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WHITE PAPER V 1.3

MEDIBITCOIN NETWORK

CONNECTING PATIENTS
WITH MOBILE
HEALTHCARE
PRACTITIONERS
THE BLOCKCHAIN-
BASED SOLUTION FOR
SEEKING 2ND OPINION
WITHIN A TIMELY,
SECURE & COST-
EFFECTIVE MANNER

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MEDIBITCOIN NETWORK

Connecting patients with mhealthcare practitioners

The blockchain-based solution for seeking 2nd opinion within a timely, secure and cost-effective manner

WHITEPAPER v 1.3=

A **white paper** is an authoritative report or guide that informs readers concisely about a complex issue and presents the issuing body's philosophy on the matter. It is meant to help readers understand an issue, solve a problem, or make a decision.

The **purpose of a white paper** is to advocate that a certain position is the best way to go or that a certain solution is best for a particular problem. It aims to influence the decision-making processes of current and prospective customers.

“Creative destruction threatens power. This is why disruptive innovations require new models of thinking to truly enable new technology to reach its potential in a competitive market.”

~Tim Wu, The Master Switch¹

¹ Tim Wu, The Master Switch: The Rise and Fall of Information Empires (2010, Atlantic Books) Chapter One

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DISCLAIMER

This White Paper is strictly for the purpose of showcasing, and explaining Medibitcoin Project (MEDI Project) to our contributors. The valued contributors are people who demonstrated their interest in our project and/or purchase our tokens. Token sale is an on-going process as it's only purpose is to fund the project. The funds raised by Token Sale had never been or ever will be used for any other purpose. This document aims to exhibit the functionality and operability of MEDI project. Any part thereof, and any copy thereof must not be taken or transfer to any country where distribution or dissemination of a Token Sale (ICO) similar the one explained in this White Paper is forbidden or restricted. MedibitCoin (hereinafter - "MEDI Tokens") are not meant to be accounted for securities in any jurisdiction. MEDI Tokens are created as 'utility tokens' and do not have a performance outside the Medibitcoin Network. Therefore, this White Paper cannot constitute a description or offer any advise/suggestion/recommendations for investment in securities. As is the case with any investment, risks and uncertainties are associated with Medibitcoin Network LLC business, projects and operations, MEDI Tokens, MEDI Token Sale (Pre-ICO and ICO, both), Medi-Decentralised applications (Medi DApp). This White Paper does not compose or form part of any suggestion or any advice to sell, or any solicitation of any offer made by Medibitcoin LLC to purchase any MEDI Tokens or provide any help and/or give advice to make investment decision.

Abstract

MediBitcoin Network is an Ethereum-based blockchain platform. This platform supports the² community by building and creating solutions devoted to improving the quality of mobile-healthcare (mhealth care) across the globe. The blockchain gives Medibitcoin (the token) the power to change the world for the better. Medibitcoin plays a foundry role in revolutionising mhealthcare industry as well as creates market intelligence through a cryptocurrency reward system that inspires active and continuous participation of the community. Medibitcoin is the first cryptocurrency that uses a decentralised review platform and transparently rewards patients and healthcare providers who make contributions, benefiting the community. The Medibitcoin Network team strongly believes in building a future mhealthcare market that will fall into the hands of the people, resulting in the disruption of the existing industries and the creation of new industries in the short and long term. Looking forward, Medibitcoin expects the platform to drastically improve self-managed mhealthcare habits, thus improving the quality of life for individuals resulting in improved overall health and increased longevity.

A message to those, willing to contribute by means of reviewing the White paper.

This version of Medibitcoin white paper has been released as a draft - with the purpose of introducing the idea and to receive valuable feedback from the community. If you would like to contribute by leaving your comment or review, please email: info@medibitcoin.co.uk or join our social network by visiting medibitcoin.co.uk.

² According to NHS "A Health Care Provider is an Organisation acting as a direct provider of health care SERVICES. A Health Care Provider is a legal entity, or a sub-set of a legal entity, which may provide health care under NHS SERVICE AGREEMENTS; it may operate on one or more sites within and outside hospitals. This definition covers Local Authorities with social care responsibilities working in cooperation with an NHS Health Care Provider on nationally targeted and prioritised care as delivered within Care Spells. Lead responsibility for such care may be solely led by one Health Care Provider or jointly shared by two or more Health Care Providers each of which must share equal responsibility. The following Organisations may act as Health Care Providers: GP Practice, NHS Trust, NHS Foundation Trust, Registered non-NHS Provider (e.g. Independent Provider, Independent Sector Healthcare Provider etc), Unregistered non-NHS Provider, Care Trust, Local Authorities with social care responsibilities, Other agencies"

NHS (2018) NHS Business Definitions, Healthcare provider [available from] http://www.datadictionary.nhs.uk/data_dictionary/nhs_business_definitions/h/health_care_provider_de.asp?shownav=1

1. BACKGROUND

Our project is highly ambitious as it challenges the current global healthcare system by allowing people to manage their own health, only if they choose to. By adapting to the digital currency also known as cryptographic currency or crypto currency, we are joining the forces to challenge the current financial systems.

This project is inspired by market research data that identifies millions of people suffering across the globe due to misdiagnosis or undiagnosed medical conditions. There is another excoriating problem-millions of patients across the globe have little or no access to 2nd opinions of a medical practitioners for few prime reasons: a. the healthcare systems they are part of don't give them easy access to medical records, which in turn discourages patients seeking 2nd opinion if needed; b. private insurance-based healthcare is mostly highly priced that doesn't leave much room in terms financial capacity, for patients to seek 2nd opinion; and c. highly qualified privately practicing medical practitioners charge high fees that is not affordable by a wider population. Lack of accessibility to 2nd opinion results in millions of deaths every year. What's even more unfortunate to learn is that the figure of millions of people suffering and dying due to lack of ill-practices, poorly designed policies and procedures and negligence of healthcare systems come from developed countries. This leaves us with a very trivial question: how many people are actually suffering because of this problem, globally?

