

Decentralization

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A Primer on the New Economy

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Abstract

Out of necessity, humans have engaged in centralized thinking since the emergence of tribal societies and throughout urbanization and the industrial revolution. Emerging decentralized technology transcends traditional economic notions of capitalism versus socialism and inaugurates new forms of economic exchange. The author examines the evolution of decentralized solutions for commerce and society as well as associated opportunities and obstacles.

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I. What is Decentralization?

No two minds will agree on a common definition or scope and scale of decentralization. Most people still see decentralization from the vantage point of centralized systems and hierarchical structures. That is very much understandable. Out of necessity, humans have engaged in centralized thinking since the emergence of tribal societies and throughout urbanization and the industrial revolution. To contrast centralized definitions of decentralization, here are some examples that show what the evolving phenomenon of decentralization is not:

- Terminologically, decentralization is not synonymous with partnership, delegation, de-concentration, disassortative, devolution, circulation
- Decentralization is not the addition of hierarchical levels in a centralized organization
- Decentralization is not just the redistribution of centrally organized authority or redistribution of centrally collected revenue
- Decentralization is not just the delegation of centralized authority to managers on all levels of an organization

Decentralization is a worldwide phenomenon that permeates all industrialized nations and affects most industries. The disruptive effects of decentralization on centralized systems provide powerful examples of the brave new realities that emerge through decentralization. Here are some examples of decentralized systems that have disrupted existing centralized commercial systems:

- Music Industry: Napster, Emule, Limewire, Pandora, Kazaa, Pandora, Spotify
- Telecommunication: Skype
- Advertising: Craigslist

Several historical examples help illustrate the emergence and effect of decentralized systems on parts of society. Take for instance:

- The attempted colonialization of the Apache Tribe
- Alcoholics Anonymous

Decentralized commerce may generically be defined as the global exchange of financial instruments, goods and services via emerging decentralized technologies. Starting with the emergence of the Bitcoin protocol in 2009, the digital asset market is a market for investment opportunities in virtual assets. Stock is not inherently digital as it has strong ties to the real world. By contrast, Bitcoin is a purely digital asset because it only exists in the virtual world. Narrowly construed, digital assets are instantiated through computer code and depend on so-called "consensus computer algorithms" to trigger and validate a transaction in a given digital asset. Broadly construed, digital assets can include video games in the broadest sense and items sold in video games can be digital assets without a consensus algorithm that validates the transaction or provides a level of security.

Existing decentralized systems display several core commonalities that affect commerce and society. For instance, decentralized systems do not have a central intelligence or leadership system with traditional hierarchies. Instead, the intelligence is spread throughout the system. Information and knowledge naturally filter in at the edges of the system, closer to where the action is and where most real-time information is created. Decentralized systems can also very easily mutate and change because the information flow is optimized through dynamic feedback effects. As a result, such systems become more attack resistant on multiple levels. In turn, the ability to mutate quickly allows the decentralized systems to grow incredibly quickly. For example, for hundreds of years people turned to experts to combat alcoholism and then AA became the accepted prevailing way to dig oneself out of alcoholism within a very short time period. Similarly, Skype offered free phone services at minimal cost and forced the telecommunications industry to reconsider its business models.

II. Types of Decentralization

Decentralized systems are constantly morphing and evolving with new features. The resulting diversity of facets of decentralization make categorization difficult. Yet, decentralization manifests itself through several applications that affect each other. Such

applications can be categorized by core commonalities and interoperative feedback effects. The resulting four general types of decentralization are:

1. Technological Decentralization
2. Organizational Decentralization
3. Market Decentralization
4. Societal Decentralization

These four types of decentralization are each subject to iterative decentralization processes and affect each other by way of feedback effects. As one type proliferates, the other types are slowly but increasingly affected, leading to changes that, in turn, affect each other and the initially proliferating type of decentralization. The combined learning and feedback effects lead to the creation of new markets while changing other markets and, over time, create a slowly emerging new economy. The different forms of decentralized commerce affect society at multiple levels as different constituents begin to experiment with their own applications and new solutions which in turn create feedback effects for each of the four types of decentralization.

