CRYPTOCURRENCY IN HEALTHCARE

MARKET ANALYSIS, USES, AND FUTURE APPLICATIONS

OCTOBER 2021

LAWRENCE, EVANS & CO., LLC
Investment Banking | Healthcare Finance | Consulting

Table of Contents

<u>Section:</u>   <u>Page:</u>

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INTRODUCTION

Cryptocurrency has taken center stage in finance, in the media, and now, in healthcare. As of October 2021, there are more than 6,000 cryptocurrencies in the world with a total market capitalization of approximately $2.5 trillion. Of those, we discovered there are approximately 20 active healthcare coins (healthcare-based Projects including tokens) with a sector market capitalization of over $725 million; the top 17 actively traded or high activity and greater than $250,000 market cap are found on the next page. As a disruptive technology, cryptocurrency's efficiency, privacy, and security targets the complex healthcare industry. The endless use cases are primarily aimed for application within medical records, rewards for wellness and adherence, clinical trials and research, as well as financial payments.

Because cryptocurrencies run on blockchain technology (we will not dig into blockchain, the underlying technology – see previous Blockchain in Healthcare paper 2018) as opposed to legacy financial networks, cryptocurrencies perform with a significantly heightened efficiency. Without all the intermediaries customary for centralized finance, cryptocurrency transactions are much faster and cheaper. Without all the intermediaries customary for healthcare information transfers, tokenized information exchanges are more efficient, from supply chain management for pharmaceutical companies to medical data transfers and interoperability to vaccine passports, provider credentialing, and revenue cycle management. The meaningful takeaway is that the technology behind blockchain and use case cryptocurrency is critically cheaper, faster, more reliable, interoperable, and more efficient than the antiquated systems currently being used.

Decentralization further lends itself to not only increased privacy, but a whole new conception of privacy, particularly in the storage and maintenance of medical data. A serious concern is afforded intake, maintenance, and use of patient private health information (PHI). Under a centralized system of healthcare information intermediaries, this PHI is only as private as the patchwork of systems allows. With tokenized PHI, in the form of medical data cryptocurrency, on a decentralized blockchain system, theoretical maximum privacy is afforded. Here, the takeaway is that the technology behind blockchain and cryptocurrency is critically more private and revolutionarily autonomous for the medical data use case. As we concluded in our 2018 Blockchain in Healthcare paper, the use of this technology for medical data storage is very challenging due to the continued stacking of data from new PHI, which is also possibly reflected in the numerous cryptocurrency failures of medical data-focused Projects.

Decentralization also allows for significant improvement in healthcare information security. Because the blockchain underlying cryptocurrency employs a continuously updated, community-verified ledger information management system, healthcare information and stores of value are no longer protected by the sanctity of the infrastructure of one or a patchwork of often proprietary system(s) but by an entire network of nodes, or computers active on the blockchain network, each cross-verifying, and many even self-debugging. With this distribution of the shares of security, healthcare patients, providers, and payers can operate with peace of mind, even as malicious third parties pursue the sector.
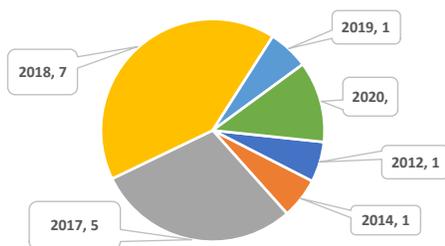
Cryptocurrency is seeing great success in the financial industry (various decentralized finance or DeFi applications) and is also being investigated to great lengths into how it can be used in the healthcare industry. Healthcare inefficiencies, whether credentialing, claims data and records management, or revenue cycle including payments, and the need for privacy, transparency, scalability, and security, are a perfect fit for the technological capabilities of cryptocurrency. While some hospitals advertise to accept Bitcoin and cryptocurrencies it appears more of a marketing ploy rather than necessary day-to-day operations, nevertheless, we are seeing selective donations made in crypto. Conversations with an RCM business discovered they use it to transfer funds internationally for internal corporate transfers for payroll and vendors due to lower cost and speed. Most of the financial applications we discovered are payments for rewards. As insurance companies and employers want to reward good behavior for wellness and adherence, various systems are being tested and rewarded including cryptocurrencies or internal "coins".

This paper dives into what cryptocurrency is, where it is practical within healthcare, and some projects that are currently implementing it.
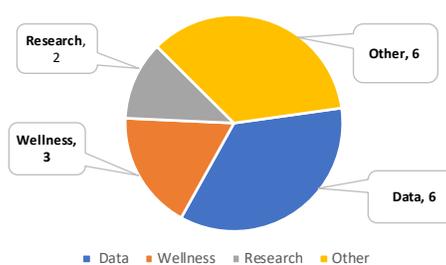
3

Cryptocurrency in Healthcare MARKET ANALYSIS, USES, AND FUTURE APPLICATIONS
October 2021

TOP Traded Healthcare Crypto Coins

#		Coin		Mkt Cap	Headquarters	ICO Year	Focus	Use Case
1	MED		MediBloc	$ 391,721,420	Korea	2017	medical data	Creating a patient-centered health data ecosystem that can protect individual privacy and maximize the reliability of health
2	HUM		Humanscape	$ 135,996,651	Korea	2018	medical data	Drug And medical data protection platform protected by blockchain
3	SOLVE		SOLVE	$ 124,507,665	Ukraine	2018	benefits	Solve.Care is a decentralized and distributed platform for administration of healthcare and benefits programs
4	SCC		Stem Cell Project	$ 21,619,505	Japan	2018	medical data/payment	STEM CELL PROJECT (SCC) combines AI and blockchain to address the healthcare sector. The project aims to set up a Virtual Clinic to enable remote and early-stage diagnosis for patients
5	DCN		Dentacoin	$ 14,035,976	Netherlands	2017	dental	Secure Blockchain infrastructure, patient-centered care and intelligent prevention used jointly to improve long-term health, reduce costs and pain, and ensure benefits for all market participants
6	LYFE		Lyfe	$ 9,364,240	Indonesia	2018	wellness	Decentralised wellness rewards and gamification platform for healthy lifestyle through blockchain technology
7	MDS		MediShares	$ 6,874,198	Singapore	2017	insurance payment	Mutual DAO System is a Ethereum based, decentralized, open-source mutual insurance marketplace
8	MEDI		MediConnect	$ 6,051,841	UK	2019	pharma	Pharma usage in UK. Prevent the over-prescribing to patients of medication from multiple pharmacies, reduce addiction, provide traceability of drugs from manufacturers, wholesalers, prescribers and pharmacies all the way through to patients
9	DYN		Dynamic	$ 5,928,346	Texas, USA	2018	medical data	Data infrastructure and interoperability framework that helps support the foundation of health systems based on blockchain
10	MTC		Docademic	$ 5,468,035	Mexico	2012	medical services	Serves as a trustful repository for health and medical data and user incentivized via the MTC token to contribute their data in exchange for services
11	CURE		Curecoin	$ 2,128,236	Michigan, USA	2014	medical research	Helping researchers uncover next-gen pharmaceuticals to cure Cancer, Alzheimer's, Huntington's, while preventing infectious disease like Ebola, HIV and Corona Virus
12	MTN		Medicalchain	$ 2,102,560	UK	2017	medical data	Medicalchain is a decentralised platform that enables secure, fast and transparent exchange and usage of medical data using blockchain technology
13	PTOY		Patientory	$ 1,549,676	Georgia, USA	2017	medical data	Empowers our users with actionable insights from health data, incentivizing them to take control of their health outcomes
14	BOLTT		BolttCoin	$ 765,190	India	2018	wellness	Rewards users for taking steps, listening to music, playing games, watching content & sharing this data on the Blockchain
15	SHENG		SHENG	$ 400,001	Singapore	2020	wellness	A Business-to-Business for Consumers (B2B4C) platform for the Lifestyle, Wellness and Healthcare industry
16	UBN		Ubricoin	$ 370,659	Nairobi, Kenya	2020	global health	Blockchain Technology for Global Health Ensuring Universal health access
17	INNBC		Innovative Bioresearch Coin	$ 252,732	Italy and UK	2018	medical research	A decentralizing funding of biomedical research, bypassing economical conflict of interests of centralized pharmaceutical companies
				$ 729,136,931				

