

MediChain

Building decentralized encrypted databases to revolutionize medical records.

*scientia potentia est*¹.

Version 0.4

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Abstract

MediChain is a distributed ledger for patient's medical data. It allows patients to store their own data in one place, and give access to doctors and specialists anywhere regardless of the payer network or EMR used. It is monetized by the ability to voluntarily give anonymised access to untampered data to pharmaceutical companies, researchers and insurers. Potentially it may also be used for prescription management.

Its unique architecture allows fast access and small downloads to make it practical for everyday medical use. The protocol based on smart cards (optional), Homomorphic encrypted access rules tables, json data formats, lightweight and strong cryptography and blockchain technology, which brings enhanced transparency and reliability in medical data exchange at every level from devices to EMR to unprecedented opportunities for privatised big data sharing.

The protocol enables connections between patients, service providers and medical researchers located anywhere in the world, regardless of systems used so long as the

systems can work with the almost universal and open json format.

By improving patient data sharing and availability, and being open to add to any existing system or be managed automatically or by doctor or by patient MediChain aims to allow better conditions for all parties, creating a better way of handling patient data than anything available today.

By including different levels of access in rules MediChain seeks to neutralize the patient's risk and increase their benefits.

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¹ Francis Bacon, 1st Viscount St Alban, PC KC, English philosopher, statesman, scientist, jurist, orator, and author. Attorney General and Lord Chancellor of England.

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Context

Medical information is dispersed and inaccessible, not only to researchers, decision makers and developers of treatments, but to doctors and patients themselves. Even when it is recorded, data is siloed in multiple EMRs, paper notes, prescription records, multiple smart devices and specialist databases².

For example, Mike Orcutt of MIT Technology Review tells us that there are 26 different electronic medical records systems used in the city of Boston alone, each with its own language for representing and sharing data. In the legacy system, critical information is often scattered across multiple facilities, and sometimes it isn't accessible when it is needed most³. This is a global reality, costing money

² See <http://www.reuters.com/article/us-health-hipaa-c-harts/patient-cant-always-access-complete-medical-records-doctors-say-idUSKCN0YE2PY>

³ See <https://www.technologyreview.com/s/608821/who-will-build-the-health-care-blockchain/>

and lives. We see it as a problem tailor-made for a blockchain to solve.

MediChain

Description

Whenever any data is gathered about a patient, by device or medical professional, dispensing a prescription or even purchase of a non prescription medication the patient (through an app) or the device get a chance to have a reference or “pointer” added to an Ethereum blockchain—a decentralized digital ledger. Instead of payments, this blockchain records critical medical information in a virtually incorruptible cryptographic database, maintained by a network of computers, that is accessible to anyone running the software and has the patient's permission to access the specific cryptographic keys.

Every point at which a doctor logs on the blockchain (or the patient logs for themselves, giving them control of their own data) would become part of a patient’s record, no matter which electronic system the doctor was using—so any caregiver could use it without worrying about incompatibility issues.

Blockchain technology can give patients more control over their information and streamline the exchange of medical records in a secure way, protect sensitive data from hackers and make sure that patients get benefit from sharing information. A custom-built “health-care blockchain” will herald an industry-wide revolution in medical records at a far deeper level than has been postulated previously.

Specific rules can be flexibly added to the protocol to make it able to radically improve health care, while adding value along the

whole chain. The rule network is flexible and extendible and will facilitate the exchange of complex health information between patients and providers, between providers, and between providers and payers and will remain secure from malicious attacks and give previously undreamed of control over privacy.

MediChain provides innovation in electronic medical records (EMRs) by providing a free to integrate open source API to add MediChain to any EMR without regulatory barriers. MediChain is a solution tuned to the needs of patients, the treatment community, and medical researchers. It adds a novel, decentralized record management system for EMRs that uses blockchain technology to manage authentication, confidentiality, accountability, and data sharing. The modular design integrates with providers' existing, local data-storage solutions, but gives the option to keep it’s own records, enabling interoperability and making our system convenient and adaptable.

Global, blockchain-based patient identifiers, which can be held in patient held smartcards can amalgamate hospital records as well as data from other sources like employee wellness programs and wearable health monitors and seamlessly weld together the components of current digital systems.