HOW BLOCKCHAIN TECHNOLOGY FORMS THE FOUNDATION OF MEDI PROJECT

The reason for choosing blockchain system as the backbone of our network is its unmatched capabilities. Xia et al. (2017) cite "the migration of medical records to cloud-based platforms has facilitated the sharing of medical data between healthcare and research institutions, enabling faster and more convenient exchange in a manner previously not possible [1]. The advantages of collaboration range from gaining new insights into already existing treatments, analysing new ones, and better management of population health.³" Building upon Xia et. al's work, Medi Project aims to create blockchain based platform that supports a. prompt and secure exchange of information between the practitioner and patient (not possible by another technology with minimal security threats as blockchain promises); b. data collection of data generated in the form of communication held between practitioner and patient.

Blockchain-a disruptive technology is relatively new and has seen advanced developments of its most significant application in cryptocurrencies. Apart from the use of the blockchain technology in the aforementioned area, the community of developers are already hard at work building applications and services leveraging the power and versatility of this disruptive technology.

³ Xia, Q (2017) BBDS: Blockchain-Based Data Sharing for Electronic Medical Records in Cloud Environments, Information- Open Access Journal of Information Science

This too assures us that with the passage of time, this project will be leveraged through technological advancements.

Research studies further indicate an urgency to develop a blockchain based access control system that adequately controls the access to medical data stored and processed on cloud systems along with securely offering efficient data sharing. Blockchain technology offers secure cryptographic techniques to identify and authenticate users and systems and thereby bring about access control in a scalable, distributed, and secure manner⁴. The blockchain in such a system will be used for data control. The system security issues will be addressed through using cryptographic keys-based access control system. The cryptographic currency will be used to facilitate transactions across the system.

⁴ Zyskind, G.; Nathan, O.; Pentland, A.S. Decentralizing privacy: Using blockchain to protect personal data. In Proceedings of the 2015 IEEE Security and Privacy Workshops (SPW 2015), San Jose, CA, USA, 21–22 May 2015; pp. 180–184.

Yue, X.; Wang, H.; Jin, D.; Li, M.; Jiang, W. Healthcare Data Gateways: Found Healthcare Intelligence on Blockchain with Novel Privacy Risk Control. *J. Med. Syst.* **2016**, *40*, 218. [PubMed]

Zyskind, G.; Nathan, O.; Pentland, A. Enigma: Decentralized Computation Platform with Guaranteed Privacy. *arXiv* **2015**.

Hardjono, T.; Pentland, A.S. Verifiable Anonymous Identities and Access Control in Permissioned Blockchains. Available online: www.w3.org/2016/04/blockchain-workshop/interest/hardjono-pentland.html (accessed on 16 April 2018).

2. INTRODUCTION

The purpose of this paper is to thoroughly explain a new conceptual framework to be used within the healthcare industry for organisational purposes. Through the utilisation of recent technological innovation-Blockchain, we have created a model with the ability to overcome the majority of the mhealthcare markets' major constraints and furthermore, proposes various measures that will significantly improve the efficiency of mhealthcare practice. This would result in improving the patients' well-being. MedibitCoin strives to create a mhealthcare community by rewarding people, who provide valuable contributions by using our crypto currency as mainstream currency. Through this reward system, the Network will see a rise in a currency that will be able to reach a broad market, including a vast number of people who have yet to participate in any cryptocurrency economy.

According to Harvard Business Review: "To protect the blockchain vision from political pressure and regulatory interference, blockchain networks rely on a decentralised infrastructure that can't be controlled by any one person or group." The integration of blockchain and healthcare is an extraordinary concept; one that requires the creation of a community in which transparency and shared responsibility can take place.

3. MARKET ANALYSIS

This chapter includes in-depth market research and analysis, market growth potential, and existing competitors.

3.1. The problem: Misdiagnosis or undiagnosed medical conditions

Many patients mistakenly assume that misdiagnosis or undiagnosed symptoms of medical condition are normal occurrences within a healthcare service providing environment. Unfortunately patients don't realise that healthcare providers are ethically and legally responsible for worsening medical conditions or medical costs resulting from delayed or incorrect diagnosis and subsequent treatments. This should not be the case. Patients are required to be aware that delays in diagnosis and failure to properly diagnosis are physically, emotionally, and financially damaging.

In 2009, the Healthcare Commission found that missed or wrong diagnoses were a major cause of complaints to the NHS. Of more than 9,000 complaints analysed, almost one in 10 related to a delay in diagnosis or the wrong diagnosis being made. Separate research also suggested that one in 10 patients in hospital was harmed because of the care they received⁵.

Between April 2008 and March 2009 there were 39,500 reports of incidents involving clinical assessment. Those included missed or wrong diagnosis but also related to scans that could have been misinterpreted or where the wrong body part was scanned or tests where patients' samples could have been mixed up.

The most common reasons for misdiagnosis are lack of training, misinterpreted test results, poor communication and diseases that had similar symptoms. According to NHS, common types of misdiagnosis are failure to diagnose, late diagnosis, incorrect diagnosis. For the FY 2014-2015, misdiagnosis of symptoms cost NHS hospitals a belting £197.2million. ⁶

The problem is not just reported in the UK. In fact, 12 million Americans are misdiagnosed every year⁷, whereas 160,000 patients each year die or suffer permanent damage as a result of medical error.⁸

⁵ The Telegraph (2009) One in six NHS patients 'misdiagnosed' [online] access <http://www.telegraph.co.uk/news/health/news/6216559/One-in-six-NHS-patients-misdiagnosed.html>

⁶ Mintel (2018) Health and protection market research reports- consumer behaviour analysis- market trends, Mintel

⁷ Forbes Health (2014) 12 Million Americans Misdiagnosed Every Year, New Study Shows [access online] <https://www.forbes.com/sites/melaniehaiken/2014/04/22/12-million-americans-misdiagnosed-every-year-study-suggests/#56ff5ddd23bc>

⁸ Forbes Health (2014) 12 Million Americans Misdiagnosed Every Year, New Study Shows [access online] <https://www.forbes.com/sites/melaniehaiken/2014/04/22/12-million-americans-misdiagnosed-every-year-study-suggests/#56ff5ddd23bc>

Unfortunately when we talk about wider global population, no authenticated research data is available on public domain.

