Examining Blockchain Accessibility

by

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ABSTRACT

This paper will examine the block-chain phenomenon from the perspective of inclusion. To do this we need to establish the nature of cryptocurrencies for those unfamiliar with them and touch upon the debate surrounding whether cryptocurrencies will become a necessity and ubiquitous technology or remain a platform for a sector of the population. The first question; how is cryptocurrency currently different from traditional currencies (fiat currencies)?

We will then address the important question of what, if anything, cryptocurrencies can bring to special needs and inclusive design? From the perspective of financial inclusion and more equitable wealth distribution, what are the risks and potential benefits? Are there potential future uses, if any, of Crypto currencies relative to financial inclusion and poverty reduction? How can Crypto currency systems be inclusively designed? The problem, and a possible solution is proposed in this paper.

I believe cryptocurrencies will succeed and become mainstream, but whether or not the culture of cryptocurrencies will embrace the importance of inclusivity is presently uncertain.

ACKNOWLEDGEMENTS

This document is dedicated to those with special needs who have guided me throughout my life, let crypto be a new chapter where accessibility is considered before success can be measured.

This MRP is also dedicated to my instructors and fellow students who taught me so much throughout this program. They taught me that this paper should be multimodal, and it is only the requirements of the MRP committee that prevent me from including an audio version, I have however removed several graphs and graphics which would not be compatible with screen readers so assistive technology can expose those with visual impairments to my writing. If this paper is well received maybe I can offer more accessible versions outside of the University.

Finally, I would like to thank my advisor Jutta Trevianus and my parents for supporting me throughout this work. Jutta has more pressing concerns but has found time to support this paper and encourage me to be ambitious with my ideas. My parents helped give feedback as well and they suggested I look into this program which has given me so much.

There are countless others who have assisted me in getting to this point and to them I give my gratitude.

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1 - INTRODUCTION

This paper is intended to introduce a diverse audience to digital currencies or cryptocurrencies including readers who are unfamiliar with blockchain technology. It can also be used as a method of reminding, or focusing for review, blockchain(s) in general, as much as such a thing is possible. Other readers may be familiar with the workings of a blockchain, blockchain organizations, blockchain technology, blockchain culture, and the blockchain ethos, so this paper is terse despite its length. It serves as a thorough introduction to blockchain but also serves the purpose of addressing accessibility in blockchain through educated opinion. Many of the issues surrounding cryptocurrencies are addressed in this paper; from manipulation to speculation, and most importantly, inclusive design. Its goal is to provide a launching point for advocates, regulators, and the special needs community to interact with blockchain technology (BCT), community, and organizations. I believe that BCT is now a permanent part of world e-commerce. I hope to quickly convince you that blockchain is a revolutionary technology with enormous potential so you will read about its use cases and develop an idea of your personal

involvement and goals. Should you want to be helping with accessibility, using Crypto as an investment, or working to develop or advertise blockchain.

When I initially invested in blockchains, very enthusiastically and with no reservations, it was under the understanding that blockchains would eventually replace all other stores of value and methods of transferring fiscal value. I had had some success investing before, mostly in technology companies such as AMD (Advanced Micro Devices a silicon manufacturer). I have a technical background and it was the 90s. Technology was booming and was expected to revolutionize everything.

For me, blockchain, especially Bitcoin's marketing, when summarized was just two words: internet, and money. These were the two hottest buzzwords and industries in the 90s and were the focus of much speculation. If one was to pick a third buzzword from the 90s it would be synergy, which is probably the third buzzword of Crypto (short for cryptocurrencies). The internet was exploding at a rate that showed that the information age would eventually dominate and the reason for the slow adoption of cryptocurrency was related to its complexity and general lack of knowledge among the public.

For me, blockchain retains its potential and upward trajectory. The barriers to entry have been tangibly reduced (on the internet side), awareness and adoption have expanded exponentially (on the money side), and the culture and organizations that permeate Crypto have proven robust and transmissible.

The monetary and useful value of blockchains has exploded which is why there is so much interest in them. There is some debate on whether this is purely speculative. The primary reason for believing it is speculative is quite simple; due to a fixed allocation,

there is an artificial scarcity of a ledger, which has no purpose other than to record or transfer value. There is no underlying value in case of a crash. This is combined with the fear that eventually ledger entries will be expensive to obtain and drives up the price. Its skeptics' rallying cry is that this is the basis for the speculation. In Crypto circles, this is called "Fear of Missing Out" (FOMO).