Global Market Size

Approximately \$25-\$60 Billion USD pa. Not currently accessed in this way. According to a new market report published by Transparency Market Research Electronic Health Records (EHR) Market - Global Industry Analysis, Size, Share, Growth, Trends and Forecast, 2014 - 2020, the global EHR market was valued at USD 15.56 billion in 2013 and is expected to grow at a CAGR of 6.4% from 2014 to 2020, to reach an

estimated value of USD 23.98 billion in 2020. This represents just part of the value of the MediChain data set as it excludes fine grained big data (e.g. out of wearables, diagnostic devices and hospital and specialist databases) and excludes additional value created by the value of data to insurers and pharmaceutical companies which can be conservatively estimated as 20% of the current annual spend on Pharmaceutical research of 157 billion U.S. dollars^{4 5}.

What is the plan?

The MediChain system is developed on an Ethereum framework initially tested in the controlled environment of diagnostic device ecosystems. The next phase will be building up the chain data warehouse through an open access API and medical partnerships. MediChain will then be made is made publically available through the API and through partners for data acquisition. Then an exchange will be developed to allow secure controlled anonymized data access to patient data.

Philosophy

The underlying philosophy of MediChain is that all personal data has value which should belong, in the first instance, explicitly to the customer. The customer can decide if they want to sell it in an anonymized form, for example to to insurers or pharma companies, but that's for them to decide. According to Seidenberg in Wired, 85 percent of

smartphone buyers expect to access personal health data on their devices⁶. Optimizing the MediChain blockchain to be usefully accessible in that way is a key to success.

There are many classes of data that can exist in the chain(s) but understanding some of them can help understand the potential of the system.

I Raw User Data

The user's raw medical data (scans, EMR records, lab test results), which belongs to the user. In addition to the value that it has to the user it has financial value but the user controls that. This is stored in a decentralized, trustless system to maintain it's integrity. There may be some sort of financial or coin transaction between the user and the provider of the diagnostic device to pay for the generation of that data (e.g. to pay for a scan, BP measurement, blood test etc). That is secondary. In any case the raw data belong to the user in exactly the way that bitcoin belongs to the purchaser. (The same could apply to your personalized behavioural data). It's in a blockchain, because on a large scale when we are looking at multiple providers, data integrity for clinical trials, FDA approval etc. This has the same issues of integrity around it as currency.

Ii Interpretations and diagnoses

These come from the user data and are provided by third parties such as doctors, specialist or algorithms. Ownership is shared between the original user and the body providing interpretation. If the user shares with say Harvard Medical School they might

⁴ Total global pharmaceutical research and development (R&D) spending from 2008 to 2022 (in billion U.S. dollars)

<https://www.statista.com/statistics/309466/global-r-and-d-expenditure-for-pharmaceuticals/>

⁵ These form a major part of the costs of clinical trials, which the Tufts Center for the Study of Drug Development has estimates at \$2.6 billion per drug.

⁶ You Should Share Your Health Data: Its Value Outweighs the Privacy Risk

<https://www.wired.com/2014/11/on-sharing-your-medical-info/>

allow it to be free for publication and research. If they share with a digital diagnosis company they might pay in coin to get a further interpretation of their raw data. Combined with the data (i) above this information at first replicates and later replaces conventional EMR systems.

iii Structural Data

This can identify data sets within the blockchain ecosystem which are of use to insurers, commercial researchers or academic scientists, anonymously through cryptographic hashes.

What are the Tokens?

MediChain Tokens (MCT) are tokens that represent the value of arbitrary patient data blocks. A rule of thumb is that initially that the data from each consultation is arbitrarily given a value in MCTs equal to the buyer cost of the consultation in US dollars. Over time this value is adjusted for token availability, different data types, diseases, patient demographics etc to reflect the buyer's market. Data is available (subject to rules and anonymization) through one or more marketplaces to buyers. When this data is sold, the patient gets a proportion of the revenue (again according to rules) through the MCT ledgers. Broken pointers will be cleaned from the system automatically following specific programmable rules.

In addition when a patient loads data pointers to MediChain they can tender clinicians, providers and algorithms to perform analyses and diagnoses on this data. This can be done anonymously. The results of these are uploaded to the blockchain (with suitable anonymizers). These can be accessed by patients paying using MCTs which can be bought with fiat currency or BitCoins, paying

a proportion to the clinician, provider or algorithm developer.