3.2. Changing consumer attitudes are driving and reshaping the market and readiness of the market to address the problem

In context of above situation, our research strongly indicates that the market where we aim to operate is ready and mature enough to adapt to the solution.

Indicator 1: The adoption of wellness and preventive medicine is a strong trend in consumer behaviour. Although public health campaigns and mass media have increased the messages on healthy habits and wellness to modify consumer behaviour, it is actually the adoption of electronic health (eHealth) and mobile health (mHealth) in the form of electronic health records (EHRs) and personal health records (PHRs), respectively that is heavily influencing the most recent innovation in self-care initiatives.

Indicator 2: As healthcare costs are expected to increase, governments and health systems are setting up newer and more efficient healthcare delivery processes using digital platforms. This trend is happening all over the world, in both developed and emerging markets. The health of a consumer is being recorded digitally starting at the healthcare practitioner's office via EHRs and ending at home with the use of medical devices, wearables or apps in smartphones that track and monitor the individual's health markers as PHRs.

Indicator 3: All this data is moving to the cloud and becoming a wealth of knowledge that will help decision makers understand how health works at many different levels: Individual, genetics, delivery of care, monitoring, etc.

Conclusively, it is observed that over a period of 2017-2022, consumers will look to achieve optimal states of wellbeing and prevent the development of future illness by taking more holistic approaches to the idea of self healthcare. The UK consumer health market registered current value growth of 5% in 2017, in line with its CAGR for the 2012-2017 review period as a whole⁹.

3.3. Market readiness

⁹ Euromonitor (2017) Consumer Health in the United Kingdom, Euromonitor

In the UK, 75% of people go online for health information¹⁰. This is because today's patients are much more open to seeking health advice online and 50% of us use the technology to self-diagnose. These trends clearly indicate a 'need' to seek advice other than primary care. We see it as a mistrust of patients on their primary healthcare providers. However contrary to popular belief, it isn't primarily younger generations that are doing this. In a 2014 survey into Healthcare's Digital Future, McKinsey found that more than 70% of patients aged over 50 want to use digital healthcare services¹¹. The key difference between these two age groups is the types of digital channels that they are comfortable using when it comes to healthcare. Older patients generally prefer website and email, though with the growing use of smartphone and tablets with the over 50's this could soon change, and younger generations are more open to newer channels such as social media.

3.4. The app economy

- As apps become an increasingly critical channel for virtually all consumer businesses in all industries, we have seen the number of apps available across Google Play and the iOS App Store expand to more than 6 million.
- Top markets (China, US, Japan, South Korea, UK) have seen double digit percentage growth in consumer spend over the last two years.
- The number of global app downloads had Surpassed 175 Billion in 2017.
- Consumer Spend in App Stores had exceeded \$86 Billion in 2017.
- Worldwide app downloads continue to grow, particularly in emerging markets, as users downloaded 60% more apps in 2017 than in 2015 which equates to nearly two apps downloaded every month per human being on the planet.
- Impressively, total consumer spend through Google Play, the iOS App Store and third-party Android stores has more than doubled over the past two years, from approximately \$40B to over \$86B.
- More than 40 countries will generate over \$100 million each in consumer spend in 2017 for iOS App Store and Google Play combined.
- Across mature and emerging markets (Mexico, Brazil, South Korea, Germany, Indonesia, India, US, France, UK, Japan, Russia) more time is spent in native apps than in mobile web browsers.
- In most markets analysed, the average smartphone user has more than 80 apps on their phone and uses close to 40 of them each month. This roughly equates to between one-third and one-half of the apps on users' phones used each month on average.

10 'The UK: your partner for digital health', Department of Health and UKTI, 2015 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/402227/Healthcare_UK_Digital_Health_Jan_2015.pdf)

4 'Healthcare's digital future', McKinsey, July 2014 (<http://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/healthcares-digital-future>)

5 Segmentation taken from 'Digital Health in the UK', Deloitte, Sept 2015 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/461479/BIS-15-544-digital-health-in-the-uk-an-industry-study-for-the-Office-of-Life-Sciences.pdf)

6 Connected health: How digital technology is transforming health and social care', Deloitte 2015

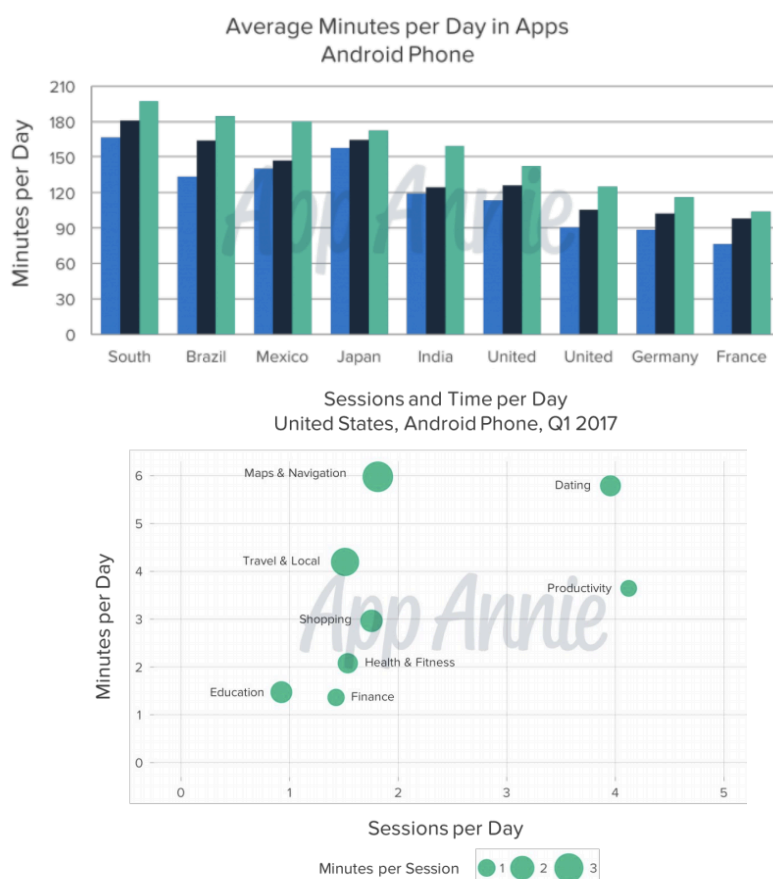
- Crypto was one of the biggest stories of 2017, and that story was told through the parallel rise of crypto apps¹²

3.5. The app market

The sales of smartphones are anticipated to reach 1.2 billion units in 2015 and 1.6 billion by year-end 2020 (BRIC)

In 2017, Smartphone users are spending more time in apps than in years past, and now access over 30 apps on a monthly basis, according to a AppAnnie. Today, users in the US spend an average of over 2 hours and 15 minutes in apps every day, which amounts to over one month out of the year. In South Korea, Brazil, Mexico and Japan, that number is even higher, with users averaging around 3 hours daily.