While this is a technical paper, my own view will be described. After fourteen years in Crypto, I believe I can serve as somewhat of an expert in its evolution and current manifestations. I will attempt to apply my knowledge to examine how cryptocurrency can be made inclusive.

Despite blockchain being a piece of software crafted by people for people, there are still a great many unknowns. Most importantly, it is still unknown for which functions blockchain will prove successful.[1]

2 - WHAT IS BLOCKCHAIN?

2.1 – Introduction to blockchain

Blockchains are a new technology involving hashing and distributing information and ledgers. In this section, I will explain how they work and a bit about what they are used for. This section does not delve into every type of cryptocurrency but rather describes the revolutionary breakthrough at the heart of this financial revolution.

Blockchain is a way of storing and distributing cryptographically signed pieces of

[1]Please note that within this paper, I use the terms coin and token interchangeably to denote cryptocurrency.

any financial ledger. It allows for a decentralized network with no central authority to audit transactions and makes sure that funds are spent by their owner alone. This means that, unlike traditional finance where a third party such as a bank or government have authority over digital transactions, the owner has custody. Cryptocurrencies have been around for several years, and the underlying technology has proven itself secure. Security breaches occur but these are usually a result of compromised passwords or systems not the underlying technology of the cryptocurrencies. That in itself is useful in the world of international finance. It allows the ability to store, transfer and erase units that can have value thus making it an easier and more secure way to transfer value electronically when those ledgers are allocated value.

Regrettably, blockchain technology, at its heart, is a software platform that in and of itself raises issues for inclusivity. The issue of making software platforms accessible and inclusive is an old and thorny one in all cases. Traditional finance has been working to wrap fiat currencies, which are a conceptual unit of value wrapped in serial numbers and paper, in electronic transferable software such as SWIFT or E-transfer which are then (often later) made accessible.

The purpose of this paper is to introduce blockchain concepts, determine whether blockchain provides necessary services and platforms, and discuss reasons and means of encouraging blockchains towards accessibility, not just as a late and mandated gesture but as a fundamentally forward-thinking acknowledgment of their centrality.

The case for blockchains having real value, being a revolution in the storage and distribution of value and providing functionality and an inevitable progression in human

transactions, is more nebulous. The idea that blockchains have real value is a lesser understood side of this debate and will be the focus of this paper. I have complete confidence in the value of Crypto and this paper is written from that perspective. Cryptocurrency has earned careful consideration by the mainstream because it has implications for the population at large, including persons with disabilities.

2.2 – How is cryptocurrency currently functioning

Many of the people working in Crypto and the people investing in Crypto believe in its value. To date, they have done very well financially. Is this optimism and profit justified? Thousands of projects have sprung up, each trying to encourage the use of its own coin or token and offering roadmaps that suggest that supply will dwindle, and use will skyrocket. This, according to supply and demand, will drive the price and value of units of cryptocurrency into the stratosphere, or as Crypto investors call it "To the Moon!"

At the present time, cryptocurrency coins are segments of a new economy. Unlike fiat currencies (government-issued currencies not backed by commodities), blockchain coins and tokens are not required for daily living, or government-backed as legal tender, but can be used to obtain specialized services, goods, rights, and even freedoms. This is also creating a new culture of money.

To date, government has not been involved in the regulation of bitcoins. There has recently been legal action in the US over whether the tokens or coins used in blockchain ecosystems constitute a traded security and if so, whether their trading, therefore,

shouldn’t be regulated by government securities agencies. This then raises the issue of whether blockchains can have underlying value.

Blockchain is used as an exchange of value but there is debate as to whether this is purely speculative value that doesn’t add anything to the economy. Cryptocurrency has value in some sense, it can be a store of value, it can be a deflationary investment vehicle, it works as a medium of exchange, and it is being developed to replace banking and money transfer systems. From the “Speculation” side, these coins will always be obtainable and will equate to fiat costs for the services which will respond to the rules of supply and demand limiting the penetration of Decentralized Applications (DAPPs). DAPPs run on virtual computers running on the blockchain, and store data and value on the blockchain itself rather than allowing it to be controlled on a local machine. Changes are suggested or communicated to validators to be included on the blockchain. For the believers, however, these coins will have a finite supply and those who didn't obtain them early will find useful and perhaps even necessary services priced out of their reach.