Social Benefit

Population-based de-identified patient data has already produced advances against WHO top ten diseases as obesity, diabetes, hypertension, and heart failure. Population data lets researchers tackle the big issues in medicine. By patients opting in and sharing their data, they promote the research breakthroughs that can one day improve their own health and help people who are suffering from similar health issues. Where there are commercial interests involved, such as drug development, the same applies, but pharmaceutical companies pay for the data and patients are paid for their contribution.

What about emergency access to medical data in MediChain?

In an extended version of MediChain information that is normally available to doctors in an emergency needs to be readily accessible even if the patient cannot give consent. Access needs to be customer defined with defaults consistent with current practice. It seems likely that most patients doctors will have access to the same level of records that they let them have now. Because there are multiple rules, the emergency services will have access to the level that the patient would normally grant them now (e.g. diagnostic levels). Neither of those levels would have mass access to raw data that might be useful to pharma or insurers and if necessary anonymity could be preserved while allowing access to the complete medical record.

What are the use of funds?

The funds are used to develop and promote the MediChain infrastructure and API and

carry out the initial population of the chain with data which gives the chain market value. Promotion will be through wearable, desktop and kiosk devices including Apple Healthkit, Healmet Inc and through the Scripps Medical research center. A proportion of the development and promotion funds will be used to mature and integrate hardware used with the MediChain system including SmartCard ID systems and IoT devices.

When will the token be listed on an exchange?

The aim is to list the tokens within 28 days of ICO

What is the development roadmap?

The MediChain system is developed on an Ethereum framework in the next 6 months to alpha launch which will be in the controlled environment of a diagnostic device ecosystem. Within 12 months MediChain is made publically available through the API and through partners for data acquisition and by month 18 an exchange will have been developed to allow secure anonymized data access.

The technical founder has executed roadmaps of similar complexity several times before and has access to team and resources used for these previously if required.

How will the organization interact with the token once it hits the market?

Interaction will be algorithmic and rule based.

Tokens will be automatically generated for each set of data added to the blockchain. Thus the blockchain ecosystem increases with value as the amount of user data increases in it. The number of tokens for each type of data added

will be revised algorithmically when baseline data sets has been built up.

Is anyone holding on to token supply beyond the pre-sale?

The holding of tokens is outlined in the token allocation section below, but basically 51% of the tokens are reserved for patient's and clinical service providers who create the clinical value of the blockchain, while 49% are available for investment and business development.

Architecture

In order that MediChain avoids same scaling limits that Bitcoin has each patient must have their own blockchain scattered across multiple clients. A typical high-grade Bitcoin network client stores the entire transaction history, and this record for bitcoin, in 2017 was already 100GB⁷. The more transactions processed on the network, the faster the size grows and this easily outstips Moore's law.

In addition to the need to store a large chunk of data, the data has to be downloaded as well. This is not practical if hundreds of gigabytes need to be downloaded by either doctor or patient a process that could take many days.

If each network node does the same thing, then obviously, the bandwidth of the entire network is the same as the bandwidth of one network node. For the Bitcoin network, Alexey Malanov claims that the network is capable of processing a maximum of seven transactions per second — for the millions of users worldwide.

⁷ The same as the full capacity of a cheap laptop's or the most advanced smartphone's storage.

And that Bitcoin-blockchain transactions are recorded only once every 10 minutes.

This simply is not going to work for normal doctor-patient interactions far more medical devices syncing daily or even more frequently.

What's more in blockchain, in order to increase payments security, it is standard practice to wait 50 minutes more after each new record appears because the records regularly roll back.

This is why you don't buy a snack using bitcoins. Unless you want to stand in line for an hour at the store. For sequenced medical procedures in a clinic or hospital that will not be workable either.

Malanov claims that Bitcoin is used by just one in every thousand people on the planet and says that given the transaction-processing speed, significantly increasing the number of active users simply isn't possible.

To overcome this the MediChain architecture needs to take a better approach. What that comprises is being divided into index blockchain(s), horizontal sector blockchains with each chain holding data for a specific set of ailments⁸ and vertical patient blockchains, the former allowing users to locate the latter across the cloud⁹.