Take for example, the proliferation of decentralized technology and its impact on existing markets, its creation of new markets, and its impact on organizational design. With the emergence of the Bitcoin protocol in 2009, the digital asset market has evolved. Until the creation of the first known alt-coin (e.g. an alternative coin to Bitcoin) around April 15, 2011, Bitcoin virtually dominated the market and was in fact the only digital asset. Between 2017 and 2019, the alt-coin market proliferated significantly. Correspondingly, from 2016 to 2017, Bitcoin's market share dropped dramatically. At the end of 2014, with the instantiation of smart contracting in the Ethereum ecosystem and the ETH currency, the market for digital assets started to diversify and proliferate substantially. New alt-coins emerged almost weekly, leading to over 2000 cryptocurrencies in circulation in late 2018.

Such new cryptocurrencies created a new market for initial coin offerings (ICOs). The ICO market peaked from March 2018 to June

2018. The percentage of ICOs in relation to total fundraising of blockchain startups dropped from 80% to around 35% in August 2018 and only marginally recovered between September 2018 and February 2019 at around 40% to 50% before dropping to 20% in March 2019. From March 2017 to June 2018, ICOs were the overwhelmingly dominant fundraising tool for the blockchain industry. The demise of the ICO market turned the overall trend away from ICO funding to venture funding in the blockchain industry.

The emergence of the ICO market changed the market for venture funding. In the existing venture capital model, venture capital funds invest significant amounts of money in the hope of finding the next unicorn start-up. This investment process is subject to long, complex, and time intensive processes leading up to a late liquidity event in the form of an IPO or acquisition. By contrast, ICOs provide liquidity to investors much faster and allow venture capital funds to capitalize on existing profits early. Venture capital funds who invested in crypto start-ups gain access to much earlier liquidity via ICOs by converting their cryptocurrency profits into Bitcoin or Ether through any of the cryptocurrency exchanges and can thereafter transfer into fiat currencies via online services such as Coinsbank or Coinbase. During the ICO boom years, the venture capital market in the decentralized technology sector ground to a halt.

The altcoin market also created opportunities for new organization design. With the emergence of Ethereum, the leading altcoin, and its smart contracting, a host of decentralized technology projects materialized. Several of such projects attempt to change organization design at a fundamental level. While it is still difficult to imagine a world without governance structures facilitated by agency constructs, Decentralized Autonomous Organizations (DAOs) have started to challenge the core belief that governance necessitates agency.

The first DAO, launched in May 2016 and instantiated on the Ethereum network (an altcoin), is the founders' attempt to set up a corporate-type organization without using a conventional corporate structure. THE FIRST DAO had a governance structure that was entirely built on software, code, and smart contracts that ran on the

public decentralized blockchain platform Ethereum. Because it was pure computer code it had no physical address, no jurisdiction that could claim jurisdiction/control over it, and it was not an organization with a traditional hierarchy as we know it from traditional corporate structures. The DAO did not use a traditional corporate structure that necessitated formal authority and empowerment flowing top down from investors/shareholders through a board of directors to management and eventually staff. Indeed, it had no directors, managers or employees. In essence, all the core control mechanisms typically employed by principals in agency relationships were entirely removed in the DAO.

The above is only one example of many others that illustrate the feedback and knock-on effects between decentralized technology, organizational decentralization, and decentralization (and disruption) of markets. Many other feedback effects are constantly emerging and affect other parts of society. For instance, higher education has started to pick up on the decentralized technological opportunities for commerce. The academy has started to create basic courses on blockchain technology and coded decentralized technology solutions starting in 2018.