Specific to Health & Fitness apps in the US, users spend 2 minutes per 1.5 session a day¹³.



¹² App Annie Retrospective (2017) 2017 Retrospective: A Monumental Year for the App Economy, App Annie

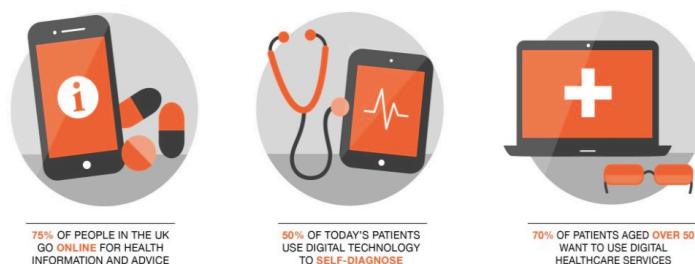
¹³ App Annie (2017) Spotlight on Consumer App Usage, AppAnnie

The US, North America

The healthcare industry is expected to reach an estimated retail value of US\$ 211 billion in 2015, with a potential cumulative average growth rate (CAGR) of 3.0% in the forecast period of 2015-2020.

3.6. Digital Healthcare market

Digital health can be segmented in a number of ways but roughly the four key areas are: Tele-healthcare, which includes tele-care and tele-health and focuses on telecommunication technologies to deliver health services or information; mHealth, also known as mobile health, which encompasses the growing market of health apps and wearable devices; health analytics and finally digitised health systems¹⁴. Of these groups the two rising stars are mHealth and digital health systems.



3.6.1. mHealthcare- The market sector where we operate

In 2013 mHealth global revenues were valued at £1.6 billion and predicted to reach £14.8 billion by 2018, while out of the four areas, digital health systems represent 66% of digital health sales, making them the largest market globally and in the UK¹⁵.

Risks

For one thing, there are all sorts of potential hacking and personal privacy issues with medical apps. According to a review by the Privacy Rights Clearinghouse, [many apps send data without encrypting it](#), and users and patients just don't know about it. Imagine all of the personal and

sensitive data that people are inputting into their medical apps; that's a potential powder keg waiting to happen.

The other issue that has some people concerned is the diminished aspect of human touch in the administration of medicine. Since the advent of medical science, it's always been about the longstanding patient-doctor relationship. These apps are changing and revolting against that unquestioned system.¹⁶

Some doctors are outright warning against losing the very essence of getting to know patients and how that can cause more harm than good.

No matter how you look at the situation, though, what's already clear is that these changes to a more tech-oriented and, therefore, independent-patient model are already taking place and have been for a few years.

¹⁶ INSIGHTS (2017) The future of healthcare: how mobile medical apps give control back to us [online] available from: <https://ymedialabs.com/future-of-healthcare/#7>

The Need

- 75% of the UK population go online for health information.
- More than 50% of the UK population use the internet to self-diagnose.
- 12 million people are misdiagnosed every year in the US.
- Unfortunately, an updated figure of misdiagnosis across the globe aren't available in the public domain.

Many patients assume that misdiagnosis or undiagnosed symptoms of medical condition are normal occurrences. Unfortunately patients don't realise that healthcare providers are ethically and legally responsible for worsening medical conditions or medical costs, resulting from delayed or incorrect diagnosis and subsequent treatments. This should not be the case. Patients are required to be aware that delays in diagnosis & failure to proper diagnosis, are physically, emotionally, and financially damaging.

Tragically many mistakes are made by healthcare systems. Common mistakes are negligence, misjudgements (in case of faulty laboratory results for example), work-environment pressure and reduced availability of time in Emergencies and Recovery (ER), misdiagnosis and failure to diagnose.

Result of misdiagnosis results in failure to recognise complications that transform or aggravate existing medical condition. Sometime one condition is diagnosed correctly whereas other conditions remains undiagnosed. In other cases, healthcare systems may fail to realise that there is a second diagnosis that also needs practitioner's attention

4. INTRODUCTION TO MEDIBITCOIN

4.1. Our Vision

“Build a community, empowered enough to self-manage its health by using disruptive technology. On our journey, be ethical in using the resources.”

4.2. Mission Statement

The MedibitCoin Network’s core missions are to empower people to self-manage their health, globally, reduce overall treatment costs and create a healthcare community. MEDI is created to be used as a prime currency inline with our mission and vision. MedibitCoin Network focuses on developing a transparent, decentralised platform that deliver the services. MEDIs will be used as a prime mode of payment in exchange of hiring the services. The goal is not to compete with other cryptocurrencies, but rather to provide a solution and support for a real-world problem within the global mhealthcare market by means of a blockchain-based system. The Network is interested in evaluating the actual substance and value that can be created with our token, representing the health of all individuals. MedibitCoin will be both a Fin Tech and logistic platform of the global mhealthcare market. The Network's exact contribution in ERC20 coins (MEDIs) used for healthcare projects will be provided later on in the white paper v.1.2.

4.3. Core Objectives

We aim to achieve long-term success, driven by our customers’ feedback and transferring the power onto them. We believe that it is the people who have the power to make any business success and not other wise. People trust people, thus there is nothing more valuable to the industry players than constant, trustworthy feedback received from the patients. However, a community needs to exist for this to be achieved and this is where MedibitCoin steps in. MedibitCoin emphasises the industry’s challenges and reveals the solutions for increasing the healthcare practice’s efficiency.