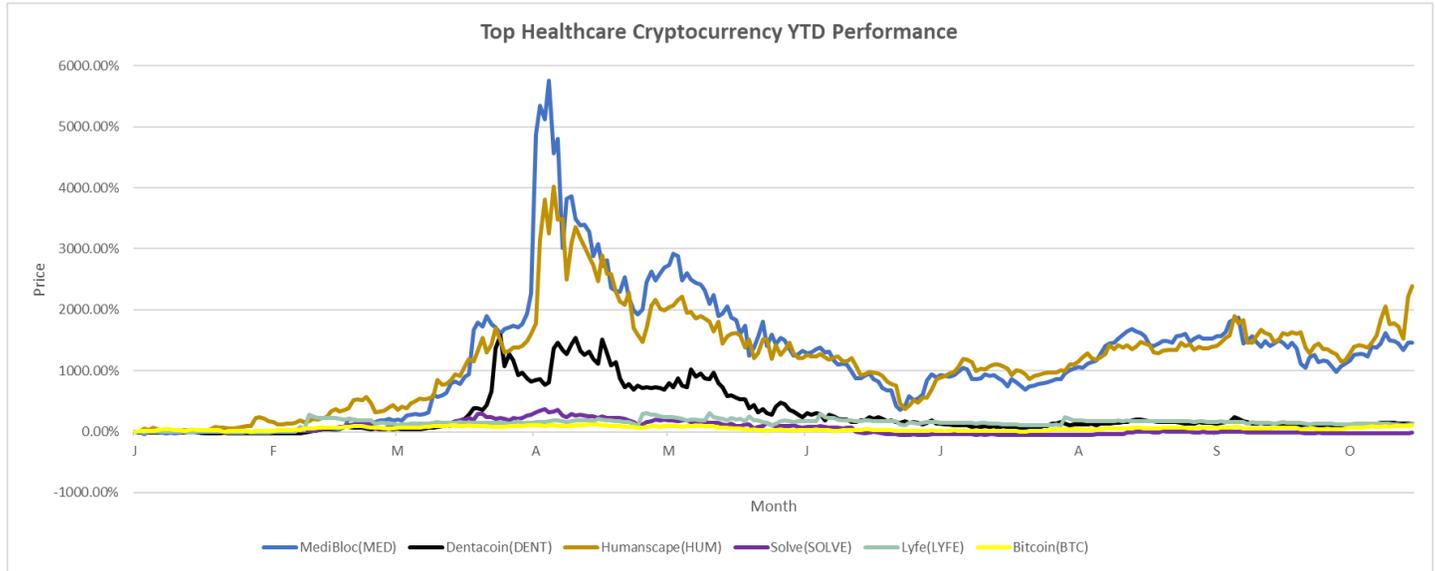Sources: Coinmarketcap.com, CoinGecko.com, Coinbase.com, Icoholder.com

ICO Year

2019, 1
2018, 7
2020,
2012, 1
2017, 5
2014, 1

Area Focus

Research, 2
Other, 6
Wellness, 3
Data, 6

■ Data ■ Wellness ■ Research ■ Other

Headquarters

Country	# of Coins
US	3
Korea	2
Singapore	2
UK	2
Kenya	1
Ukraine	1
India	1

Cryptocurrency in Healthcare MARKET ANALYSIS, USES, AND FUTURE APPLICATIONS
October 2021

Top Healthcare Cryptocurrency YTD Performance

Top Coin Performance Vs Bitcoin BTC

Index:	YTD Returns 2021	Price 1/1/21	Price 9/30/21
BTC	49.08%	$ 29,374	$ 43,791
HUM	1172.06%	$ 0.00780	$ 0.09925
MED	1121.32%	$ 0.00486	$ 0.05936
LYFE	119.72%	$ 0.01777	$ 0.03905
DENT	109.09%	$ 0.00001	$ 0.00002
SOLVE	-31.76%	$ 0.09424	$ 0.06431

ICOs and Graveyard Coins

New Healthcare ICOs 2021

Ticker	Name	ICO Date	Description
IHT	iHealth	Oct-21	A decentralized medical research token
NUBA	NUBA Pass	Sep-21	HER ecosystem based on blockchain
FLY	Fly Amanita	May-21	Unlock potential of Amanita mushrooms for pharma
cCBD	CBD Cash	May-21	cCBD tokens backed by CBD
$HOPE	Hope Token	Apr-21	A social token
WELB	WellBe Coin	Apr-21	Supports fitness industry

*ICOlink.com

Graveyard or "Zombie" Coins

Ticker	Name	Summary of Use
CVC	Covicoin	From the immense transactional freedom through a unified healthcare framework, to the decreased financial inequality as a result of algorithmic allocation of charity funds
HOSP	HospitalCoin	A decentralized medical research token
ZOM	ZOMZOM	OM is Yazom's digital currency that will be used to power its DApps which will communicate with its native mobile and web apps
SLC	SeleniumSLC	Selenium Coin simplifies the documentation processes in the healthcare sector to coordinate and exchange data better to benefit different stakeholders, including patients, doctors, hospitals and others.
DPH	Digipharm	The key to unlocking the door to a future health economy; for both patients and healthcare organisations alike
PCT	PerksCoin	An Ethereum based ERC20 token designed to be the main transaction medium within the PerksCoin Transaction Platform (PTP), designed by CannaSOS
MEDIC	MedicCoin	A community-driven crypto focused on improving the health of people throughout the world via innovative reward programs, recruiting others to help advance scientific research and donating to charities
HELTH	Health Token	Will be used within Health Token's ecosystem of apps which aim to create a community based around Fitness and wellbeing, whilst providing rewards in HELTH to active and contributing users
HEP	Health Potion	An incentive token for players to participate in game competition, mainly used to breed new pets in the game.
HEAL	EthealHeal	Token that is used to help doctors pay for patient leads, incentize patients for writing reviews, and profile validation

5

CRYPTOCURRENCY BASICS

There has been a lot of hype around the word cryptocurrency, leading to a great divide in companies looking to leverage the buzzword for marketing, and others developing uses or applications for business payment transfer (fintech) or consumer/patient engagement. Frequently, you may hear the word "decentralized" used as one of the main buzzwords associated with cryptocurrency. Even that is tossed around a little loosely, as different implementations of blockchains and cryptocurrencies provide for different magnitudes of decentralization. We provided a definitions section at the end to assist with clarifying the most commonly used words.

Cryptocurrencies are the only type of currencies with the following three features: ensuring pseudo-anonymity, independence from central authority, and double-spending attack protection

So, what is cryptocurrency then?