III. Transcending Capitalism and Socialism

Decentralized technology inaugurates new forms of economic exchanges. Historical evidence has demonstrated that every time decentralization emerges in a given industry, profit margins disappear. Examples include Skype's effect on the telecommunications industry and Emule's and Napster's, among other file sharing systems, effect on the music industry. Yet, these are examples that predate the emergence of decentralized technology. With the emergence of the Bitcoin protocol, decentralized technology has created early structures that are emerging into new forms of economic value systems and economic exchange.

Human society and economic systems have revolved around political doctrines for organizing society and allocating resources for the last two centuries. First and foremost among those are the

dichotomies of capitalism and socialism which are seen as mutually exclusive for the most part. Society is organized around those notions and has formed power structures and political hierarchies to serve these ideas.

Decentralization transcends traditional economic notions of capitalism and socialism. Decentralization uses elements of profit generation and redistribution in a way that in effect combines capitalistic and socialistic ideas. Decentralization allows for the organization of society in economic structures that generate profits while at the same time redistributing resources. The profit generation is less based on capitalistic notions of economies of scale but rather revolves around notions of open source volunteer contributions and greater good perspectives for society. Just as the Bitcoin protocol and the DAO were created by volunteer idealists who contributed their time and skills without knowing at the time of origination if they would ever be able to benefit from their creations, emerging decentralized solutions for commerce and society can create profits if and when their solutions become more mainstream and people see the greater benefit for themselves and others.

Take for instance, the ability to sell one's personal (e.g. social media etc. consumption) data, preferences, opinions etc. in decentralized systems, including in real time. Such assets, e.g. one's data, preferences, opinions etc. currently in centralized structures can only limitedly be commercialized. In decentralized structures such assets can be tokenized, valued, and mobilized. Similarly, tokenized hard assets, such as real-estate, can be tokenized and sold in unprecedented fractional forms. The ability to control one's data and fractionalized (hard) assets enables new forms of consumption for consumers. For instance, many startups are already working on a barter system in which services, such as free car rides etc., become available in return for disclosure of consumer's data and personal preferences etc. These are only early examples of what decentralized systems may facilitate for consumers in the new economy.

Centralized businesses will change as a result of the new decentralized business structures that are emerging. Existing centralized businesses have started to evaluate ways to expand

existing business lines or adapt other business lines to continue to stay competitive with both centralized and decentralized business competitors.

IV. Opportunities

Emerging technology enables the evolution of decentralization. For instance, a review of blockchain technology provides the earliest possible insights into how decentralized technology solutions may continue to shape and transform commerce and society. The emergence and proliferation of distributed applications (DApps) in the aftermath of the invention of the Bitcoin protocol in 2009 demonstrate that a nascent market for such applications and consumer demand already exists. Consumer preferences will continue to shape the DApps market and the solutions it may offer for commerce and society.

Technology-enabled decentralized commerce is subject to far fewer and rather different transaction cost. The decentralized emerging technologies used in decentralized commerce can increase the overall trust of consumers and market participants at an unprecedented scale. Trust can help lower transaction costs but it also increases consumer and overall market confidence and certainty, which facilitate economies of scale that may not be possible in centralized structures. Moreover, because of their lower cost structure, decentralized cryptocurrency platforms have the ability to remove consumer fees that are an integral part of their centralized competitor businesses. Removing such centralized fees also allows for the eradication of downward pressure on the platforms' worker compensation. The lack of fees can help create a more efficient marketplace through the removal of the rent seeking intermediators.

Decentralized payment systems' ability to rely entirely on cryptocurrencies creates comparative advantages in orders of magnitude over centralized systems. Centralized fiat payment systems and platforms typically require some form of an existing banking relationship in order for consumers to utilize their services. Holding and storing cryptocurrencies does not require a banking relationship. Centralized fiat payment systems are subject to

payment processing issues and slow processing times for payments. They also require high fees for intermediaries that facilitate the payment process such as banks and PayPal, among others. The fees make it only economically viable for higher volumes of transactions, creating barriers to entry in the process. Decentralized payment systems are not subject to these limitations. Finally, anonymity of market participants in cryptocurrency networks can increase participation in certain markets and economies.