3.0 – WHERE DOES BITCOIN COME FROM – ITS CULTURE, ETHOS, AND MENTALITY

In his excellent book *Coders*, Clive Thompson focuses on the culture of coders in general. He states, “[Coders] grew up in the shadow of the millionaires created by the likes of Netscape, Yahoo and Google –and their enormous social impact. Sure politics, law, and business are powerful, but if you want to really remold the contours of society? Write code.” (Thompson 56).

It is this ethos that has been the driver behind the creation of cryptocurrency, and

the question remains—can it be used for good and become inclusive.

When we were learning about co-design, we also learned about a more traditional form of design in which the intended audience was designated individual characters with vaguely generic characteristics. I think it is useful to understand that Crypto has no concept of even this primitive design methodology but if we can imagine them doing this it's difficult to imagine how inclusive they would be. They are primarily educated westerners who are catering to other educated science-fiction reading westerners. The only other characters they perceive in the narrative of Crypto are:

- Developers (the source of the Crypto revolution, those who define it, and those whose work is creating value)
- The financial system (basically seen as opponents who are undecided on whether to attack Crypto or ride it)
- "Whales" (those with lots of money and often inside information, controllers of the quantitative market manipulating mega traders)
- The government (the source of all regulation)
- Industry investors (to be held off for a while then welcomed in to pump prices)
- Opportunists (those who think of Crypto as an easy and fast way to make a buck)

Most Engineers and financiers have a low consciousness of repercussions and low regard for anything that deviates from a meritocracy. Basically, they aren't conscious of accessibility, and they wouldn't care enough to implement it without some kind of financial or regulatory incentive. This runs the risk of creating mono-cultural blind spots. "If a tool is built by a team that's essentially a monoculture, it's going to have serious

blind spots, as any first year MBA learns. Some of the most influential software in recent years has been made by groups of mostly young, mostly white, mostly men who didn't foresee ways their code will affect people who aren't like them." (Thompson 24). That said, most engineers and financiers are idealists and want to change the world in a positive way so they would likely want accessibility if it were better understood, or its importance was made clear to them. Crypto companies are obsessed with profit and expansion, but they have two things that classic companies do not: almost unlimited funds, and no shareholders to justify accommodations for a small audience. This coupled with their desire to self-regulate means that Crypto's fundamentals are positively positioned to inclusivity, they just don't know how.

4.0 – WHAT CAN BLOCK CHAIN AND CRYPTOCURRENCIES DO - THE USE CASE

In this section, we will examine the potential uses that Crypto and blockchain serve which will add value to the ecosystem. Uses such as micro-payments, self-custody of digital currency, oracles, new forms for the internet, smart contracts, and DAPPs suggest that Crypto will find new niches and use cases invalidating arguments that it is purely speculative. This argument has been significant in that it has placed the onus on cryptocurrency maximalists to prove that cryptocurrency will be useful to the majority and eventually replace the systems it claims. It has kept the vast majority of people from investing in bitcoin but has done little to stop technologists from developing solutions using the technology.

Cryptocurrencies are framing themselves around use cases, or why their coins or tokens are useful. The point of this is that they want to establish that their token will be useful for something in the future. This parallels the concept of platforms, or services delivered to add opportunity and capability to the public. The use cases that are being suggested are very broad but may not be totally inclusive. Because these currencies are entirely electronic, the platforms offered are digital and the structures that exist are information or governance related.

Blockchains make use of peer-to-peer technology, a system for allowing computers to co-operate to provide services to each other. Individual computers on these kinds of networks, or nodes, share resources to make the network function and provide security. This has implications for the creators of blockchain technology in that their customers are also their distributors, IT providers, security apparatus, and hosting providers.