Cryptocurrencies are virtual cash or tokens that exist online, not backed by any government and built to be very secure. "Crypto" comes from cryptography, which is the process of converting regular text into unintelligible text. The text is only for those who can read and process it by using code to keep the information secure and away from hackers. Cryptocurrency transactions are irreversible, which means that after a cryptocurrency has been sent and the network has confirmed it, it cannot be retrieved. They also have varying stages of anonymity depending on which token is utilized, enabling anyone to open a wallet without identification. Cryptocurrencies are fast and globally accessible whereby entries are immediately broadcast across the network and confirmed within a few seconds to minutes.
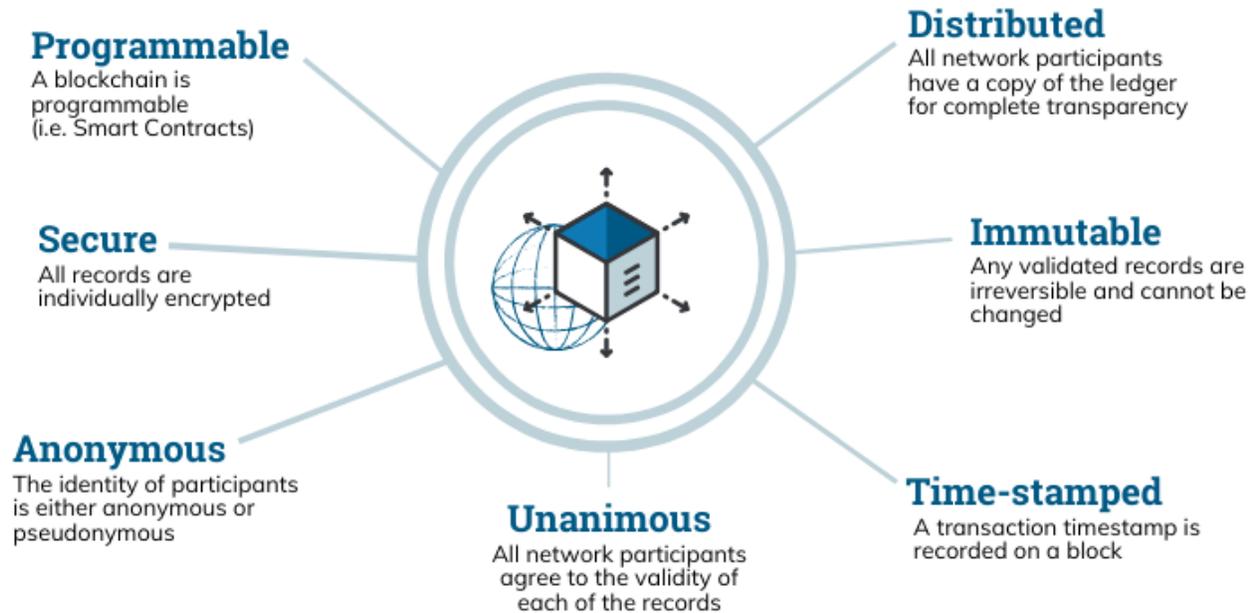
Cryptocurrency[1] is a system of decentralized, digital currency that meets all the following 6 conditions:
> (1) The system does not require a central authority.
> (2) The system keeps an overview of cryptocurrency units and their ownership.
> (3) The system defines whether new cryptocurrency units can be created. If new cryptocurrency units can be created, the system defines the circumstances of their origin and how to determine the ownership of these new units.
> (4) Ownership of cryptocurrency units can be proved exclusively through cryptograph.
> (5) The system allows transactions to be performed in which ownership of the cryptographic units is changed. A transaction statement can only be issued by an entity proving current ownership.
> (6) If two different instructions for changing the ownership of the same cryptographic units are simultaneously entered, the system performs at most one of them

Cryptocurrencies often get confused with blockchain, but while blockchain can be implemented without cryptocurrencies, cryptocurrencies need blockchain (or some other form of a decentralized and transparent system such as IOTA, an open-source distributed ledger and cryptocurrency designed for the Internet of things) to function. In an exposed and decentralized system such as cryptocurrencies, "miners" are a key component of extending the availability of the currencies (since there is no central government or body to manage the supply). A miner's role is to perform calculations on computers to verify the transactions. The incentive for their involvement would be the currencies when each transaction is coded and solved. With the miners and the blockchain system, cryptocurrencies can then facilitate inter-party transactions, including greater transparency in payment frequency and occurrence, ease of sharing data cross-platform, and reducing barriers to entry into the healthcare system.

1. Lansky, Jan (January 2018). "Possible State Approaches to Cryptocurrencies". Journal of Systems Integration.

The Properties of Distributed Ledger Technology (DLT)

Programmable
A blockchain is programmable (i.e. Smart Contracts)

Distributed
All network participants have a copy of the ledger for complete transparency

Secure
All records are individually encrypted

Immutable
Any validated records are irreversible and cannot be changed

Anonymous
The identity of participants is either anonymous or pseudonymous

Unanimous
All network participants agree to the validity of each of the records

Time-stamped
A transaction timestamp is recorded on a block

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This blockchain mechanism is a ledger of encrypted data that is copied amongst all participants (or nodes) in the network, a Distributed Ledger Technology (DLT). You can think of it like an Excel spreadsheet or Google shared files. Imagine that you and your colleagues are working on the same spreadsheet, adding new rows containing unique information. The computer you are working on represents a "node," which will be used to verify yours and others' changes to the spreadsheet. When you click save on your spreadsheet, it sends the changes out to the other Excel workbooks in an encrypted fashion.

For them to accept the changes, there needs to be "consensus" amongst the nodes that you are, in fact, a participant in the network who is authorized to make changes. How consensus is done varies depending on what cryptocurrency type is used, but the general principle that everybody now has an updated copy of the Excel spreadsheet is the same across all types. Once consensus is reached, everyone's updated copy is reflected across all nodes, and the thus the size of the blockchain has increased as well.

Cryptocurrency is fundamental to blockchains for a few reasons. First, blocks can only contain a finite number of transactions. Second, there are only two ways to program a system to allocate finite resources: pricing mechanisms or rationing algorithms. Finally, pricing mechanisms are more effective when the demand is not entirely known beforehand.

BENEFITS

The primary advantages that are gained from cryptocurrency are the added **1) Efficiency**, **2) Privacy**, and **3) Security**.

Information asymmetry is one of the root causes of many of the issues facing healthcare systems today. Healthcare providers' disputes and frustrations are often caused by various prevalent issues with processes, most notably, data management, consent management, and compliance with administrative and clinical protocols. Hence, getting the right information to the right people at the right time.

The administrative burdens that are being placed on healthcare providers cannot continue to stand in the way of providing effective and efficient healthcare in the twenty-first century. Modern healthcare systems, *(how is that even defined)* are missing something fundamental, which is the ability to establish and maintain a trusted relationship with key stakeholders. What is needed is a fundamental shift in the way how healthcare is approached.

Data management, consent management, and administrative management are essential to all healthcare transactions, and tokenization and blockchain address each of these pertinent issues while also facilitating their automation.

Cryptocurrency and blockchain allow for the building of interoperability around the patient, which empowers patients to be self-sovereign, ensuring that all their medical data is decentralized and solely in the control of the patient. This is the paradigm shift that is required, especially if we are to improve the healthcare system.

By utilizing digital currencies in healthcare, practitioners and hospital administrators can easily track and audit patient transactions on the ledger, creating a transparent and secure payment system. Even with blockchain technology, the healthcare industry will not achieve an equilibrium of efficiency by investing in the old paradigm. Instead, all key stakeholders, from healthcare providers and patients to insurers, must establish trusted relationships if a system is to achieve true efficiency. Cryptocurrency and blockchain can be utilized to establish trust between these parties and ensure the future prosperity of the industry as a whole, with the patient right at the center.

Further, cryptocurrency adoption can improve healthcare sector efficiency by affording improved access and allowing a more dynamic and holistic patient-provider relationship. Despite being called a currency, cryptocurrencies are not just limited to currency in the financial sense. In fact, cryptocurrencies have evolved into a crypto "token" to expand the applications beyond purely monetary implications.

Gamification with rewards for activity or adherence is finding its way
into home healthcare and senior facilities to improve balance and fall prevention

Tying tokens to patient behaviors has a broader-based impact on the healthcare paradigm, including wider implications for global impact and population health. In today's world, advancements in medicine and technology have significant influence for population health management. The ability to collect data for one, multiplied by the many more patients who opt in, can transform the way patients manage their health, partner with providers, and pay for healthcare services. If healthcare data is transparent and transactions recorded on the blockchain, that information can be used as a marker for disease progression and improvement. Imagine a diabetic patient who is trying to maintain A1C levels. If that healthcare data can be analyzed and shared, cryptocurrencies can be used to create incentives for patients to continue to track their levels and maintain their health.

Think about one of the biggest challenges the healthcare industry faces: adherence. Part of the adherence challenge is understanding whether a patient has been able to acquire prescriptions. With the blockchain, the hospital, the doctor, the pharmacy (all in different locations and on different systems) can see where the prescription gap might be. Any of these intermediaries can then intervene for the patient and ensure the prescription gets filled, thereby improving adherence and overall health.

There are many types of electronic currencies for a variety of financial use cases, including the ownership of an underlying physical device ("smart property") and more complex applications like "smart contracts." Ethereum is a "smart contract" crypto that can execute contract terms more quickly than can be done today, for example, ensuring hospital supply orders get filled, shipped, and paid at a specific volume threshold (within hours), versus waiting for a signature, invoices, payments, and final delivery (which could take days to weeks). Smart contracts are theoretically maximally efficient, executing code to process contracts as opposed to requiring human interaction to execute and thereby introducing human error and reduced processing speeds.

Because they are more than just a financial vehicle, cryptocurrencies represent a token of trust between transacting parties. In healthcare, most of the valuable information is disparate and isolated from other systems and beneficiaries. Cryptocurrencies can help democratize the sharing and access of anonymized data by providing an incentive for people to share data and for miners to transact on the ledger, while maintaining maximal privacy.

