of Societies*.

// Heterodox Economics

Hannah Appel Prof. of Economic Anthropology, UCLA. Member of the Debt Collective. Specialist in economic imagination.

Carlo Vercellone Prof. of Economics, Sorbonne. Leading theorist of cognitive capitalism, immaterial labor and commonfare.

Andrea Fumagalli Prof. of Economics, University of Pavia. Key analyst of Post-Fordist economy. Exec Member, Basic Income Earth Network.

Bill Mauer Anthropologist of Money and Finance. Dean of Social Sciences, UCI; Director of Institute for Money, Technology & Financial Inclusion.

// Network Economy and Post-Capitalism

Douglas Rushkoff Prof. of Digital Economics, CUNY. A leading thinker of distributed economy and digital networks.

Mike Rafferty Prof. Political Economy, RMIT University. Specialist in financial derivatives as organizations. Author of *Capitalism with Derivatives*.

Jonathan Roffe Jonathan Roffe, PhD. University of New South Wales. Specialist in 'money', 'economy', 'memory', 'markets'. Author of *Abstract Market Theory*.

Esko Kilpi Specialist in relational approach to work and open production architectures. Advisory board of the World Bank, Senior adviser at the Finnish Innovation Fund.

// Social logistics

Tiziana Terranova Prof. of Sociology, University of Naples. A key thinker of the effects of info technology on society through concepts such as digital labor and commons.

Brian Massumi

Prof. of Communications, University of Montréal. Philosopher of coming politics and forms of collaboration; key figure of affect theory.

Geert Lovink Director, Institute of Network Cultures, Amsterdam. Open source, digital economy and network culture visionary.

// Art

Goldin&Senneby Financial alchemy, exploring juridical, financial and spatial constructs through notions of the performative and the virtual.

YKON International artistic initiative. Game design, scenario development, experimental education, alternative economies.

Patrick Soderlund Co-founder of IC-98 art group. Designer of new economic affects. Key artists working on the future of social structures.

// Strange Attractors

Rafe Furst Chief Investment Officer, The Crypto Company. Fouder of Internet Sports Network, Expert Insight, Full Tilt Poker and Crowdfunder.

Nicholas Haan Vice President of Impact and Faculty Chair of Global Grand Challenges, Singularity University.

Marina Gorbis Executive Director, Institute for the Future (IFTF). Futurist and social scientist. Political activist.

Erin Manning Prof. of Philosophy, Concordia University. Director of SenseLab. Artist and political philosopher of interaction and movement.

Anthony "Texture" Donofrio Creator of DAS. Ex-Global Director of Community Engagement at Ethereum, Founder of Decent, and Chaos Collider.

Ron Goldshmidt Financial engineer. Ex Wall Street. Trader. Emerging markets. Startups Investor. Founder of Lab 240 Capital.

Bettina Warburg Co-founder Animal Ventures. Producer Tech on Politics. Expert in new forms of governance.

Brett Scott Alternative finance explorer, former derivatives broker, fellow at the Finance Innovation Lab, the author of The Heretic's Guide to Global Finance.

Simone Giacomelli Singularity DAO developer, Founder of Vulpem, Evangelist of novel cryptocurrency models, ICOs and incentive mechanisms.

David Hanson Robotics designer. Founder and CEO of Hanson Robotics

Eve Blossom Founder of WE'VE Built, COO at Future Family. Social Entrepreneur, Design Thinker, Builder of Radically Conscious Businesses.

Dan Hassan Dan Hassan MSc (UK|GUY), is a computer engineer active in autonomous co-operatives over the last decade; in areas of economics, housing, migration & labour.

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