Those who created Bitcoin based it upon Metcalfe's Law of Network Effect Theory. Network Effect Theory claims that value increases exponentially with connections and uses. Network effects typically account for 70% of the value of digitally related companies. Network effects were understood by Robert Metcalfe, one of the co-inventors of the Ethernet and a co-founder of 3Com. 3Com created networking cards that plugged into computers giving them access to the Ethernet, a local network of shared resources like printers and storage, and the internet. Metcalfe explained that whilst the cost of the network was directly proportional to the number of cards, the value of the network was proportional to the square of the number of users. In other words, the value

was due to the connectivity between users, enabling them to work together and achieve more than they could alone. Metcalfe's Law says that a network's value is proportional to the square of the number of nodes in the network. The end nodes can be computers, servers, or simply users. For example, if a network has 10 nodes, its inherent value is 100 (10 x 10 = 100). Add one more node, and the value is 121. Add another and the value jumps to 144. Metcalfe's Law provides a formula for measuring this non-linear, exponential growth (Fisk).

Cryptocurrencies are trying to harness this exponential growth. Some of the functions of these platforms and use cases are strictly self-referential and internal, such as being mediums of exchange, paying for transactions, governance, payment to launch chains (tokens), and getting rewards in the same currency. But some are closer to open-source corporations or applications. These use cases vary widely but they assume growth, sometimes exponential growth, in commerce, socializing, information exchange, automation, and AI.

These platforms generally centralize around financial services such as loans, investments, transfers and transactions, digital services such as information storage, virtual worlds, non-fungible art ownership, presentation and retrieval, and governance functions such as vote accountability, corporate governance, supply chain accountability, legal and contract immutability, and distribution. Many also focus on automation, robotics, decentralizing the internet, the internet of things, home automation, file storage, and information verification.

Traditional financial markets are divided about cryptocurrencies. They have only

recently listed them for purchase on exchanges and advisors and brokers didn't assist investors who were interested with information. This led to the creation of new cryptocurrency exchanges where Crypto could be bought with fiat or other Crypto. These exchanges are either centralized exchanges where Crypto or fiat is transferred to the exchange, exchanged, and then withdrawn later, or decentralized exchanges where control of Crypto is maintained by the user and exchanges are done through DAPPs on the blockchain. These exchanges offer a variety of other services such as staking (lock up Crypto to earn interest), “Learn and Earn” (opportunities where informative advertising videos from cryptocurrency projects are paired with short quizzes that, when completed, see a small amount of the cryptocurrency transferred to the exchange wallet).

So, what does Crypto offer that differentiates it from other stores of value? Why is there such a drive to own and hold it? The most obvious answer is that cryptocurrencies focus on use cases. Use cases are products, voting rights, and services that must be paid for using a specific coin or token. In some cases, this relationship between currency and purchase is arbitrary and any form of payment would do, in which case there is often a defined (and sometimes flexible) rate at which the transaction can occur. An example would be purchasing distributed storage which could be paid by using fiat just as easily.

Sometimes the cryptocurrency is linked to the transaction to such an extent that the use case provides the reason to exist (raison d’etre) for the cryptocurrency such as Basic Attention Token (BAT) which uses its currency as the payment system for online transactions for a new advertising and internet browsing application. BAT is used for paying users to view ads and take surveys, charging advertisers to advertise on its

browser, and paying content creators to produce content.

Tokens that are linked to their use case often take advantage of cryptocurrencies properties, such as indelibility, divisibility, decentralization, non-fungibility, and user custody (the control of "Private Keys", or the software locking mechanism for transferring Crypto which is controlled by the owner and not a custodian such as a bank). This is important as banks locking funds or confiscating funds is a sticking point for the Crypto community.

Finally, there are tokens that are technically linked to their use cases. These include cryptos that use smart contracts to automate the distribution of their token, that allow users to participate such as proof-of-stake, liquidity pools and (yield) farming, voting rights, and the ability to launch sub-chains.

As cryptocurrencies increase in number, value, and size and begin to strongly influence world trade, it begins to appear unthinkable not to participate. But Crypto remains a platform with no known situations in which you are forced to use Crypto to accomplish anything with broader implications, except perhaps in El Salvador. El Salvador has become the first country in the world to formally adopt cryptocurrency as its official currency after its Congress voted overwhelmingly to approve a law classifying Bitcoin as legal tender. The Salvadorian President stated the hope that this will boost foreign investment, improve financial inclusion and generate jobs. One of the key benefits of the shift to cryptocurrency was deemed to be its divisibility for fractional transactions. These small transactions allow even computational functionality to charge small fees for execution.