With open access to the entire medical record, the opportunity for providers to care for patients across a patient's lifetime is remarkable. An early-stage company, **Factom**, has built a business to maintain a "permanent, time-stamped record" of an organization's data footprint, which can reduce costs, time, and investment for audit trails and regulatory requirements. Factom has teamed up with a medical records company so that healthcare providers can store and share data, especially during billing disputes. The greater the utilization of blockchains and cryptocurrencies, the greater the possibility for trust among parties to grow.

9
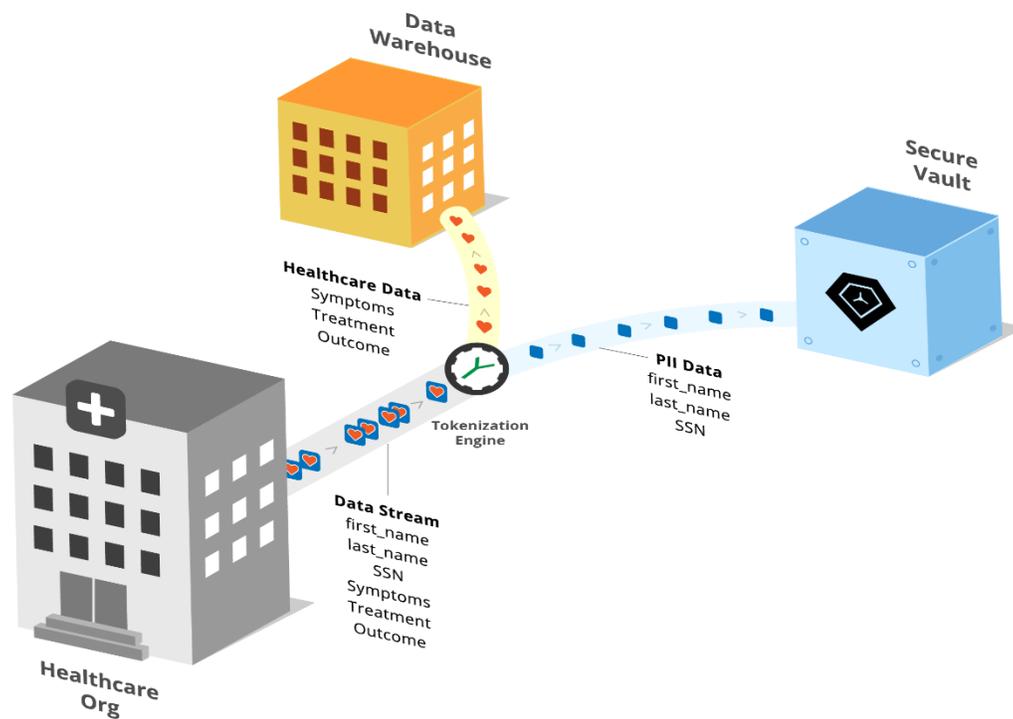
Extending the concept even further, as data becomes increasingly shared and data silos reduced or minimized, and incentives aligned, the interoperability challenges currently facing healthcare could be reduced. One example of data sharing includes **Dentacoin**, which patients can earn with each review or feedback they provide to their dentists. With this knowledge, dentists can improve oral health for patients and patients receive the benefits of their feedback combined with a derivative option to pay for dental services. Examples like these show the implications across the healthcare value chain could be significant, potentially eliminating waste in healthcare transactions and even fostering greater community and openness between providers and patients.

Because every node in the underlying blockchain must have the exact same copy of the ledger, every change to it is transparent and clear to every participant. Therefore, there is critically increased security and a growing sense of trust amongst the participants in the network. This concept could be important for the use of financial institutions when verifying transfers of money and preventing fraud. In the healthcare industry, the underlying blockchain and related cryptocurrencies could be used for claims processing. For example, practices could be deterred from billing for services they did not provide, as the ledger could be permanent and audited back to the beginning of time.

Along with trust comes the added layer of security. In healthcare, interoperability and related security are of the upmost importance. Exchanging healthcare information amongst the required parties requires extreme care. Cryptocurrency, if implemented properly, could provide a safe vehicle for exchange of information, as only verified participants can access such information. Further, tokenized medical data allows for direct transfer between and amongst the network of patients, providers, and payers, providing what is ultimately a critically more efficient and secure information transfer system between players.

RISKS

The primary disadvantages garnered from cryptocurrency are **1) Volatility**, **2) Security**, and **3) Regulatory Risks**.

A key aspect of the bull case is that cryptocurrency is everything a traditional fiat currency is not. In most cases, it is designed to have a finite number of coins. This in theory means it is not subject to a government's proclivity to "print" money, which can drive inflation and help with debt but reduces the currency's purchasing power. It is no coincidence that prospects of inflation have driven investor interest in cryptocurrency as a potential hedge. But there are many reasons to remain cautious about cryptocurrency:

The key job of any currency is to be a consistent, reliable store of value. Anyone holding currency should have a general sense of what it will buy, at least for the foreseeable future. Given the volatility of these cryptocurrencies thus far, the store-of-value feature is clearly not yet functional.

Cryptocurrency's eye-popping returns have attracted many new investors. But those returns have come amid extreme volatility. Bitcoin has experienced much sharper drawdowns than the S&P 500 since early 2020. Speculators have added fuel to the fire by using leverage (borrowing to buy). A recent *Wall Street Journal* article pointed out that margin debt makes up about 2% of the $49 trillion U.S. stock market, but for the $1.6 trillion crypto market it's 6%, three times that amount.

The most consistent long-term returns come from investments that can be priced based on fundamental value. This reduces the impact of investor sentiment on the price. Cryptocurrencies have traded with extreme volatility driven by rapidly shifting investor sentiment, most infamously in response to overnight tweets from Elon Musk, Jack Dorsey or Mark Cuban. It is a market where emotional reactions to a headline or tweet can lead to violent reversals.

Security is a major concern. While cryptocurrencies afford greatly increased security on the blockchain itself, cryptocurrency markets are still unregulated, digital wallet apps can be anonymous, and services are neither regulated nor insured. If there is a cyberhack, software failure, theft, or even lost passwords, investors have nowhere to turn for support or help. According to *The Wall Street Journal*, hackers stole $120 million of cryptocurrency in 2020 and another $411 million as of early June 2021. This seriously undermines the argument that it is a secure way to transact. Organized criminal groups like drug cartels or hackers have been increasingly using Bitcoin as a more efficient means to execute anonymous transactions. Offsetting this concern, we have seen new insurance policies to cover selected losses. Utilizing these cryptocurrencies with daily comfort and protections continue to evolve quickly.

Regulation, for better or worse, and a country's ability to manage its currency is a critical tool in a functional economy. It seems unlikely that the governments in the U.S., China, the European Union, and other large countries will stand by and watch their sovereignty erode with the global adoption of a replacement currency. China has already started to regulate cryptocurrency by declaring it illegal to mine, trade, or own, and other nations (Nigeria) have indicated similar intentions. On the other hand, El Salvador announces full adoption of Bitcoin as means of legal tender and the MiamiCoin (Miami FL) is the first CityCoin which allocates 30% of the mining rewards to Miami (call it a tax?). Governments are forced into a balancing act, where they must choose between overregulating and stifling innovation, or underregulating and leaving the consumer, the public vulnerable. According to **John Wagster**, a cryptocurrency attorney at **Frost Brown Todd** law firm, the aim becomes "to eradicate the truly bad actors," particularly those attempting to engage in fraud and theft of both medical data and stores of value, while setting a precedent that the larger legally abiding cryptocurrency communities are not going to see their wealth and projects exorcised at the stroke of the pen.

Another regulatory concern might be that compliance in healthcare is often based upon FMV to prove there is no fraud or kickbacks and with a potentially volatile value a transaction at FMV might wildly change in a short period of time.

The future of healthcare maybe decentralized, autonomous, and tokenized.

The incorporation of digital currencies and blockchain technology dramatically changes the way in which we engage with healthcare services, from consultation to payment of services and prescriptions. By incorporating blockchain technology, we will benefit from the enhanced transparency and security of transactions made within the healthcare system. It will improve the efficiency of the system for all stakeholders. But most importantly, the patient must be at the center of where we build interoperability.