⁸As defined under the World Health Organization International Classification of Health code system (i.e. the ICD, ICF & ICHI codes)

<http://www.who.int/classifications/icd/en/>

<http://www.who.int/classifications/icf/en/>

<http://www.who.int/classifications/ichi/en/>

⁹ In fact the whole Ethereum network accumulated 200GB of history data in the blockchain, within two years of launch and six months of active use. We can see that a universal medical blockchain's life span is limited to about a decade, if we don't follow to architecture outlined. Thus we plan to create a

Thus each disease would have its own blockchains relevant to a specific ailment and research community which could be mined in that community by academics and companies with an interest in that particular set of ailments.

Implementing the horizontal blockchains each patient-doctor interaction would therefore only have to access one repository per consultation.

Time for download of repositories would be reduced and typically specialists would have those repositories. Anonymity would be maintained by repository access in the first instance the user ID being hashed with a strong (let's say 1024-bit sha) hash and a salt code which is either weak (pin), specific (biometric) or strong (e.g. 3FA). This might develop over time. Optionally we would allow additional encrypted user identification and an optional distributed anonymous proxy service (which can be third party to de-centralize).

There are still shared databases and require multiple access, it is still essential that there is interaction between the transactions and that we still see disintermediation of patient data. So a blockchain approach is still the best way.

Local data may also contain complete or fragments of other user's blockchains striped across multiple users storage, which are stored for backup.

Homomorphic encryption

Security is a major issue. According to Humer & Finkle of Reuters an individual's medical record is worth more to hackers than their

system technically based on Ethereum, but one that does not piggyback it.

credit card¹⁰, while Schlesinger & Day of CNBC reports that 4.5 million patients had had their records compromised by hackers accessing of one of the largest U.S. hospital operators, Community Health Systems Inc¹¹.

MediChain works by placing the rule network under Homomorphic encryption so that computation can be carried out on encrypted data. This means that those who have the rights to access data types can identify that they will have access to specific parts of patient data without having to know who else has access or under what conditions. This is an essential prerequisite to giving patients granular control of their privacy while allowing them to control who sees what in their data. While underlying mechanisms share similarities with Dr Halamkas' MedRec from MIT Media Lab which uses a private blockchain based on Ethereum access is more suited to the real world. MediChain goes beyond automatically keeps track of who has permission to view and change a record of medications a person is taking and determines who can aggregate that data into a study, whether health insurers have access (and which ones if the patient is looking for a competitive quote) as well as allowing authorised App access across treatments to look for side effects, advanced diagnostics and predictive analytics.

¹⁰ "Your medical record is worth more to hackers than your credit card"
<https://uk.reuters.com/article/us-cybersecurity-hospitals/your-medical-record-is-worth-more-to-hackers-than-your-credit-card-idUSKCN0HJ21I20140924>

¹¹"Dark Web is fertile ground for stolen medical records"
<https://www.cnn.com/2016/03/10/dark-web-is-fertile-ground-for-stolen-medical-records.html>

Lightweight Symmetric Cryptography

Conventional Blockchain is open, and everyone sees everything. Thus, blockchain has no real anonymity. It offers pseudonymity instead. For this reason we are adding both Lightweight Symmetric Cryptography which acts as a short term cache to unincorporated transactions and deep data security which encrypts the data within the blockchain to create true anonymity.

There are many circumstances where patients will want to add to their data set quickly and without massive computation. Accessing prescriptions, adding personal medical notes or notes from specific checkups are examples. By using iClass at the patient end patients can store their blockchain data on Smartcards. Even if the Smartcard is hacked that will only give access to the Homomorphic rule layer. Deeper record security still lies with the AES level.

Deep data security

We are looking at a system with a long life span and high value aggregated data value as well as sensitive personal data. Such a cryptosystem must clearly obey Kerckhoffs' law, must be secure against man in the middle attacks, must not have secret keys that are constant across all devices. This level of security need not be Homomorphic or Lightweight

Mining

The transaction ledger and coin growth is maintained in the normal way by coin mining, but it's proposed that the main coin miners will be medical researchers and data

contractors selling authorised data¹² to insurers and commercial researchers such as pharmaceutical companies.