A growing body of evidence suggests that stable cryptocurrencies may play a role in the world economy. In 2018, the IMF estimated that 11 countries are at 20% or higher inflation. Using black market exchange rates measured weekly, the Cato Institute's Troubled Currencies Project estimates that the real rates are significantly higher than the IMF estimates. Currency devaluation is rampant in many countries, e.g. Venezuela (2018: -99%), Argentina (2018: -53.2%), Turkey (2018: -38.4%), and Brazil (2018: -20.6%). In the United States, transacting in cash costs the consumer around 200 billion dollars annually - about \$637 per person. The cost of cash is primarily associated with counting, managing, storing, transporting, guarding, and accounting for bank notes. The theft of cash alone costs U.S. retail businesses lose around \$40 billion annually. Similarly, according to one study, one in every \$12,400 of cash notes printed may be counterfeit. The effect of corruption on economic welfare is significant. More corrupt countries also experience significantly lower rates of investment in the respective country. Corrupt countries are also subject to a significantly higher inflation rate. Several studies demonstrate that the poor and those with less access to institutions bear a disproportionate share of these costs of using cash.

Cash and bank notes are gradually losing ground to other payment systems. Whereas the overwhelming majority of humans live in cash economies where at least 90% of transactions are conducted in cash, consumers in wealthier economies tend to favor noncash alternatives. Cash usage in the United States, the United Kingdom, the Netherlands, Sweden, Finland, Canada, France, among other industrialized nations, has fallen well below 50% of total transaction volume. Most significantly, in Northern Europe as few as one in every five transactions are made in cash.

Central banks and governments around the world have been experimenting with government-sponsored digital currencies and cryptocurrencies since 2015. In the case of central banks, such experimentation is already close to launch or fully operational. Several governments have issued their own digital currencies. Most major tech companies in the private sector have been experimenting with cryptocurrency projects since 2017. Examples include Tunisia (eDinar), Venezuela (Petro), Senegal (eCFA), Sweden (eKrona), Dubai (EmCash), Japan (Jcoin), and Estonia (Estcoin), and Ecuador, among others.

Several factors explain such early experimentation in the public sector. The end of technological life cycles of legacy systems and associated emerging trends in payment systems necessitate central banks' enhanced examination of cryptocurrency solutions. Central banks in countries with rapidly declining cash usage are subject to the most pressure to find solutions for bank note alternatives.

The private sector also continually engages in cryptocurrency experimentation. Most cryptocurrency exchanges are creating their own stable cryptocurrency. On February 14 2019, J.P. Morgan introduced the first prototype of its blockchain settlement product: JPM Coin, a stable cryptocurrency backed one-to-one by JPM's fiat currency reserves. Finally, Facebook is developing a stable cryptocurrency in an attempt to break into the financial services business.

The rise of an early stable cryptocurrency design, Tether, in terms of its total market capitalization, its stability around \$1 value, and investors' uses of Tether as a temporary safe haven, provides some support for stable cryptocurrencies' ability to create market stability, even if only temporarily. Like all other stable cryptocurrency projects, Tether is still afflicted with significant design challenges.

The total volume of stable cryptocurrencies relative to the rest of the cryptocurrency market is growing consistently. The growth of stable cryptocurrencies can largely be traced back to attempts to combine the utility and benefits of cryptocurrencies and blockchain technology with remedies for the existing fluctuation and volatility in the cryptocurrency markets. The growth data suggests that

demand for products that help manage the volatility inherent in other crypto assets is likely to continue to increase.

V. Obstacles

Several factors limit the evolution of a distributed app economy and decentralized commerce. In 2019, decentralized commerce is relegated to the trading and exchange of cryptocurrencies and basic smart contracting. The low transaction throughputs of public blockchains is a core limitation that holds back more advanced DApps.