Utilizing these technologies can reduce healthcare costs in several ways, but it also makes the administrative, care delivery, and payment processes far more transparent. We can also eliminate many time-consuming processes and provide each party with the capacity to carry out the main functions of their role, providing a standard of care that is worthy of the price tag.

Hashed Health CEO **John Bass** commented "*The crypto ideals of decentralization and community-ownership fit the healthcare space very well. The successful introduction of cryptocurrencies in healthcare would represent a great "unlock" moment. Programmable value transfer is what healthcare needs to support the scaling of new payment & incentive models. Correctly modeled token economics could introduce network effects that the healthcare world has never seen before. These clinical fin-tech solutions have significant technical and non-technical concerns that have made them illusory to date, but the space is maturing rapidly.*"

Questions remain as to whether cryptocurrency will completely disrupt modern finance and with it the healthcare sector. Governance, taxation, and regulation concerns must be addressed before cryptocurrencies can be formally adopted. Companies will have to determine whether the benefits at current outweigh the risks associated with the asset class. Still, the secure, cryptographic nature of cryptocurrency and the ability to efficiently exchange amongst a set of participants makes it a perfect candidate for interoperability in healthcare. Many cryptocurrency advocates will argue that it is still in its infancy, but the next few years will show if the hype was justified.

Healthcare attorney **Louis C. Szura** of **Szura & Delonis PLC** remarks that *"Cryptocurrency has the ability to revolutionize health care administration. The potential efficiency and security benefits are enormous to providers, patients, payers, and those serving the health care sector. The change to the business of health care administration could be similar to the way tele-medicine has been changing patient care encounters."*

If the healthcare industry does not embrace the technological and innovation that it so desperately requires, the provision of healthcare globally will become even more scarce and unsustainable. Will there ever be a Medicare Coin or Medicaid Coin as alternative payment or other application implemented by the government to support healthcare services creating a more efficient system? Now could be the time to be innovative and take some risk to bend the healthcare cost curve by ensuring a safer, more efficient, transparent system.

MediBloc (MED)

The name of MediBloc's mainnet is Panacea and it means "a remedy for all ills." MediBloc is developing a blockchain based health information platform that provides reliable, personalized, patient centric health information under the vision of 'showing innovative paradigm through developing a patient centric health information solution and building a world of healthy lives for everyone.' Panacea is a core technology that will realize MediBloc's vision and will make an ecosystem of patient centric health information collection, management, and utilization possible. Many problems that patients face these days will be cured and improved through Panacea and patient's healthcare experience will be reinvented. Panacea is a health information protocol, a public blockchain with an independent network. On Panacea, records are made and validated through nodes' validation; once a record is successfully put on the blockchain, it cannot be forged or falsified. The core function of Panacea is to record the hash value of health information and to prove the integrity and ownership of the data through the hash value. Panacea can be utilized freely with its cryptocurrency, MED coin.

Panacea's Consensus Mechanism
Panacea blockchain uses a DPOS (Delegated Proof of Stake) consensus mechanism with a PBFT (Practical Byzantine Fault Tolerance) algorithm derived from the Byzantine Generals' Problem. In a DPOS consensus mechanism with a PBFT algorithm, validators (block producers), that are decided by votes of network participants, efficiently produce new blocks at a high speed while synchronizing the blocks. In Panacea, the group that validates and produces blocks are called Validators and when they successfully fulfill their duties as validators, they are rewarded with MED mainnet coin based on the number of votes they received as an incentive. Those with MED mainnet coins that are not selected as validators can vote for validators, contribute to block validating process and receive incentives after each block creation is completed.

Simplified Panacea Architecture
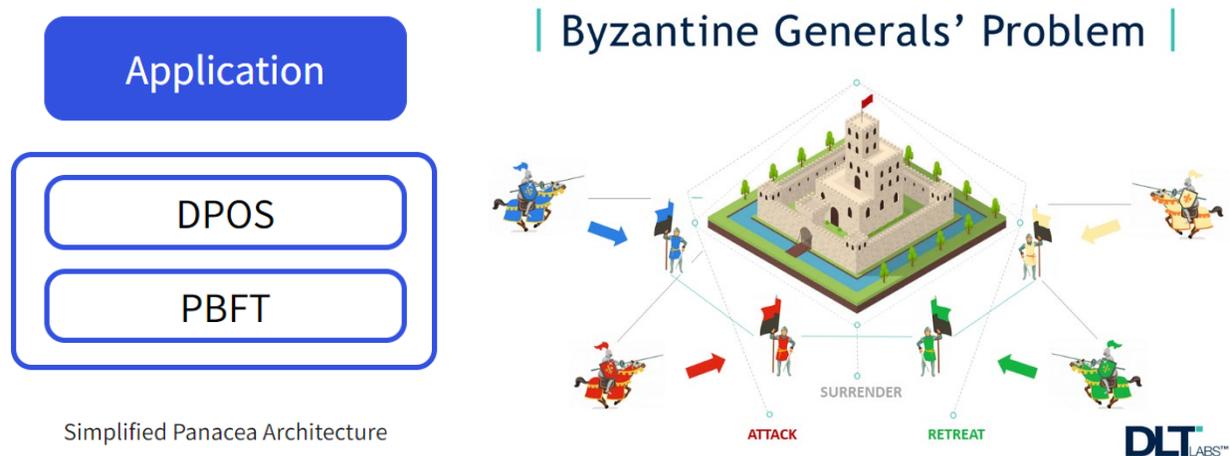
Features of Panacea's consensus mechanism:

Slashing
Panacea utilizes a PBFT algorithm, special for its ability to filter out insincere validators. If a validator does not validate block faithfully or acts maliciously, the staked coins of the validator and the voters will be slashed. In other words, voters' role of choosing a right validator is as important as validators role of acting faithfully. As a result, the voters are motivated to vote for suited validators and, ultimately, lead a virtuous cycle of the blockchain. This algorithm and method will upgrade data validation, security and reliability that are required for a successful medical blockchain and will be the forte of Panacea.

One Block Finality
Panacea's one block finality mechanism complements weak spots of existing blockchain. Existing blockchains use "First - block production and then - consensus" mechanisms that are exposed to various risks of malicious attack, whereas Panacea uses one a block finality mechanism, which is "First - consensus and then - block production", that yields a 100% reliable consensus mechanism. With this feature, there will never be any forks.

Incentives
Validators that receive more votes from the voters (the mandators) will have more frequent block producing turns as it will have a higher probability of being selected as a block producer. The validator will be rewarded with MED, MediBloc coins that are gathered through inflation (minting) and a gas fee. Validators can set their own rate of commission and the voters (the mandators) who voted for a specific validator will be incentivized according to the voting rate from the total incentives that the validator has received minus the rate of commission that the validator has set. The voters (the mandators) can check the validators' information and the rate of commission through Panacea explorer. The inflation rate is adjusted based on the number of staked coins on Panacea. If the number of staked coins is decreased, the inflation rate will go up and vice versa. Hence, as more coins are staked by the validators of Panacea, the circulated supply of MED mainnet coin will decrease while maintaining its value.