Thus MediChain also solves a key issue facing just about anyone who wants to take blockchain outside the realm of digital currency, by getting researchers and third parties wanting to access authorized data to be miners use computers to perform calculations that verify data on the blockchain. This is a crucial service that keeps the system functioning. In our model, they're rewarded with data access.

So like MedRec we incentivize medical researchers and health-care professionals—to perform the role of miners to access aggregated, anonymized data from patients' records epidemiological studies

As a key feature of MediChain, we engage the medical research community with an integral role in the protocol. Medical researchers provide the "mining" necessary to secure and sustain the blockchain authentication log, in return for access to anonymized, medical metadata in the form of "transaction fees."

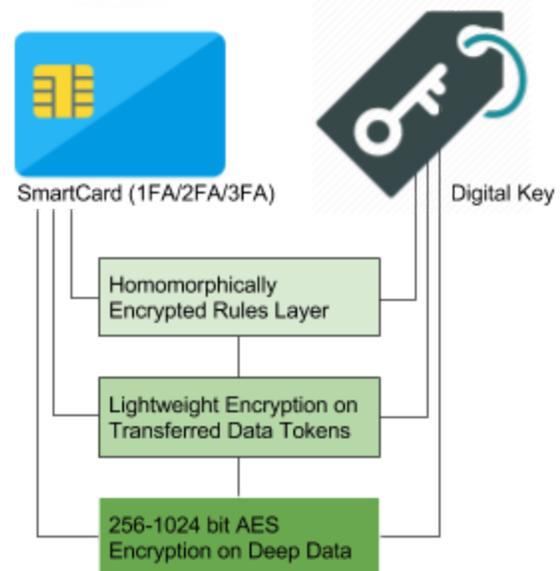
In addition the health-care blockchain could rely on the abundant computing resources available in some hospitals to verify the exchange of information, for example.

Either way, blockchain's potential for the health-care industry no longer will depend on whether hospitals, clinics, and other organizations are willing to help create the technical infrastructure required. MediChain will provide the infrastructure and free open APIs. The project will include prototyping and testing fundamental concepts but using established technologies such as SmartCards

¹² Where the patient's rules have given consent

with 1,2 or 3 FA¹³ to provide robust information about both patient and doctor's identity.

MediChain Architecture



Anticipated MediChain Network Development



1. Diagnostic Devices
2. Associated Algorithms
3. Personal Monitoring
4. Academic Medical Studies
5. Medical Insurers¹⁴
6. EMR Integration¹⁵
7. Telemedicine
8. National Resources

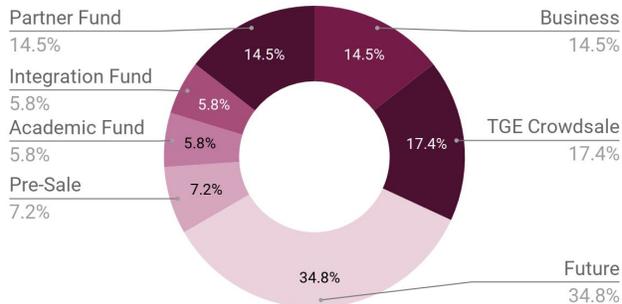
¹³ 1FA - tap or swipe the card
2FA Chip and pin or chip and password,
3FA Chip and pin plus fingerprint or iris scan.

¹⁴ SmartCard Integration at this stage

¹⁵ Electronic Medical Records

Token Allocation

The 49% of MediChain Tokens made available for sale in connection with the a Token Generation Event ("TGE") will



The 49% of MediChain Tokens made available for sale in connection with the a Token Generation Event ("TGE") will be allocated as follows

1. Pre-Sale Maximum 7.2%
2. Crowd Sale 17.4%
3. Business Development 14.5%
4. Partner Fund 14.5
5. Integration Fund 5.8%
6. Academic Fund 5.8%
7. Future Fund 34.8%

The other 49% tokens not issued in the TGE will be issued as part of the data growth of the system i.e. tokens are issued to people who add their data or data analysis to the ecosystem. This creates value across the whole Token ecosystem.

Pre-Sale

7.2% of MediChain tokens MCT will be distributed at presale.