4.1 – Decentralized Applications

A decentralized application (DAPP) is a computer app. Because the blockchain is digital, it can contain code that can be run. In the case of blockchains, this code can be run in a decentralized fashion, with data and resources being shared between systems. This is a bit like cloud computing. DAPPs are also more closely integrated with the ledger, micro-payments, yield-farming, oracles, and node functionality. This is creating a new form of application.

An advantage of DAPPs is that they can allow trustless execution of code on a neutral network. This has massive implications for governance and financial software.

4.2 – Micro-payments

Micro-payments are very small payments. These have been a challenge for traditional finance because the overhead and cost of small transactions is usually larger than the value being transacted. Cryptocurrencies are divisible into small values. The use cases are many and varied. Journalism remains the major driving force. Subscriptions don't serve when an article or piece of information is unlikely to be referred to again or the media organization is of little interest beyond the immediate. However, it is critical that people gain access to journalism they are interested in or curious about. Traditional forms of media such as newspapers and news programs haven't fared well against the online inundation of free journalism but there is mounting backlash against free

journalism for its inaccuracy, lack of integrity, bias, inability to verify content, and poor quality. Micro-payments could bridge this gap.

4.3 – Oracles

Decentralized consensus regarding transactions is not enough for a financial revolution. Consensus also needs to be established about real-world data. Decentralized oracles aim to solve this problem in several ways. Oracles create nodes based on how many coins the vendor has. These coins earn a percentage of transaction fees for requests for information but also act as a security for information distributed on the network.

A successful oracle transaction begins when someone buys or earns the coins they download. They then launch a node. They see a request for information or establish a juicy piece of information, which is then bought and distributed through the blockchain. The fees are kept in escrow for all nodes. Validators verify the information is correct and the fees are paid out to the nodes who also get coins from the network to establish new nodes. If a validator finds that the information being distributed is incorrect then the transaction fees are not distributed to the node that provided the information and often some of their tokens staked as a guarantee are slashed.

4.4 – Decentralized Oracles

Cryptocurrencies are starting to develop programming languages that execute between blocks. These are primarily being used for financial arrangements such as loans and derivatives contracts but could be extended to any legal or information application. In

order to get information into the blockchain from the real world or other sources on the internet, a set of “Oracles” has been created and incentivized to gather and apply information. These Oracles charge fees for reliable information and usually require collateral to vouchsafe and guarantee accuracy. This collateral is seized in cases of false information and distributed to harmed or “burned” parties.

These oracles are largely decentralized and attempt to establish or verify needed information to resolve these contracts. Several scams have been executed by manipulating this information but the potential to pay small amounts for verified vetted facts that are backed by reputations and financial assets has broad applications. For example, information about wheelchair accessibility, available assistive devices, or the quality of service provided by a caregiver, can be requested, but the current primary focus of oracles is financially relevant information such as net worth or information that affects derivatives or futures contracts. The possibilities, however, are endless.

4.5 – Smart Contracts

Smart contracts are a way to execute code inside the blockchain. These can hold and distribute funds as well as check oracles for data conditions. These pieces of code are distributed to the blockchain so most often can be reviewed by any parties to the contract and any outside parties. When a cryptocurrency says it has a DAO (decentralized autonomous organization) it usually means that its bylaws are written in and enforced by smart contracts. These can include upgrades to their functionality. This means that cryptocurrencies with smart contracts are more open about their regulations, enforce them

automatically and universally, and have tried to codify their policies and procedures. The scary thing about this is that if these Smart Contracts are nefarious, they will not have discretion in their application and special cases will need to be coded in for applicability. Similarly, inclusive policies which take special circumstances into account will have to be codified which may prove difficult for those without programming or legal expertise and may take some time. The advantage of automated regulation and enforcement is that if the policies and procedures of a cryptocurrency or DAO are biased, bigoted, or not progressive this will be a matter of public record. This means that when policies are eventually inclusive, they will be perfectly applied.