Node construction of Panacea
The validators of Panacea will be selected by votes from the users. Candidates will be divided into different classes such as regular user, healthcare companies, medical institutions, etc. Some of the nodes could be healthcare companies or medical nodes that cooperates with MediBloc. Before the token swap of QRC20 and ERC20 tokens to the mainnet coin, MediBloc will be operating all the validators (nodes); after a successful token swap and selection of validators, MediBloc will burn or airdrop all the incentives it received as validator.
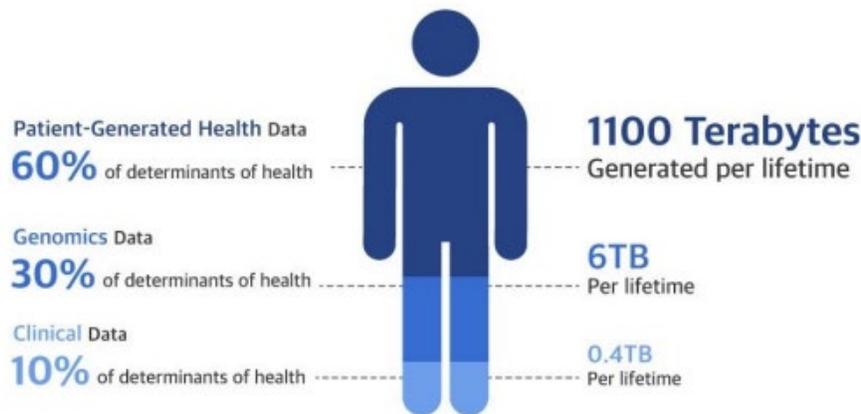
Verifiable health information hash value
In the MediBloc platform, health information is managed in the form of a Merkle tree. In case of services that utilize a specific data format or messaging protocol (ex. HL7-FHIR), the data go through a "Merklizing" process and MediBloc provides software tools and guides to have these services easily utilize data through Panacea. The merit of the Merkle tree approach is that the users can share parts of the data while guaranteeing its integrity. The data owner will record the root hash of the Merkle Tree on Panacea, the blockchain. Due to Merkle Tree's properties, even if the owner of the data only shares part of the data, the receiver could still check the integrity of the data through Merkle proof and root hash. Through this trait, data could be de-identified easily by omitting the personal information or could be checked for integrity before the actual data gets transferred or traded. The original data, which is converted into the Merkle tree format, is stored in users' smartphone devices. Since only the root hash of the original data will be stored on blockchain, there are no restrictions in the methods of encryption in sharing or storing the data. Even if the current encryption method loses its security because of the increase in computing power, new encryption methods could be implemented at the service level while not interfering with the records on the blockchain.

Panacea's role
Through Panacea, data is managed by the data owners and the owners can safely update, send, utilize, and record the hash value of the health information. Many problems that patients face these days will be cured and improved through Panacea and patient's healthcare experience will be reinvented.

All the activities on Panacea could be checked through transactions (In case of protected health information, only the hash value will be stored); Supporting the collection of patients' health information from websites, mobile applications, etc.; Receiving patients' consents to utilize their health information; Empowering patients to have control over the collected health information; Allowing healthcare companies and medical institutions to trust patient managed data; Enabling the utilization of patient-consented data More information at www.medibloc.com.

Humanscape (HUM):

Patient-Generated Health Data
60% of determinants of health

1100 Terabytes
Generated per lifetime

Genomics Data
30% of determinants of health

6TB
Per lifetime

Clinical Data
10% of determinants of health

0.4TB
Per lifetime

Source: "The Relative Contribution of Multiple Determinants to Health Outcomes",
Lauren McGover et al., Health Affairs. 33. no.2(2014)

Humanscape is developing a blockchain-based patient network for the exchange of medical information.

Patient-Generated Health Data (PGHD) refers to health-related data recorded and generated by patients outside hospitals. Due to the widespread penetration of smartphones and the growing familiarity of patients with smart devices, the collection of diverse PGHD has become easier through the utilization of online survey, mobile apps, and wearable devices.

PGHD is a component of health data alongside genetic and clinical data and occupies substantial amount of health data which makes its importance and applicability more significant [Figure above]. Since most of a patient's activities occur outside hospitals, information recorded at a clinical office is inevitably limited. Therefore, a growing importance is being placed on PGHD, as information directly collected from patients and directly produced by patients throughout their struggle against diseases. While PGHD has previously been regarded with less clinical value and interest compared to other types of information, it fills an information niche by complementing aspects that cannot be explained by existing medical data and allows a more comprehensive understanding of patients' health.

An **Accenture** survey found that the number of consumers who participated in the collection of PGHD using mobile healthcare applications rose to 33% in 2016, up from 16% in 2014, which shows that the volume of PGHD collected will increase exponentially in the future. Information on patients' health and diseases can provide a clue to the solution for diseases that are currently incurable. As PGHD becomes more accessible with technology advancements, patients have become able to capture their health-related data independently and thoroughly. As a result, patients are more actively engaged in overcoming their diseases and are more interested in their own health. In addition, patients can participate in the collection of data; to observe how their health status has changed with time; to independently identify behaviors that influence health; and to satisfy their intellectual desire to be informed about diseases and the human body by sharing information with other patients.

These processes allow patients to be more deeply engaged in treatments or research on their diseases and reinforce their desire to undergo treatment. For instance, according to a survey conducted on heart disease patients in the Connected Cardiac Care Program at **Mass General Brigham**, 98% of the respondents reportedly became more aware of their diseases through PGHD, and 85% of them came to be able to better control their diseases. A pilot project conducted by the Care Beyond Walls & Wires revealed that PGHD influenced reducing the readmission rate by 44%, average length of stay by 64% and hospital cost per patient by $92,000. As such, PGHD has been shown to have an actual influence on various aspects of patients' struggle against diseases.

Healthcare professionals make decisions on medical treatments based on data collected from hospitals. However, these data are created by capturing patients' health at a certain time point, and therefore exclude PGHD, which involves continuous changes of conditions or phenomena occurring outside hospitals. Sole dependence on clinical data does not allow for a comprehensive evaluation of patients' health and may result in incomplete diagnosis or underdiagnosis.

To improve this situation, PGHD collected in patients' daily life can be used to reduce misdiagnoses and aid the treatment of chronic and rare and intractable diseases. Furthermore, healthcare professionals will be able to more comprehensively understand patients' health using PGHD. For example, they may take proper actions earlier, after detecting sudden changes in patients' health conditions, and manage patients' health to the best possible extent by changing treatment methods if necessary. In addition, their continuous observation of patients' daily life through PGHD yield insight into patients' health as well as necessary for treatments tailored for patients' condition, which ultimately assist the improvement of patients' health.

Researchers and pharmaceutical companies can recruit test subjects more easily and diversely through online ads or social media without being dependent on hospitals or hospital-based systems. These collection methods can improve the speed of research and reduce the time required to establish a cohort or a data set to facilitate effective analysis. For example, **PatientsLikeMe** functions as a platform for patients to better manage their health and for researchers to easily obtain data. Pharmaceutical companies and clinical trial institutes acquire patients' data through PatientsLikeMe and are using the data for research purposes. Likewise, Humanscape will also contribute to disease research, through the documentation of shared data on the medication effectiveness and side effects to patients and the categorization of patient groups for various diseases.

The US Food and Drug Administration (FDA) is already reflecting the PGHD of patients' opinions and experiences in its drug review process for rare and incurable diseases. This is because reflecting patients' direct experiences and opinions in the development stage of a new drug, such as in clinical trials, may result in the production of safer and more effective medicine. Specifically, the FDA is developing Externally-Led Patient-Focused Drug Development (EL-PFDD) meetings into a channel for the collection of data based on the experiences of actual patients to provide them with helpful information on medication and treatments. For more information: www.humanscape.io/en/about.html

Solve.Care (SOLVE):

Solve.Care's revolutionary platform will significantly improve care outcomes by dramatically reducing healthcare administration costs and substantially reducing the opportunity for duplication, waste, abuse, and fraud. We expect to create major cost savings by facilitating authorized peer-to-peer transactions that delegate authority to individual stakeholders while empowering payers regarding cost control and oversight. Utilizing blockchain technology and Care.Coin, an intelligent programmable payment token used to pay providers, offering incredible flexibility in managing accountability and transparency and validating proof of service, Solve.Care radically reduces the unacceptable administrative burden placed on healthcare providers and enhance the care experience of individuals.