Other core infrastructure products that do not exist in 2019 but are needed for the evolution of decentralized commerce include: truly decentralized consensus combined with higher levels of transaction throughput, evolutionary governance designs that overcome the need for hardforking, decentralized underwriting protocols that enable democratized access to insurance, and verification protocols for smart contracting, among other decentralized infrastructure needs.

Without a core use case, other than the store of value (in Bitcoin), decentralization technology is less likely to proliferate. Banking and money transmission related services and triple entry accounting via blockchain technology are natural use cases but they fall short in their application as the universal use cases for public blockchains.

User access and usability of existing decentralized technologies fall short of mass adoption needs. It will be very difficult to educate the public sufficiently to seamlessly adopt decentralized protocols in their daily life if users have to discern and manage public and private keys to wallets, among other concerns.

Finally, people will not enter into a long-term smart contract unless they have a stable currency to refer to. A renter and a landlord will not gamble their future wealth on a smart contract lease that may halve or double in value in any given month.

The transferability of stores of value entailed in cryptocurrencies creates core points of attack and undermines the very nature of decentralization. Because of the store of value entailed in cryptocurrencies (and really any currencies or store of value), exercise of power over such value inevitably leads to centralization due to economies of scale.

VI. Evolution

The existing limitations for decentralized commerce can be overcome. Emerging technological improvements, such as the evolution of 5G technology, among others, enable overall higher levels of applications of big data solutions and higher transaction throughput in decentralized systems. Even without the availability of 5G technology, the rapid advances of AI in combination with big data and machine learning have already affected many of the sectors of the economy. The combined effect of AI, big data, sensors, and blockchain technology foreshadows a market expansion for DApps.

Stable cryptocurrencies facilitate decentralized commerce. The adoption, evolution, and acceleration of decentralized commerce depends, in part, on the functioning and stability of cryptocurrencies. Stable cryptocurrencies that allow for smart contracting can be expected to create widespread usage in cryptoasset trading, payments for products and services in decentralized applications, commerce across industries, and as a treasury currency for decentralized projects. Because of their disciplining and market stability enhancing effects, stable cryptocurrencies are part of the financial technology infrastructure that will form the backbone of any emergence of the distributed app economy and decentralized commerce. In turn, decentralized commerce has knock-on effects for the evolution of stable cryptocurrencies.

Decentralized underwriting is of core importance in any iteration of future decentralized technology solutions. Without someone or something that functions as an insurance policy should risks in commerce materialize, the public has no reason to try to benefit from the potential benefits of decentralized commerce, such as

substantively lower transaction and agency costs. Most sophisticated smart contracts will require a form of insurance/underwriting to offset the risks of possible failure. Most legacy insurance companies will not consider underwriting a smart contract that is not subject to the traditional legal framework. Even if legacy insurance companies should over time begin to offer insurance product for the DApp market, it is questionable if they will be able to provide insurance products that actually fit the need of emerging decentralized commerce. Actuarial methods for risk assessment under traditional insurance metrics may be only partially compatible with rapidly evolving decentralized products. Decentralized underwriting is more adaptable and serves a particular function in the proliferation of decentralized commerce.

Decentralized underwriting democratizes the functions of banking and insurance. This makes these features of finance more efficient because it frees untapped sources of power and knowledge. Democratizing underwriting in this manner is also more secure and stable because:

1. it diversifies lenders and underwriters, which adds liquidity in all states of the economy;
2. this diversity silos losses so there is less cascading during economic crises;
3. moral hazard detection and selection bias detection is distributed, to access greater knowledge at the edge with more opportunity for transparency, accuracy, and opportunity;
4. blockchain technology is more transparent and therefore more easily auditable, so an underwriting DAO is theoretically capable of being more responsive to regulation (if its governance process is well designed);
5. democratized banking is more responsive to regulation because ideas at the edge have a greater opportunity for affecting policy than centralized structures such as the existing global hierarchy which leads to a single group in Basel, Switzerland providing the dominant voice.