Smart contracts and oracles allow for decentralized lending. This is different from traditional lending because it rarely relies on reputation scores such as credit scores. Decentralized lending relies on collateral which can be established by values contained on the blockchain or information from oracles regarding the value of currencies or goods used as collateral or the agreed-upon value of Non-Fungible Tokens (NFTs, tokens which are not treated interchangeably). Because there is no regulation beyond the code and because the parties are semi- or fully anonymous with no enforcement measures available, these loans are often over-collateralized. It may seem strange to borrow less money than you're putting up, but it can be profitable if the loan and collateral are in different currencies or asset classes.

4.6 – Non-Fungible Tokens (NFTs)

While most cryptocurrencies have indistinguishable tokens which are reallocated

for efficiency of transactions (reducing the fragmentation of coins held by each address) some have coins that are each individually identifiable. These individual coins are used to convey ownership of a range of digital and real-world assets, from digital art to real estate.

NFTs have already found a wide range of applications and will likely find many more in the future.

4.7 – Stable Coins

Some cryptocurrencies want to keep a relatively stable value. To do this they issue or repurchase coins backed by fiat currency when the price deviates from the value of the underlying fiat.

Decentralized blockchain oracles are being forged in the fires of fraud and it is up to all of us to make sure these services can be provided by and for the marginalized.

Blockchains are designed to be distributed to every concerned party, with their immutability verifiable. This creates a permanent record of data on a blockchain. These records can store any digital information such as laws and records of abuse. This means that crimes can be documented permanently and immutably and the records distributed peer-to-peer. In the past, autocracies have attempted to cover up their crimes but blockchain provides an immutable record of anything. Gandhi's statement that cultures can be judged on their treatment of the marginalized means that an indelible record of past transgressions can be preserved bringing shame or even penalties. Immutability and distribution lend strength to journalistic or even personal accounts of atrocity and

injustice and decentralize the record-keeping to such an extent that it seems unlikely any past transgression will go undocumented permanently. Whether these accounts are given credence or acted upon remains to be seen but encrypted blockchains provide a powerful tool for an indelible record of both the good and the ill of humanity.

4.8 – Proof of work

Originally, cryptocurrency encryption was rendered secure by cryptographic hashes that showed a massive investment of processing power. The concept was that anyone looking to publish their version of the transaction history would need to have more computational power than legitimate "miners" (The people, machines, and software hashing the proof of authenticity. Hashing takes large numbers and analyzes them producing numbers which change drastically with even small changes in the underlying data). At the time of writing, Bitcoin, the original blockchain cryptocurrency still uses proof of work [finding numbers that produce identical hashes through brute force calculation] but few cryptocurrencies do, this is important as proof of work is being challenged as using significant amounts of electricity. Most cryptocurrencies including Bitcoin have added code to prevent a "Quantum Computer" from easily breaking their encryption though it is difficult to verify how successful these will be.

4.9 – Proof of stake

Some blockchains get around the problem of consensus by using the amount of cryptocurrency "staked" to arrive at consensus and determine who mints the next block.

This has the problem that rich cryptocurrency holders earn more and have more power over the direction and rules of the currency. The mitigating factor is that since they control more of the currency they have more at stake. This system removes some of the environmental concerns surrounding cryptos like Bitcoin (BTC) but does reward early adopters and punish the skeptical.

4.10 – Interoperability

Right now, Crypto isn't directly interoperable. Coins and DAPPs each transfer and compute only on their native chain, but coders are working on making them interoperable. Different block chains use different programs to store and manipulate value. These include separate wallets, block chain explorers, voting systems, and smart contract programming languages.

I believe to a certain extent that interoperability between blockchains is a fundamental driver, which will bring smart contracts to banking and government. I also feel that if cryptocurrencies can hold (through "Bridges", ways of making another Crypto transferable on another chain) each other they will have even GREATER potential as currency.

4.11 – Security

Bitcoin and other cryptocurrencies use a publicly updated ledger so the security used to keep them from being manipulated by hackers and governments needs to be top-notch.

Cryptocurrencies use a variety of proof of work and proof of stake consensus mechanisms to ensure that transactions are authorized by 51% of the network. While there have been several 51% attacks (hackers temporarily gaining control of the network and imputing their own transactions and new coins) as well as some borrowing scams involving the manipulation of oracles, the vast majority of attacks have been traditional hacks of organizations, individuals, and exchanges. Each hack is carefully scrutinized and there haven't been many cascading or repeatable attacks. Several code auditing firms have sprung up offering cryptographically safe code, some of which is even designed to be impenetrable to quantum computers. This is of vital importance because if a hack is demonstrated that cannot be patched then all of Crypto goes down the tubes.