Crowd Sale

17.4% of MediChain tokens MCT will be distributed through the crowdsale. Raised funds will be used to the operations of the MediChain for the next five years. This include

development, administration, marketing, financial and legal consultancy, etc. Remaining, unsold tokens from the crowdsale budget will be hold and sold privately to institutional investors at a price not lower than the price of the ICO token.

Overall Business Development

40.6% of MediCoin tokens MCT will be allocated to initiatives concerning business development, multistakeholder model, as well as academic research, education, and market expansion. During the next four years, the MediCoin foundation will allocate 27% of the initial MCT supply to third parties promoting the application and growth of the MediCoin. This budget will be held in publically viewable wallets and subjected to community scrutiny.

This breaks down as

Business Development

Business Development 14.5% of MediCoin tokens will be used to carry out conventional business development of MediCoin use particularly in developing paying markets for MediCoin data. This focuses on monetization of MediCoin

Partner Fund

Partner Fund 14.5% of MediCoin tokens will be used to facilitate building partnerships to promote the use (and therefore the value which increases according to number of users) of MediCoins. This focuses on 'locked-in' growth of MediCoin use with specific partners.

Integration Fund

Integration Fund 5.8% of MediCoin tokens will be used to facilitate the adoption of the MediCoin in integrations of selected medical applications including building markets where

necessary. This focuses on growth through mainstream acceptance of MediCoin.

Academic Fund

Academic Fund 5.8% MediCoin initial token supply will be used to sponsor academic research, educational materials for developers, as well as promotion of MediCoin technologies and contributions to open source communities. Some of the planned activities include:

- Establishing research labs in cooperation with high profile universities;
- Creating tutorials and educational materials for MediCoin developers;
- Cooperation with other open source communities;
- Events and conferences to raise the awareness of the MediCoin technology and facilitate market adoption.

This focuses on credibility, profile and ability to respond to changes for MediCoin.

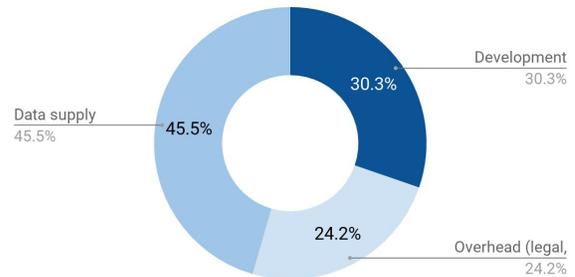
Future Fund

34.8% of MediChain tokens [6,000,000] MCT will be held back for future specialists and future rounds of investment and distributed among founders, early backers and the development team and. Founders, early backers and the development team are rewarded with MCT tokens for their efforts, resources, and technologies contributed to the development of the MCT.

The focus here is ensuring the growth and long term future of MediCoin.

Allocation of Resources

Funds raised by sale of MediCoin Tokens in the Token Generation Event ("TGE") are expected to be allocated as follows.



Use cases

The patient experience I

Alice, the patient, visits Dr Bob the Medical services provider. She provides Bob with specific classes of data by accessing the blockchain with her MediChain Smart Card. Dr Bob's systems have unfortunately been compromised. Craig, the password cracker has a keylogger on Dr Bob's computer, but is unable to get access to data from Alice's Smart Card as she is using a chip and pin card. Eve the eavesdropper is a passive attacker who has installed a keylogger and spyware can see what Dr Bob can see, but cannot access Alice's access codes or any other part of Alice's data. Likewise Mallory, the active attacker tries to use a man-in-the-middle attacks but without Alice and Bob's Smartcards he cannot get access to the actual blockchain, The integrity of the blockchain is preserved.

The patient experience II

Alice, the patient, visits Nurse Dan, a different the Medical services provider. Nurse Dan performs specific medical tests on her (anything from blood tests to EEG to NMR and beyond) and adds the results to them to her blockchain with his smartcard signing the addition and Alice's encrypting it.

Later on another day Alice provides Dr Bob with the results from Nurse Dan's tests by accessing the blockchain with her MediChain Smart Card.

Although her data may be compromised if Dr Bob has not cleaned up his computer the integrity of the blockchain is preserved.

Over time Walter one of the system wardens detects patterns of misuse on Dr Bob's system and Craig, Eve and Mallory are identified and tracked down with varying degrees of difficulty.