Decentralized banking frees economic resources are less optimally released in legacy banking. The slow, transparent evolution of decentralized finance solves the multiple equilibria problem of

acquiring public confidence in the system that underwriting provides in many areas. Banking works measurably better when it reaches an equilibrium state that comes from public confidence in the institution, and that public confidence is supported by public confidence in a feedback loop that raises the efficiency of an economy. Traditionally, this leap was made by governmental fiat, e.g., FDIC underwriting backed (implicitly) by the US government. Decentralized banking uses blockchain technology's property of complete transparency, a permanently uneditable record, and equal access to all, in order to provide a continually auditable system to slowly and stably build toward this higher equilibrium of public confidence.

Emerging decentralized reputation systems facilitate and accelerate evolving decentralized commerce. Why is decentralization enhanced through decentralized reputation systems? Smart contracts allow anonymous parties to engage in decentralized commerce by providing automated contracting that self-executes and self-regulates according to mathematical strictures. Smart contracts are evolving quickly. Their evolution enables most business logic to be included in smart contracts over time.

A simple example involving smart property may help illustrate the uses of smart contracting. The example illustrates that smart contracts can self-execute in a decentralized environment with anonymous actors. Consider the example of a home owner making her house available for rent. The home owner posts a smart contract with the terms she will accept, including length of stay, price per night etc. After encumbering digital currency in the smart contract, a renter would be able to unlock and use the house with a private key digital signature which would only work for the contractually agreed period paid. The smart lock of the house allows the renter to enter if and when all conditions specified in the contract have been satisfied, e.g. the deposit was encumbered and other qualifying criteria for the renter were fulfilled. On the one hand, if the home is not in the agreed upon condition at any time the rental contract started, the smart contract could automatically reimburse (part of) the encumbered deposit. In turn, if the house was not returned at the agreed upon time, the renter would lose (part of) the encumbered deposit.

Smart contracts provide multiple benefits for businesses. Smart contracts are intended to simplify and automate business, removing transaction costs, and creating certainty for counterparties. They make business transactions fully secure and efficient. It is also inexpensive to run smart contracts on a blockchain. The smart contract near optimally coordinates the relationship between the anonymous parties and removes the need for agency / intermediaries almost entirely. Negotiation between counterparties is near minimal, transaction cost typically associated with contracting are almost entirely removed by the automation. The inherent mathematical logic of computerized code in smart contracts can optimally clarify parties' intent. It also increases certainty and creates unparalleled efficiency which in turn incentivizes commerce. Most importantly, the smart contract removes centralized guarantors. The smart contract self-regulates. Only limited legal recourse is available if something goes wrong in the execution of the terms of the contract.

Despite the significant benefits of smart contracting for business and society, smart contracts are subject to significant limitations. Human business interactions require a flexibility that is at odds with merciless mathematical logic of smart contracts. Human interaction requires flexibility in interpreting intent that cannot be ensured by smart contracting because smart contract code does not follow the same logic on similar terms as natural human language. Smart contracts also undermine counterparties' ability to continue collaboration when unanticipated eventualities arise. In most cases of unfulfilled parameters, the smart contract will simply cancel out. Human business interaction also typically requires the possibility that each party may fulfill only a portion of any intended collaboration. While more sophisticated smart contracts over time can fulfil some of these human business requirements, the needed flexibility in existing decentralized protocols will unlikely ever be attained unless a decentralized verification system is built into decentralized commerce.

An intangible value system is needed. Reputation as a metric and store of value does not suffer the same consequences and does not lead to centralization because it must be earned, it can be lost, yet it cannot be turned into a fungible store of value that allows the

exchange for goods etc. Hence, unlike currencies, reputation does not naturally lead to centralization.