Implementing a blockchain based industrial cryptocurrency can incentivise the industry in solving the majority of the existing and future constraints. Below are the 4 phases of implementation each with its own milestones, goals, and focus.

4.4. The MediBitcoin Platform

4.5. The MediBitcoin Network

MedibitCoin network develops a community of patients and healthcare practitioners. We are a UK based enterprise that offers a blockchain based system enabling patients and healthcare practitioners to connect via a decentralised (dapp). The platform allows patients to seek 2nd opinion along with sharing diagnostic reports. At the core of technology, we are offering an innovative disruptive idea in the information and communication technologies (ICT) space. Our system enables the efficient sharing and exchange of information with stakeholders (patient, healthcare practitioners, investors, and wider community) while ensuring data integrity and protecting patient privacy. In addition, other service offerings also form the components of this network. These are: MediExchange, MediBank, MediIntelligence (market intelligence data collection unit)

This system represents a good solution to the healthcare industry as it will reduce cost of operations, and interoperability challenges currently plaguing the implementation of eHealth initiatives across the globe.

4.5.2.1. Preliminaries for infrastructure development

BLOCKCHAIN NETWORK

(Adapted from Xia et al., 2017)

The blockchain is a distributed database that contains an ordered list of records linked together through a chain, on blocks. Blocks can be described as sets of individual entities that hold information pertaining to some transactions, for example, financial transactions or medical reports etc. The blockchain maintains a continuously growing list of records which are distributed and immutable. It is for this reason that many systems built on the blockchain technology achieve secure distribution of assets amongst untrusted clients.

For a client “A” (lets say a patient seeking 2nd opinion) who wants to transfer an asset (her medical reports) to a client “B” (a medical practitioner), the asset is verified by sets of nodes and ownership of such an asset is tagged to the client “A”. The client transfers the asset through a channel to “B” who becomes the new owner of this asset. All these records of verification, transfer, and change of ownership are recorded in a public database for future transactions and references. In cases where there is a malicious activity, verifying nodes can trace the attributes of the record and resolve the issues. For such systems, there is a need for a database that is highly immutable and provably

secure.¹⁷ For transactions between clients who have no idea of the identities of each other, there is an equal need for a system to allow a trust-less but secure transaction between such parties. The blockchain is a perfect fit for resolving these problems associated with trust and change in data in cloud storage. It is highly distributed; which means that every single client part of the network has records of every valid transaction completed on the network. The properties of the blockchain that make it attractive for secure sharing of data are its immutability and “trust-less” transaction execution.

Cryptographic Keys

Cryptographic keys denote the sets of keys established to perform tasks pertaining to the security of a system. For the blockchain-based scheme, keys will perform roles in relation to a. user authentication and membership, b. user verification, c. request generation, and d. request authentication. These keys help to guarantee a level of security of the scheme. The keys include:

- Membership issuing keys
- Membership verification keys
- Membership private keys
- Transaction private keys
- Transaction public keys

Membership Authentication and Verification

For a user to join the authorised blockchain, there is the need for membership authentication. The verification and acquisition of a user’s identity used to generate specific keys in relation to the user needs to be secure through already established systems. Our system adopts an efficient and secure identity-based authentication and key agreement protocol that guarantees user anonymity as a means to which membership authentication is achieved. Methods necessary to setup a new user as a member into the system is categorised into two parts a. cryptographic techniques; b. sharing of information for account registration and verification for the user.

Pool of Unprocessed Requests

The pool of unprocessed requests (in our case, logging in to the system, waiting for an appointment etc.) is a data pool of blocks which contain requests created by the user for the purpose of contributing data or accessing data from the storage. The consensus node is the entity that fetches data from the pool for processing. Attention should be drawn to the fact that blocks found in the pool are not chained together. They are tagged with a timestamp of when they arrived in the pool. A

¹⁷ Qi Xia *, Emmanuel Boateng Sifah, Abba Smahi, Sandro Amofa and Xiaosong Zhang (2017) BBDS: Blockchain-Based Data Sharing for Electronic Medical Records in Cloud Environments , MDPI

suitable algorithm is necessary to define the order at which such blocks will be fetched and processed. A point worth noting is that the pool of unprocessed requests and the blockchain network are two separate entities which are not linked together in any way. The only characteristic between them is the consensus node.

SYSTEM DESIGN

Our system will be formulated as data sharing mechanism used by the blockchain-based medical data sharing infrastructure. This infrastructure will include three entities, namely the a. user (patient and medical practitioner), b. system management (issuer, verifier and consensus nodes); and c. storage, as shown below in fig 4.5.1 and 4.5.2.