Summary of key characteristics of Care.Coin: Stable monetary value, guaranteed redemption, adjustable administrative cost components, immutable audit trail, access control, proof of service and automated escrow and release.
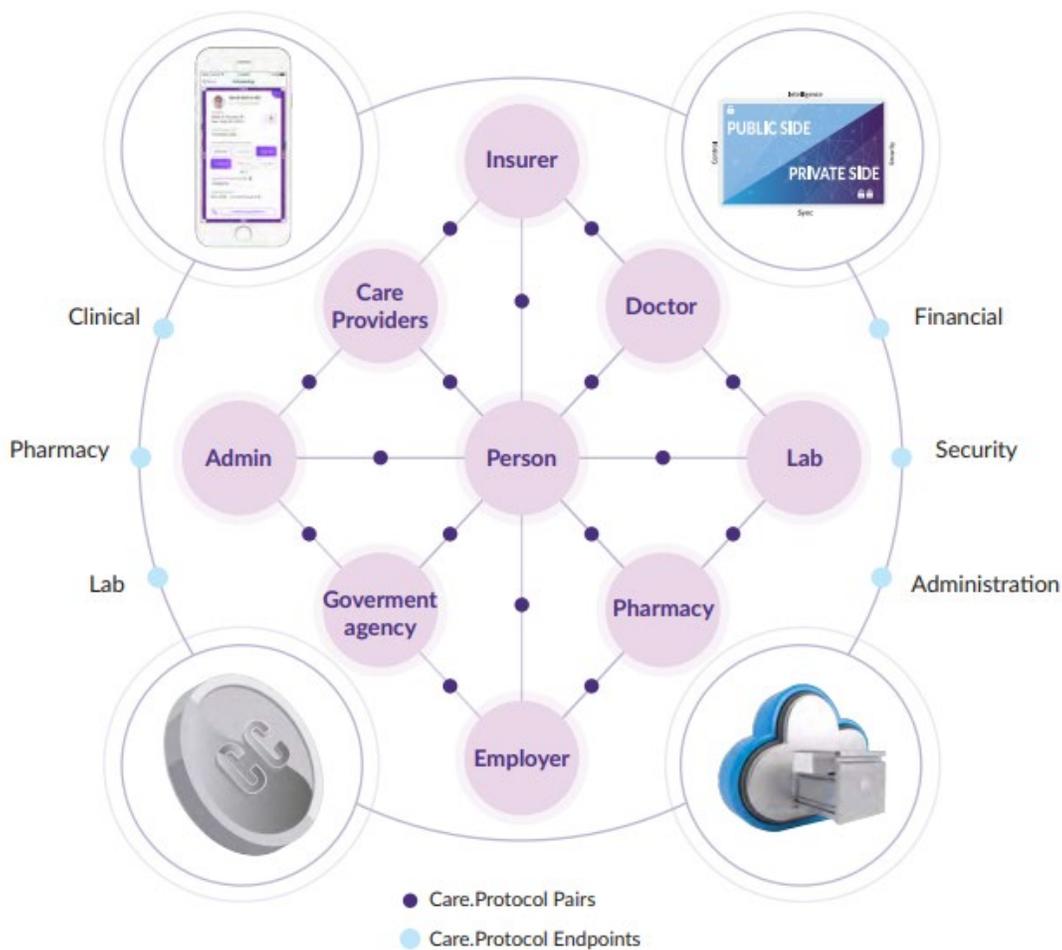
Solve.Care platform can perform the tasks of current processing and management systems at 3% of total spend using Care Administration Networks thus reducing processing and management of systems and the potential to reduce overall spend. The growth of blockchain technology is the paradigm shift in health care that will allow for true coordination of care administration that the Solve.Care platform can achieve. Solve.Care estimates that the addressable market size is over $100 billion for the U.S alone and billions more in other health care systems around the world

In early 2018 Solve.Care signed a multi-year agreement with the first client – Arizona Care Network ('ACN'). This is a substantial organization that manages care for over 250,000 members, through 5,500 physicians, at 1,800 locations.

Using Care.Protocol, a simple but powerful tool that enables anyone to easily and rapidly define and publish decentralized healthcare applications (dApps) that are interoperable, secure, and personalized on the platform, at 1/10th the cost compared to traditional systems. www.solve.care

Solve.Care ensures patients, doctors, and those who are responsible for managing the payment of healthcare can collaborate effectively along three core business pillars:
1. **Effective Coordination of Benefits** – Enabling seamless interactions between stakeholders (patients, healthcare providers and insurers) regarding the eligibility of care, payment plans, and timely reimbursements.
2. **Effective Care Coordination –** Minimizing administrative frictions surrounding care management, enabling interoperability, and improving clinical outcomes.
3. **Effective Payment Coordination –** Providing pricing transparency and immediate payments, and eliminating waste and overbilling, using a programable digital token.

Stem Cell Project (SCC):

A cryptocurrency created on the basis of Ethereum network, and it has been designed to use for all the services provided by the Stem Cell Project team. There are 5 billion coins in circulation and the funds raised from the initial coin offering in 2018 of SCC will be used for development/introduction of payment system for the cost of Stem Cell treatment at their own hospitals/affiliate clinics, development/introduction of pathological/diagnostic imaging systems by artificial Intelligence (AI) and blockchain, development of virtual clinic platform, costs of construction and expansion of hospitals for stem cell treatment, research and clinical work for pharmaceuticalization of stem cells. https://www.stemcell-pj.net/en

Dentacoin (DCN)

Founded in 2017, the Netherlands-based Dentacoin Foundation is the autonomous organization behind the Dentacoin blockchain-based solutions and the same-named cryptocurrency. It is an Eth Dentacoin offers 3 primary areas of value-added use cases. Firstly, through creating and implementing the first Blockchain-based platform for trusted dental treatment reviews, the Dentacoin Foundation will allow patients voices to be heard and dentists will have access to up-to-date, extremely valuable market research data and qualified patient feedback - the most powerful tool to improve service quality and to establish a loyal patient base. Secondly, Dentacoin offers a rewards-based system through their Dental Oral Health app, where users are able to be awarded Dentacoins for maintaining good dental hygiene. Finally, implementation of a dental assurance plan through a self- executing Smart Contract is financed completely through a Dentacoin. The fundamental value of the coin is $60 per coin. www.dentacoin.com

Lyfe (LYFE):

A gamification platform that was founded and designed to help monitor physical activity and maintain a healthy lifestyle through various challenges and be compensated with Lyfe tokens for completing challenges. Lyfe tokens can be redeemed for items in the categories of travel & transportation, shopping, food & beverage, E-commerce, health & fitness, insurance etc. In 2021, Lyfe launched Lyfe Gold (LGold) which is a digital asset in Indonesia that is supported by gold commodities. LGOLD is a part of Lyfe's program to create stable tokens and be backed up by Physical assets to complement the Lyfe token ecosystem. More information at www.lyfe.health

18

Medishares (MDS):

Mutual DAO System is a Ethereum based, decentralized, open-source mutual insurance marketplace. MediShares (MDS) is the token that users spend to buy into mutual insurance schemes. More information www.mutualdao.org/en

MediConnect (MEDI):

MediConnect is a blockchain solution intended to revolutionize the use of medication in the UK. Its token, the MEDI is utilized by partnering with pharmacies and offering rewards for shopping on those pharmacies' websites, and the token will help with the Mediconnect platform by fueling the computer processing power that it needs in order to fund transactions. The MEDI token can then be exchanged for other cryptocurrencies and be used for rewards on the MediConnect platform. More information at https://www.mediconnectuk.com

Dynamic (DYN):

At its core, Duality creates a data infrastructure and interoperability framework to help support the foundation of information exchange across all health sector boundaries including physical infrastructure (networks), services, and applications. Dynamic utilizes a DYN token asset system to ensure there is enough fuel supply for Distributed applications, a predictable cost, and that there is proper incentive for Validators to secure the network. To achieve this, Duality has created an Emission Algorithm to reward Validators and an Arbitrage Smart Contract to cap the fuel price for developers. More information duality.solutions

Docademic (MTC):

The MTC coin has 3 different purposes. Firstly, as Crypto Token users can pay for products and services on all of Docademic's platforms, secondly as the currency that interacts with the blockchain Docademic stores patient and healthcare data in, and finally as a tradable Crypto Token on the open market. 1 billion MTC coins were issued, and proceeds from the ICO will go into expansion of services (50%), this includes setting up Doctor Video Call Centers throughout worldwide regions as well as sales teams, Product Development (20%), Operations (15%) and Legal/Regulations (15%). More information at www.doc.com

Curecoin (CURE):

CURE is a Bitcoin-like digital token designed to reward those who create computing power for the DCN. It uses decentralized blockchain technology to allow unlimited and nearly free exchange of Curecoins on the Curecoin network. Developer Joshua Smith developed the original concept in early 2013, joined soon after by Maxwell Sanchez. Together, they created the version of Curecoin that launched in May 2014. Maxwell is now leading the charge on the technical side of the next iteration of Curecoin version 3.0+. To date, the Curecoin Team has donated nearly $45,000 USD in converted CURE and other cryptocurrency to over 30 charities around the world, and continues to do so through their 501(c)3 sponsorship from Visions Made Viable, a nonprofit incubator. More info www.curecoin.net

MedicalChain (MTN):

Medicalchain is a decentralized platform that enables secure, fast and transparent exchange and usage of medical data. Medicalchain's platform will be powered by MedTokens. Over 500 million tokens are issued, which will be distributed at a rate up to 1 token to $0.25 USD in ETH and/or BTC. MedTokens will be used as a reward compensation for users who let research institutions use their health data for studies in a marketplace. Users know exactly how their information is used and how much of it is being used. Users will be able to pay for a variety of different services offered through Medicalchains platform such as telemedicine visits. More information at www.medicalchain.com

19

Patientory (PTOY)

Patientory centralizes all medical data and is HIPAA and GDPR compliant, so that you can easily manage and track your healthcare. Their token (PTOY) is a digital cryptocurrency that drives the Patientory matrix's (PTOYMatrix) value of private health data and cybersecurity. The PTOYMatrix storage network improves data integrity, reduces transactional and operational costs. This system eliminates the friction of third-party intermediaries in managing healthcare data. Using the PTOY, users are able to buy additional storage on applications that use the PTOYMatrix as well as participate in company specific token use cases, enable the Execution of Smart Contracts for the healthcare ecosystem, and healthcare developers can seamlessly integrate their existing healthcare technology software or build forward thinking solutions as Distributed Applications (DApps) on the PTOYMatrix system.