In as much as reputation enables truly decentralized solutions, reputation is also the key ingredient that enables commerce. Centralized capitalist institutions have been built entirely around centralized and hierarchical reputation systems. Bitcoin proved that a decentralized system can automate the transfer of valuable digital currency without intermediaries, no centralized authority for recourse, efficiently, securely, cheaply, and expeditiously. Until blockchain technology was introduced via Bitcoin in 2009, decentralized reputation system mostly relied on the old and corruptible concept of the Web of Trust.

Decentralized reputation verification systems enable mathematically rigid smart contracts to become more adjustable for the needs of business. Reputation verification becomes the backstop for smart contracting. While the rigorous standard of “code is law”, associated with smart contracting, can be upheld, reputation verification enables smart contract template verification. Validated templates of smart contracts increase trust for counterparties. The validation removes the need for costly back-testing and experimentation with smart contract templates.

To truly increase trust for counterparties in decentralized smart contract-based commerce, counterparties need to be able to review a long history of each other’s conduct in decentralized commerce and the history of performance in earlier smart contracts. This is possible through a platform that creates reputation for both parties and for the smart contract itself. Similar business deals and contracts between counterparties need to be organized and reviewable by the public. The history of transactions has to be fully openly viewable and verifiable, so that business parties can see that their counterparties will perform as expected. This necessitates that counterparties’ actions in decentralized commerce endure and become part of a public record. In other words, counterparties’ actions need to stick. Their actions have to become part of a precedence system that is meaningful.

VII. Ethical Governance

Common ethical principles define most governance structures. Defining the boundaries for such common ethical denominator has proven difficult in any prior attempts to organize society. Decentralized systems are no exception. Without a core common ethical denominator, decentralized systems cannot last, they lose coherence, become attackable, and can be corrupted, leading to suboptimal societal outcomes.

Ethical governance is at the core of any ethical design of decentralized systems. Blockchain technology offers humanity new tools that directly address the problems at the root of why governance has continually been plagued by corruption throughout the ages. Blockchain technology gives uncensorable transparency with its opposing tension of privacy; decentralization of power with strict accounting for that power. As such, decentralized technology has the potential to provide a better incentive design for ethical decision making.

Ethical governance asks: how will power over decision making be distributed, i.e., as the system progresses in time, who will be rewarded with more power and who will be punished with loss of power? Secondly, who changes the rules governing the day-to-day functioning of the decentralized system, and who changes the rules governing how to change the rules? The first question concerns executive governance and the second addresses legislative governance.

These are essential questions that have plagued every human organization that has ever existed. However, blockchain technology gives humanity new tools for anonymity, transparency, and permanency of records that can enable fully decentralized governance, while maintaining privacy, distributing power justly and efficiently, and preventing censorship.

By way of overview, the core objective of decentralized governance designs is to create the proper incentives that help independent and selfish actors to be organized and to collaborate productively towards a common goal. From a quite pragmatic perspective,

addressing precise choices of parameters in algorithmic token design, it is important to underscore which choices relate to which values a group may preference.

As a simple example, the profits of a DAO must be chosen to be distributed in some ratio with the members who do the present work which garners the profit, members who have previously done such work which built the reputation of the DAO, members who designed the protocols for how to do the work, and with members who designed the governance structure which initiated the DAO. The choice of distribution weights which determines how much each of these four groups shares in the profit should match the current values of the DAO. A greater share for new workers will attract new workers, a greater share for the older workers will signal long-term stability, while a greater share for the protocol designers will attract more innovation.

Another core ethical governance problem revolves around system attacks. Someone can always game the system. It is a mathematical fact that is essentially encapsulated in the "Folk Theorems of game theory". For any static set of rules in an infinitely repeated game using reputation (stakes), there is a way to subvert the rules for an individual's profit at the expense of the group. A dynamic, changing set of governance rules can address the conundrum, and can set up the incentives necessary to stop the abuses.