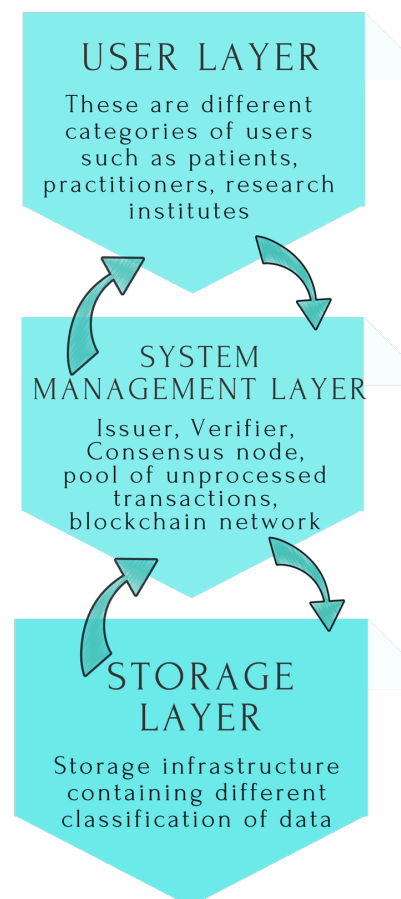


FIG. 4.5.1 BBDS ECOSYSTEM

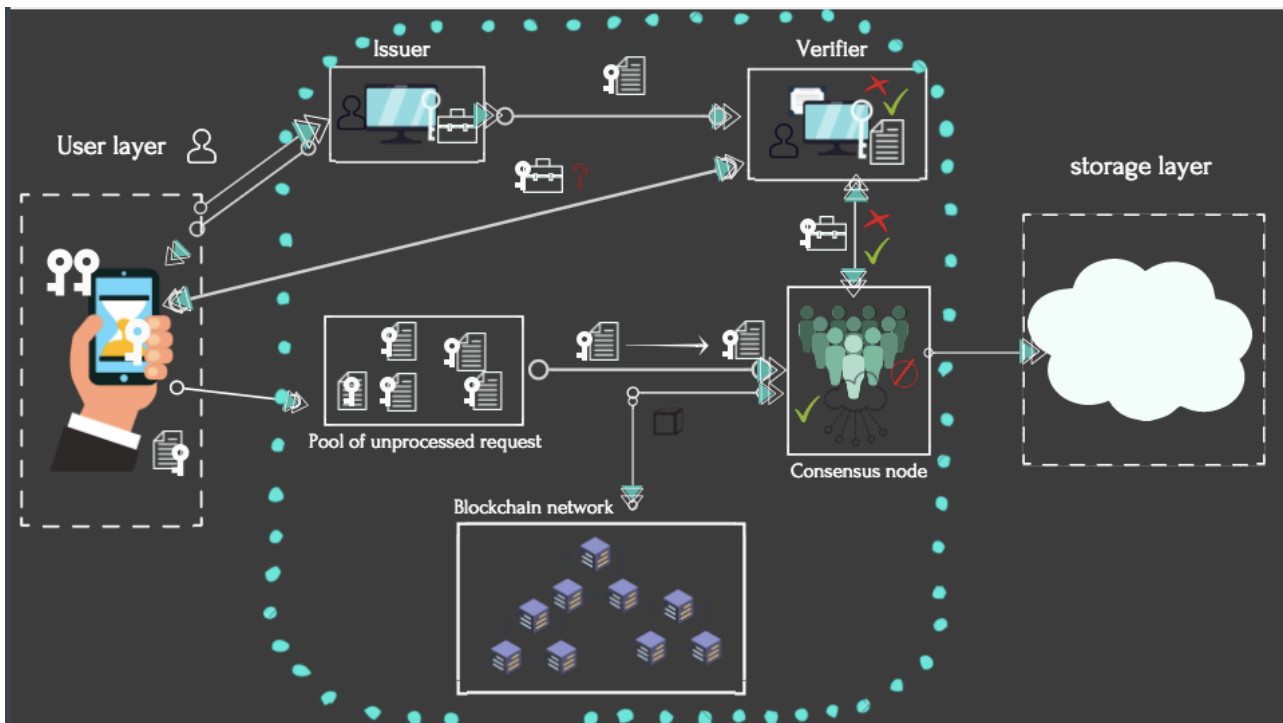


FIG. 4.5.2 BBDS SYSTEM ARCHITECTURE (ADAPTED FROM XIA ET AL. 2017 WORK)

SYSTEM IMPLEMENTATION

At the moment, we are in the developmental process system implementation. Technical details to be followed in yellow paper.

PROTOCOLS USED TO COMPLETE THE SYSTEM

At the moment, we are in the developmental process system implementation. Technical details to be followed in yellow paper.

4.5.2.2. Decentralised-app (Dapp) development

At the moment, we are in the developmental process of Dapp. Technical details to be followed in following versions of white paper.

4.5.2.3. MediIntelligence-Development of Blockchain-Based Trusted Review Platform

Through creating and implementing the first Blockchain-based system for trusted mhealthcare treatment and treatment reviews, the MediBitcoin Network will allow patients' voices to be heard whereas healthcare practitioners will have access to up-to-date, extremely valuable market research data and qualified patient feedback. This data will be the most powerful tool to improve service quality and to establish a loyal patient base.

Through a self-executing Smart Contract, the MediBitcoin review platform will assure optimal autonomy, trust, speed, and safety thus mitigating any risks in connection with manipulations. The blockchain-based feedback system (smart contract) will trigger a dynamic movement in patients and healthcare providers to open MBTC wallets. There will be a MediBitcoin community that will create the prerequisites for the future steps. These steps will be taken to penetrate the global market providing valuable market research. At this moment in time, MediBitcoin's developers are working on the frontend, the database and the smart contract.

This platform is under construction. Before it is presented in the market, the ICO sales would generate 2nd round of funding for the business. ICO sales is planned for June 2018. Once the ICO begins, the marketing strategies for the UK nationwide expansion will be implemented, resulting in creating a rapid growing community of Medibitcoin.

5. The Project Phases

5.1. Phase 1.1: PreICO sale 01-May-01 - June 2018

Phase duration: 01-May 2018 - 1-June 2018 or until the cap of 600,000 MBTC is reached

Phase sales target: 600,000 MBTC OR MBTC in equivalent to £100,000

Number of total MBTC Tokens to be developed: 100,000,000

Minimum contribution towards token sale by buyers: 500 MBTC equivalent of £100

Maximum contribution towards token sale by buyers: 25,000 MBTC equivalent of £5000

This phase invites close community members and early contributors to obtain MBTC tokens. This ensures that MBTC tokens are well-distributed amongst strategic believers and supporters, and users of our network.

Early bird rewards: 20% extra MBTC Tokens for all accepted contributors

This phase is further segmented into 2 sub-phases: Invite-only Private Pre-sale phase; and Pre-ICO sale.

Invite-only Private Pre-sale phase: Medibitcoin Network reserves the right towards introduction of “invite-only Private Pre-sale” contribution period, where higher rewards may be awarded during this Private Pre-sale phase (at Medibitcoin Network’s discretion). The MBTC Tokens sold during this phase will not exceed 50% of all the available MBTC Tokens sold to the contributors.

Pre-ICO sale: Pre-ICO contributors will receive their MBTC tokens once the company sets MBTC / USD exchange rate and by the time of initiation of crowd-sale. However tokens will not be trade-able/locked for the crowd-sale phase followed by a short confirmation period. This is needed to ensure that across all phases, token distribution had been executed correctly. After successful validation of the process, all tokens will be unlocked and become transferable.