Two year later Alice visits specialist Professor Francine who accesses all Alice's data to make an algorithm informed smart diagnosis based on longitudinal symptoms, treatments and responses.

The patient experience III

Alice, the patient, Faythe a trusted advisory service to find the best insurers for someone with her background by giving Faythe broad but anonymised access to Alice's blockchain without revealing personally identifiable details.

Medical Devices

Alice, the patient, uses wearable monitors like those in the Apple Healthkit ecosystem or Home health hubs like Foxconn's Healmet to acquire her personal data and add it to her blockchain. These are available for future analysis by authorised apps & algorithms, doctors or specialists.

Algorithmic Analysis Services

Olivia, manages Alice's blockchain and reading the rule network that Alice has allowed specific algorithms to access relevant parts of Alice's data. Alice is now alerted automatically

when specific, harmful trends are found in her vital traces such as LVH indicators in her ECG picked up by her smart devices. In that case this reduces her risk of unexpected fatal cardiac events by approximately 50%

Medical Research

Olivia, manages Alice's blockchain and reading the rule network that Alice has allowed specific types of researchers to access relevant parts of Alice's data.

Professor Francine now has access to thousands of patients data, fully anonymised and in this case voluntarily contributed by people like Alice through allowing limited access to their blockchains.

Insurers I

Again, Olivia, manages Alice's blockchain and reading the rule network that Alice has allowed specific algorithms to access relevant parts of Alice's data. Alice has allowed that data to be accessed by her Medical Insurer. Alice is now called in for treatment when specific, harmful trends are found in her vital traces improving her quality of life and lifespan, decreasing, premiums and increasing profitability for the insurer.

Insurers II

Una, the insurance data scientist has been given access to a subset of the data that Professor Francine has, having to pay those patients who agreed to share data for that data. Some have allowed messaging to their anonymised accounts so Una knows that she has 52,342 anonymous addresses who she can offer a preferential policy to and can pay to campaign to them (or even target with display ads if they have opted into this), but will not

know who any of them are unless they respond.

Team

Blockchain Coordinator;

Baker, M. Former CTO at Peerius, Europe's Largest User of Secured, Privacy Enhanced Big Data for Predictive Analytics, Founder AegisDRM, developers of security solutions used by Hong Kong Government against Chinese Hackers, Oxford PhD, Cambridge Post Doc, C & Python developer

Blockchain Engineer (B-CTO)

Cristan Nosty., Senior Engineer Bitcoin Trading USI Tech; Bustabit; JumpBits (bitcoin gaming); BTC Exchange Changelly.com; Bitcoin payment MyBitCoin: BTC Trading & cryptocurrency & C++

PR manager;

Kai Sedgwick: Bitcoin and Ethereum-based blockchain technology blogger with over 5 million online readers to date

Copywriter

Stella Livaniou blockchain/Initial Coin Offering (ICO) services whitepapers and press release specialist. JWT (Account Planning Manager), Johnson & Johnson (subsidiary Janssen-Cilag), and ICAP Group (Senior Sales Manager), Executive MBA in Marketing, Member of the National Crowdfunding Association of America and the American Crowdfunding Academy.

Blockchain Support team

includes 4 technical support staff for 24 hour support; also named individuals identified for

team include

Traffic manager; Designer; Lawyer

Summary

MediChain uses blockchain technology to create a distributed ledger of medical information on a per patient basis with a separate distributed ledger index. To establish trust and usability we will test and establish this using wearable, desktop and kiosk devices initially from the Helmet company and through the Scripps Medical research center.

Personal data is secured within the blockchain by three levels of security.

MediChain data is secured initially through device tokens and user passwords but is designed to rapidly use Smartcards with 2FA similar to chip and pin banking.

Acknowledgements

Asaph Azaria, Ariel Ekblaw, Thiago Vieira, Andrew Lippman *Using Blockchain for Medical Data Access and Permission Management*

<http://ieeexplore.ieee.org/abstract/document/7573685/>

Tsung-Ting Kuo Hyeon-Eui Kim Lucila Ohno-Machado *Blockchain distributed ledger technologies for biomedical and health care applications*

Journal of the American Medical Informatics Association, Volume 24, Issue 6, 1 November 2017, Pages 1211–1220, <https://doi.org/10.1093/jamia/ocx068>