As governments certify crypto-currencies as assets, Cryptos will receive formal protection from anti-virus groups that work with the internet's firewalls to monitor traffic and prevent code from being used once it has been demonstrated to be malicious.

Equivalent in security infrastructure to large banks, the Crypto applications are taking security very seriously and understand that hacks are an existential threat.

5 - CONCERNS ABOUT CRYPTOCURRENCIES AND HOW/WHY THEY MIGHT BECOME EXCLUSIONARY

Crypto is very focused on early adopters. As it is evolving, early adopters have often focused on excluding latecomers by creating "walled gardens"(Platforms designed to encourage continued use and exclude casual joining). Ironically, this is the largest

reason that Crypto's value relative to fiat has been increasing so drastically. The mindset that a finite supply of a desirable commodity can create the ultimate walled garden and exclusivity.

It remains to be seen whether Crypto will maintain its exclusionary mindset as platforms providing: the internet of things, decentralized internet, voting on prices, voting on fees, voting on distribution, voting on partnerships and technical considerations, mature. If some of these projects become mainstream, it is hard to imagine the government paying billions to purchase tokens to enable them to have access.

One major problem with decentralized currencies is built into its very DNA. Decentralized currencies are designed to not trust any central authority and leave decisions regarding software updates, rollbacks to previous states, and other decisions up to the people that hold the currency. It is difficult to know if this is the actual situation as all decisions are regulated in code and we only have the assurances of auditors paid by the founding team that the decentralized blockchain is inviolate. Several critical issues have arisen which have necessitated votes from the community to implement a solution. On the whole, this type of voting gives reassurance that most blockchain projects are honestly putting the power to make critical changes in the hands of their holders and that blockchains are trustworthy. Gaining a broader public trust may pose additional challenges.

As stressed above, cryptocurrencies are non-physical currencies. There has been enormous progress made in ensuring that computer technologies are accessible to those with physical disabilities like blindness or deafness, and these same technological

solutions should be made available if cryptocurrencies become more widely used. It is, however, difficult to enforce accessibility requirements while cryptocurrencies exist only in the private, unregulated realm.

6 - EGALITARIAN REVOLUTION AND OPPORTUNISM

Currently, the true power of currency lies with those who have direct control over it, known as custodians. Custodians have the power to freeze, move, or take funds. To provide the power for peaceful protest or outright rebellion, funds need to be in the custody of the individual who owns them. Crypto brings the notions of meritocracy (with its problems and blind spots) and open-source to finance and tries to take control of currencies from the government, putting it into the hands of everyday people and removing the gatekeepers and unilateral control of banking and finance from governments and corporations.

Central Bank Digital Currencies (CBDCs) are competing with existing stable coins, which already have strong integration with a variety of networks. CBDCs will likely have government level, mandated, accessibility features. They will likely not be deflationary or geared to investment. If CBDCs support accessibility there will likely be the impression that existing cryptocurrencies won't have to, this will create a divide on accessibility when there should be guides and templates available for designing accessible applications. There is also the possibility that CBDCs vaunting their accessibility will force other Crypto to do the same. The debate remains over whether CBDCs will even preserve anonymity and many other issues. The Crypto space is abuzz about the

possibilities and repercussions.

6.1 - What can Inclusive Design do for blockchain?

It is unrealistic to function in society without currency. This means that the broadest possible user base needs to be considered when developing tools and systems for the use of Crypto. Since no one should reasonably be excluded, Inclusive Design will bring the needs of a diverse group of users into view. If Inclusive Design is used to assess the potential of Crypto, not only will the needs of more users be considered but advantages raised from the extrapolation of those needs will provide new functionality which will have unexpected benefits. Inclusive design also talks about barriers such as homelessness which affect people. These barriers are being addressed, in part, by cryptocurrencies offering a partial banking or financial system for those without a permanent residence or the funds to pay bank fees.

6.2 – What can special needs do for blockchain?