5.2. Phase 1.2: Public Crowd-sale

This phase invites contributors from general public.

Phase duration: Until the cap of 6,000,000 MBTC is reached

Phase target: 6,000,000 MBTC OR MBTC in equivalent of £1,080,000

This target sum can only be approximated as it is likely to vary due to fluctuations in the ETH/USD exchange ratio. Another fact that needs to be factored in is that the total number of tokens sold might increase by the number of unsold tokens from previous phases.

Phase rewards: 10% extra MBTC Tokens for all accepted buyers

Target amount of distributed MBTC tokens: 6,000,000 + unsold tokens from previous phases

Minimum contribution towards token sale by contributors: 500 MBTC

Maximum contribution: The maximum amount of each contribution will be decided upon community requests prior to the public crowd-sale starts. Contributors receive their tokens immediately after the payments are received and account verification. However tokens will not be trade-able for the crowd-sale phase followed by a short confirmation period. This is needed to ensure that across all phases, token distribution had been executed correctly. After successful validation of the process, all tokens will be unlocked and become transferable.

5.3. Phase 1.3: Public Crowd-sale 03 Sep - 15 Oct 2018

This phase invites contributors from general public.

Phase duration: 3 Sep - 15 Oct 2018 or until the cap of 8,000,000 MBTC is reached

Phase target: 8,000,000 MBTC OR MBTC in equivalent of £1,440,000

This target sum can only be approximated as it is likely to vary due to fluctuations in the ETH/USD exchange ratio. Another fact that needs to be factored in is that the total number of tokens sold might increase by the number of unsold tokens from previous phases.

Phase rewards: 10% extra MBTC Tokens for all accepted buyers

Target amount of distributed MBTC tokens: 8,000,000 + unsold tokens from previous phases

Minimum contribution towards token sale by contributors: 500 MBTC

Maximum contribution: The maximum amount of each contribution will be decided upon community requests prior to the public crowd-sale starts. Contributors receive their tokens immediately after the payments are received and account verification. However tokens will not be trade-able for the crowd-sale phase followed by a short confirmation period. This is needed to ensure that across all phases, token distribution had been executed correctly. After successful validation of the process, all tokens will be unlocked and become transferable.

5.4. Phase 1.4: Public Crowd-sale

This phase invites contributors from general public.

Phase duration: Until the cap of 5,400,000 MBTC is reached

Phase target: 5,400,000 MBTC OR MBTC in equivalent of £972,000

This target sum can only be approximated as it is likely to vary due to fluctuations in the ETH/USD exchange ratio. Another fact that needs to be factored in is that the total number of tokens sold might increase by the number of unsold tokens from previous phases.

Phase rewards: 10% extra MBTC Tokens for all accepted buyers

Target amount of distributed MBTC tokens: 5,400,000 + unsold tokens from previous phases

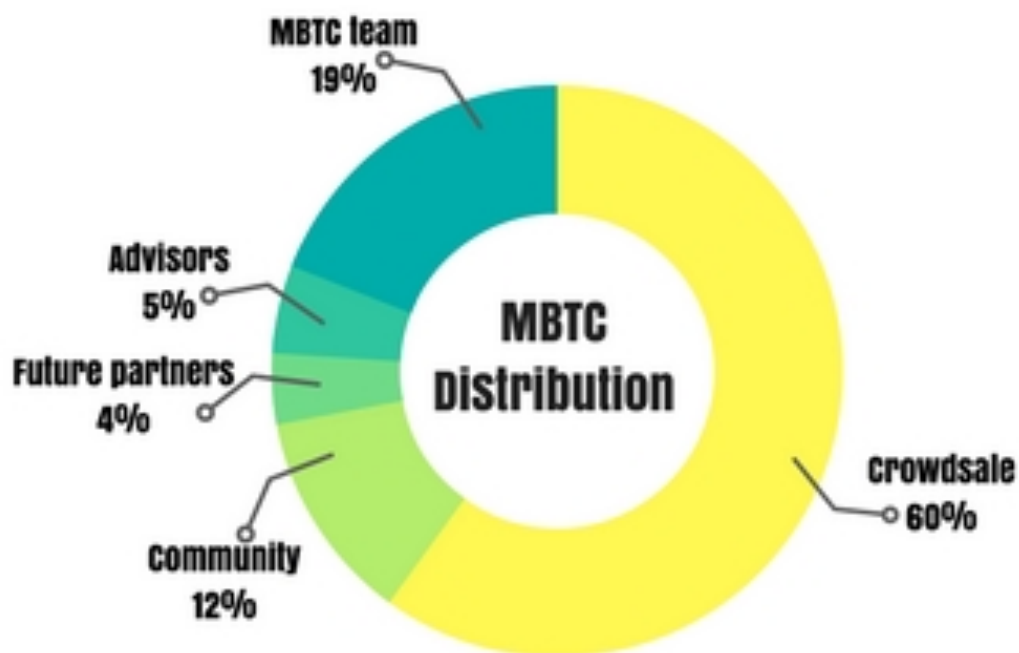
Minimum contribution towards token sale by contributors: 500 MBTC

Maximum contribution: The maximum amount of each contribution will be decided upon community requests prior to the public crowd-sale starts. Contributors receive their tokens immediately after the payments are received and account verification. However tokens will not be trade-able for the crowd-sale phase followed by a short confirmation period. This is needed to ensure that across all phases, token distribution had been executed correctly. After successful validation of the process, all tokens will be unlocked and become transferable.

5.3. MBTC Token Distribution

Some tokens will have a vesting period scheduled below:

- Tokens issued to the team will have a vesting period of 2 years;
- Tokens issued to the advisors will have a vesting period of 2 years;
- Tokens issued to the future partners will have a vesting period of 3 years;
- Tokens issued to the community and general public will not have a vesting period.