Boltcoin (BOLTT)

Bolttcoin is based in India, and it rewards users for taking steps, listening to music, playing games, watching content & sharing this data on the Blockchain. The rewards are in the form of BOLTT coins. BOLTT Coins can be used to shop offers and products from a large In App Rewards shop. In June of 2020, one of the largest Korean mobile platforms, Kakao, implemented BOLTT in its chat feature called KakaoTalk. More information bolttcoin.medium.com

Sheng (SHENG):

ShengWorld is a Business-to-Business for Consumers (B2B4C) platform for the Lifestyle, Wellness and Healthcare industry. The ShengWorld platform allows companies that sell healthcare, lifestyle, wellness products in a marketplace. The SHENG tokens are used by vendors to stake their positions in the SHENG Ecosystem. In order to join the SHENG Eco-system, vendors must purchase, stake and maintain enough SHENG Tokens to create a node on the blockchain. Different vendors will have different staking requirements depending on their transaction volume size and needs. SHENG Tokens are also used to purchase services such as advertising on the platform. (sheng.global)

Ubricoin (UBN):

Ubricoin will help create a system for solving the three fundamental problems in healthcare: lack of access to health services, poor quality of health services and high cost of health services. Ubricoin has tokens that users can earn that goes towards building retail clinics and a biomedical industrial city in Kenya. These coins can be earned through purchases on sokojanja.com, Participate in ubricoin excellence programs, and buying tokens. https://ubricoin.com

Innovative Bioresearch Coin (INNBC):

Innovative Bioresearch Ltd is a privately held biotech company founded by Italian research scientist Jonathan Fior with the goal of bringing innovation to the field of HIV, cancer and regeneration research. The company utilizes the (INNBC) and (INNBCL) crypto assets that were issued to expand biomedical research, as well as to provide a direct utility as a means of payment to access medical products and services and become the most widely used digital payment system used by a wide number of companies and commercial activities. The (INNBC) and (INNBCL) are meant to be used as a means of payment to access medical products. As such, by owning INNBC you own access to such products, with a token backed by actual pharmaceuticals. INNBC is also the governance token for their (DeFi) ecosystem which is used for keeping track and exchanging coins and but also to access things like NFTs, gaming, and all the other DeFi products in development. More information at www.innovativebioresearch.com

ADDRESS:

Also known as a wallet address, it is used to send and receive transactions on a blockchain network. An address is an alphanumeric character string, which can also be represented as a scannable QR code.

AIRDROP:

A token distribution method used to send cryptoassets to wallet addresses. Sometimes airdrops are used for marketing purposes in exchange for simple tasks like reshares, referrals, or app downloads.

AIR-GAPPING:

A method for securing computers in which the device does not connect to the internet or any other open networks.

ALTCOIN:

Any digital currency alternative to Bitcoin. Many altcoins are forks of Bitcoin with minor changes.

BLOCKCHAIN:

A consensus digital ledger composed of unchangeable, digitally recorded data in packages called blocks. Each block is 'chained' to the next block using a cryptographic signature. This allows blockchains to act like a ledger, which can be shared with and accessed by anyone with the appropriate permissions.

BLOCKS:

Many digital currencies make use of blocks, which contain transactions that have been confirmed and then combined together.

CENTRALISED:

A system or process for which there is a singular source of authority, control and/or truth.

COIN:

A coin or altcoin is a representation of digital asset value that is generated via their own independent blockchain.

CRYPTOCURRENCY:

A cryptocurrency is merely a currency that relies on cryptography. Bitcoin, for example, leverages cryptography in order to verify transactions.

CRYPTOGRAPHY:

Cryptography is the process of encoding and decoding information so that would-be observers are unable to understand the information being sent.

DISTRIBUTED LEDGER:

A distributed ledger is a system of recording information that is simply distributed, or spread across, many different devices. The blockchain, for example, is a distributed ledger that was originally created to keep track of all Bitcoin transactions.

DECENTRALISED:

The transfer of authority and responsibility from a centralised organisation, government, or party to a distributed network.

DECENTRALISED APPLICATION (DAPP):

An open source, software application with backend code running on a decentralised peer-to-peer network rather than a centralised server.

DECENTRALISED FINANCE (DEFI):

Refers to the economic paradigm shift enabled by decentralised technologies, particularly blockchain networks.

FIAT CURRENCIES:

Currencies that have value because they are minted by a central bank. Fiat means "by decree," and these currencies have value because some central authority has decreed that they have monetary value. Examples of fiat currencies include the British pound, euro and Japanese yen.

EXCHANGES:

Marketplaces where traders can make digital currency transactions. If a person wants to buy Bitcoin, going to an exchange is the fastest way to accomplish this objective.

FORK:

A change in a digital currency's rules or protocol. Developers update a cryptoasset's protocol from time to time. A fork can be either a hard fork or a soft fork. A hard fork is a change to a digital currency's protocol that makes blocks created using the old protocol incompatible with the new chain.

INITIAL COIN OFFERING (ICO):

Represents the first time that an organisation offers digital tokens to the public in an effort to raise money. Companies frequently hold these offerings so they can finance projects.

MINING:

The process for creating new units of a digital currency. For example, the Bitcoin network releases new Bitcoins every time a block is mined. In this instance, mining involves confirming transactions and combining them into blocks.

NODE:

Any computer connected to the blockchain network is referred to as a node.

NON-FUNGIBLE TOKEN (NFT):

Fungibility refers to an object's ability to be exchanged for another. For example, an individual dollar is considered fungible as we can trade dollars with one another. Artwork is usually deemed non-fungible as paintings, sculptures, or masterpieces are likely to be unequal in quality or value. A non-fungible token is a type of token that is a unique digital asset and has no equal token. This is in contrast to cryptoassets like ether that are fungible in nature.

PROOF OF WORK (POW):

A system of proving that a digital currency's transactions have been verified. Many digital currencies, including Bitcoin, use POW. Under such a system, miners must do "work" that is difficult for them to contribute, but easy for the broader network to verify.

PROOF OF STAKE (POS):

Another method of confirming transactions. The digital currencies that use this approach to verification frequently provide all their digital tokens up front, and miners are selected based on how many units they have (their stake).

PRIVATE KEY:

A piece of information—presented as a string of numbers and letters—that an investor can use to access their digital currency.

PUBLIC KEY:

An address where an investor can receive digital currencies. This public key, like the private key, is a combination of numbers and letters.

SMART CONTRACTS:

Programs whose terms are recorded in a computer language instead of legal language. Smart contracts are automated actions that can be coded and executed once a set of conditions is met.

STABLECOIN:

Any cryptoasset pegged to a stable asset, like fiat or gold. It theoretically remains stable in price as it is measured against a known amount of an asset not subject to fluctuation.

TOKEN:

A digital token is a unit of a digital currency, such as a Bitcoin. It is worth noting that some of these tokens are used for specific ecosystems, and those are frequently referred to as utility tokens. Other digital tokens are essentially securities.

WHITE PAPER:

The developers who create digital currencies usually provide white papers for these innovative assets. These documents generally offer comprehensive information on the digital token in question, as well as its underlying technology.

Definitions source: www.theurbanlist.com/a-list/Cryptocurrency-terms