Special needs people and accessibility advocates and experts can contribute many things to the blockchain ecosystem from a diverse perspective for both coders and users. Resourcefulness and creativity could lead to undreamt of uses for this technology as inclusive design has previously done for so many other technologies. Accessibility is the axis from which Crypto can demonstrate that it is considering a diverse range of users and considering the repercussions of a revolution in the financial system. Handled well, Crypto issuers and developers can show that progress has been made in designing with

accessibility in mind from the beginning. People working to make cryptocurrencies more accessible might be disabled themselves and have lived experience to broaden the audience for cryptocurrencies and bring them into the 21st century of inclusion.

6.3 – Accessibility is a priority

The rhetoric and ethos of cryptocurrency founders focuses on how they will change the world for everyone and bring everyone into the cryptocurrency revolution. Their actions, however, suggest an old-fashioned definition of everyone which includes only the most mainstream or "normal" members of society. They are thinking globally and currencies are focusing on adoption in developing countries plagued by inflation and corruption. They also are increasingly focusing on getting government approval and regulatory compliance set up. This quest would be hugely advantaged by including accommodations for accessibility in their applications and business models. Financially blockchain could benefit by showing that it can add financial leverage to the un-banked and people with special needs. This would demonstrate that it truly is decentralized and inclusive and removes barriers to entry in traditional finance.

7 - A VISION FOR MAKING BLOCKCHAIN ACCESSIBLE

My idea for bringing accessibility to cryptocurrencies is simple but addresses problems that are larger than cryptocurrencies such as effective pricing for accessibility.

A company could offer to assist with making cryptocurrencies and cryptocurrency

apps accessible in exchange for some of that cryptocurrency. This would be hugely profitable as cryptocurrencies that are accessible would have a much better chance of receiving regulatory support. This business model should be easy to accomplish as cryptocurrencies are reaching out to new partners all the time and have massive amounts of their own cryptocurrency available in the early days. Continuing this adoption strategy would involve launching an accessible cryptocurrency which could be used as an investment vehicle for people with special needs, a method of paying for tools, legal aid, and services in the special needs community, and through purchasing it as a way of sponsoring the development of tools and services for the special needs community. Such a currency could centralize information and services for the community while also providing incentives and guidance for those looking to assist. This would be a major contribution to cryptocurrencies and accessibility.

Incentives for the special needs community are currently highly disorganized with money being spent inefficiently and redundantly. A cryptocurrency devoted to accessibility would bring the power of private industry to bear on the problems, goals, and strengths of the special needs community and reinforce their interaction with technology. Growth of the value and adoption of the currency would provide an endowment for those with special needs and their guardians and service personnel. This would provide a fundamental shift in the thorny issue of making a living from the suffering of others and becoming rich irrespective of the condition of disabled clients. Simply put, if you want to make a lot of money and work with the disabled you will feel exploitative, with a shared endowment this problem could be ameliorated.

Technological innovation, governance innovation, and policy and procedure innovation is very rapid in the cryptocurrency world and these innovations are largely open source. By creating a cryptocurrency devoted to accessibility, the motivation of selfless individuals, legal and governance legislative authority, and the efficiency of hardheaded capitalism could be combined and shared.

The blockchain also provides an immutable ledger which can be used for media and legal documents to make society more accountable and legal information more accessible, these aspects should be embraced by the disabled community and brought to the forefront of discussions about injustice and bigotry. Because cryptocurrency is decentralized these avenues to justice will need to be soft at first due to the lack of oversight but as people become more responsible and regulations are put in place a permanent ledger of injustice will serve as a powerful tool to fight for equality.

8 - CONCLUSIONS

This paper has discussed the current mechanisms of cryptocurrency and the debate surrounding whether it is a technological revolution or purely speculative hype. This debate also suggests that since cryptocurrencies are here to stay it is worth investing the time to make them accessible. Accessibility is also shown to pave the way to formal acceptance, regulatory acceptance and mainstream adoption. By empowering those with special needs and those with an interest in helping Crypto can demonstrate that it can act in a semi-unregulated manner while still being useful for everyone. This is vital for

people to be able to use Crypto. It also provides Crypto with respectability it desperately needs.

Finally, I outlined a blockchain project to bring accessibility to Crypto and a mechanism for funding these developments while empowering the existing crypto developers. This proposal needs to be taken up immediately for the good of Crypto and the accessibility of access to financial markets.

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