6. MBTC Funds distribution

The funds will be allocated across three phases:

- Phase 1 - Development: £1.3 million
- Phase 2 - Scaling: £1.3 million
- Phase 3 - Marketing: £1.3 million

6.1. Phase 1: Development phase fund allocation

- 50% of sales covers the technical development costs of the platform;
- 10% of sales covers the costs of non-technical product development, including project management, team management and business development;
- 10% of sales covers the costs of expanding and developing business network;
- 5% of sales covers the first marketing phase, covering basic marketing operations, including advertising campaigns for user acquisition and branding;
- 5% of cost covers day-to-day operations, office rent, office equipment, travel expenses and legal fees.
- 15% of the funds will be put aside to back the circulating tokens

6.2. Phase 2: Marketing phase fund allocation

- 20% of sales covers the direct sales to our target audiences, including direct calls and personal meetings;
- 10% of sales covers the costs of negotiating potential partnerships;
- 10% of sales covers the costs of funding a global, ongoing PR campaign, targeted towards specialised and mainstream media
- 45% of sales covers the cost of ongoing global marketing campaign covering all relevant media outlets, designed to increase our DApp user database and assure platform liquidity;
- 15% of the funds will be put aside to back the circulating tokens

63. Phase 3: Scaling phase fund allocation

- 30% sales covers the technical development costs of adding users from new markets into the database as well as adding additional languages;
- 10% sales covers the costs of non-technical product development, connected directly to the global scaling of the product;
- 10% sales covers additional travel expenses and setting up offices in new markets;
- 10% sales covers the costs of negotiating partnerships with additional platforms, including personal meetings;
- 20% sales covers fund the marketing on new markets, including advertising campaigns for user acquisition and branding;
- 10% sales covers cover day-to-day operations, office rent, office equipment, travel expenses and legal fees.
- 10% of the funds will be put aside to back the circulating tokens

7. PRODUCT SECTION

During the pre-ICO and ICO launch, our prime product is our token, Medibitcoin (MEDI TOKEN). Post ICO launch, our products will be Medi-DApp, MEDIS, MEDI-Intelligence, MEDI Exchange and bank, MEDI Projects.

5.1. Medibitcoin (MEDI)

For our system to work, MEDI that had been forked from Ether, is a necessary element- a fuel that runs the distributed application platform created in Ethereum. It is a form of payment made by the patients who use our platform-Medibitcoin Network, to the machines executing the requested operations.

MEDI Token will be traded in its own marketplace i.e. MediDApp where it would be traded as a mainstream currency.

5.2. MEDI-Decentralised Application (DApp)

The concept of DApp is still in its infancy, hence a standardised definition of DApp is yet to be provided. Built on ethereum platform, one out of 3 categories that concerns our project is defined as “semi-financial applications, where money is involved but there is also a heavy non-monetary side to what is being done; a perfect example is self-enforcing bounties for solutions to computational problems.¹⁸” The simplest explanation of DApp in the context of our project though, is that DApp are similar to apps, however, these are built on blockchain-based systems such as Ethereum. MEDI-DApp will have following features:

- It will be open sourced which means that it can be governed by autonomy and any changes will be decided by the consensus, or at least by majority of the users. The code base will also be available for scrutiny.
- It will be decentralised which means that all records of the application’s operation will be stored on a public and decentralised blockchain so that any pitfalls of centralisation can be mitigated.
- It will be incentivised which means that validators of the blockchain will be incentivised by rewarded with MBTC tokens.

¹⁸ Github (2018) A Next-Generation Smart Contract and Decentralized Application Platform [online] <https://github.com/ethereum/wiki/wiki/White-Paper#applications>

- Lastly the community's agreement on a cryptographic algorithm to show proof of value will be needed. Given the fact that MediDApp will be built upon Ethereum, it will be using PoW with plans for a hybrid PoW/Proof of Stake (PoS)⁵ in the future.

6. USE CASE

MediDAapp will be designed to provide a directory of medical practitioners with profiles, photos, credentials, research publication (if any), patient ratings, addresses, and directions. Users can search for practitioner by location, gender, medical specialty, response time-frame, and request an appointment directly from the dapp. Patients will be requesting second opinion on their primary care diagnosis. The MediDAapp will be able to upload user's medical records / diagnostic reports, imaging, and test results for online review. The benefits it will deliver are transparency, hence empowering users to manage their own health. Other benefit would be significantly cutting the request / response time in contrast with the existing healthcare systems across the globe. Most importantly, medical practitioners would be able to perform on the basis of patient's symptoms combined with her experience.

Global healthcare systems have been reportedly bringing our attention towards issues such as lack of patient-centric care, addressing chronic health conditions, high fatality rate due to misdiagnosis and or undiagnosed medical conditions and lack of transparency¹⁹. Secondly, global healthcare systems accessed privately via medical insurance route, are costly that doesn't leave much flexibility for buyer's pocket. Third, healthcare systems require practitioners to follow strict guidelines, policies and procedures. This leaves us with a question: does healthcare systems train practitioners to perform on the basis of 'one size fits all'? What further supports the validity of this question are the research studies pointing towards millions of suffering reported only within the US and UK. The figures across underdeveloped countries could be shockingly painful to learn.

MediDAapp is conceptualised to address all the above problems, by simply connecting patients seeking medical second opinion and healthcare practitioners irrespective of their healthcare systems.

¹⁹Deloitte (2016) Global health care challenges need global solutions
[accessed online] from: <https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/health-care-current-december6-2016.html>

7. ROADMAP OF DEVELOPMENT

PHASE 1- Q4 2017

- Company founded
- White paper in working
- Website design and development in working
- Pre-selection of social responsibility initiatives

PHASE 1- Q1 2018

- Networking initiated
- Two independent audits of smart contracts completed
- Real-world Ethereum based cryptocurrency- MEDI developed
- Social responsibility strategy devised
- Intellectual property registration
- Pre-ICO sales/ early birds rewards

PHASE 1- Q2 2018

- ICO sales
- Network development continues
- MEDI DApp in development phase
- MEDI community involvement in platform development where MEDI token holders will have their say on upcoming business developments

PHASE 1- Q3 2018

- ICO sales continue
- Network development continues
- MEDI DApp in development phase

PHASE 1- Q4 2018

- Community grows
- Sustaining the leadership in blockchain mobile healthcare sector