The Clinical and Investment Potential in the Gene-Chain Project

The Blockchain-based application of Encrypgen, LLC is now in Initial Coin Offering.

Abstract

In recent years, tremendous growth has been seen in the size and variety of genomic data. This growth has been met with technological advancements in the capture, process, analysis and storage of genomic information. The complementary expansion between genomic databases and data technologies have enabled the emergence of targeted therapies and personalized medicine. However, the huge potential of genomic data in scientific developments is hampered by issues on data security and privacy. Who owns the health data? Who can access the genomic databases? More importantly, what can people with malicious intent do with the genomic information which they have access to? In the era of continual technological and digital progress, patients and researchers should have a better solution for managing, storing, and finally, utilizing the data - one that confronts the issue on data privacy and security head on and thus propels genome-based scientific discoveries to new heights. This whitepaper explores one solution, the Gene-Chain, which is an application based on the Blockchain technology that focuses on a safe, trackable and virtually unhackable method of making digital transactions involving genomic information over a secure network. The Gene-Chain project is equipped with all the technical features that are afforded to the Blockchain technology, In particular, individuals and entities who deposit, use or mine data are rewarded with Gene-Chain Coins, which represent an ever-growing value and exchangeable cryptocurrency.

The Unprecedented Growth of Genomic Data

The explosion of genomic data and the increased capacity to access such data constitute a boon to both scientific research and commerce. All of this was catalyzed by the completion of the Human Genome Project. In 2003, scientists from all over the world successfully concluded a 13-year initiative to sequence the entire human genome. The Project was able to identify and map about 20,500 human genes. The completed DNA sequence now provides scientific guidance as to the structure, function and organization of the human genome. Essentially, the Project produced a comprehensive blueprint of instructions for how a human body grows, develops and

functions and how these instructions are inherited.[1] Establishing the human genome map enabled, and continues to enable, studies that can dive into the nature, variations, mutations, and phenotypic linkages of human DNA. With this depth and breadth of scientific knowledge, researchers and clinicians have been given the unique opportunity to understand and explain health and diseases at the genetic level.[2]

Why the Human Genome Project is only the beginning

According to the US National Library of Medicine, the Human Genome Project allowed researchers "to begin to understand the blueprint for building a person."[3] The project's completion was only possible with the determination, effort and collaboration of government agencies in the US with members of the academe both within and outside the US. International partners were located in Germany, France, UK, China and Japan. The project began in 1990 and concluded two years ahead of schedule in 2003. Today, it continues to have promising implications in the fields of biotechology, life sciences, medicine, pharmaceuticals and healthcare.[4] However, the value of data is only realized when it is used to generate meaningful and life-changing insights. Optimizing genomic information will require openness to the possibilities that lie within technology, a penchant for collaborative work, and a thirst for policies and solutions that allow researchers to overcome data-related challenges such as the issues on security, privacy and ethical practices.

Some of the research techniques that proved useful, and continue to be so, in the creation and maintenance of the human genome pool include DNA sequencing, Polymerase Chain Reaction and Bacterial Artificial Chromosomes.[5] Moreover, the increased demand for more sophisticated data processing capabilities has been met with advancements in data collection tools, data analytics, data storage, rapid retrieval and information distribution mechanisms.[6]

Essentially, the growth of access to and availability of genomic data has been matched with the emergence of high performing computation, and the potential for genetic discovery has become endless. Companies that focus on creating and maintaining databases that curate genomic data

1 National Human Genome Research Institute (2016). What was the Human Genome Project? Retrieved from https://www.genome.gov/12011238/an-overview-of-the-human-genome-project/

2 Encrypgen. LLC (2017). "Gene-Chain" a solution for enhancing privacy, security, and utility in genomic databases

3 US National Library of Medicine (2017). What was the Human Genome Project and why has it been important? Retrieved from https://ghr.nlm.nih.gov/primer/hgp/description

4 Ibid.

5 National Human Genome Research Institute (2016). What was the Human Genome Project? Retrieved from https://www.genome.gov/12011238/an-overview-of-the-human-genome-project/

6 Ibid.

have sprung up, enabling researchers and drug developers to mine the data and build their understanding of cell function, disease progression, population health and illness prevention.[7]

The features of genomic data today

Due to the completion of the Human Genome Project and the advancements in data technologies, the genomic data of today possesses three main improvements over the genomic data of yesterday:

- ➔ ***Faster*** - the computing power has been accelerated in that genomic data can be captured, analyzed and retrieved within hours or days compared to previous years when it would have taken weeks or months
- ➔ ***More accessible*** - Not only is the genomic information accessible to research and academic entities, but it is now also available to the public, usually for a fee. A few websites and applications now enable consumers to trace their ancestry (AncentryDNA and 23andMe) and determine drug dosing based on genetic variation (dosisacenocumarol.com and warfarindosing.org)
- ➔ ***More affordable*** - With the growth in the number of genomic databanks and the breadth of genomic data expertise, acquiring information on the human DNA is becoming more and more affordable. Over the years, the cost of sequencing an individual's DNA has gone from $4,000 down to $1,000.[8] In the coming years, researchers expect that the cost will eventually be driven down to $100[9]

The dilemma in genomic data utility: Scientific progress or data security?

Genomes, however, are personal and may contain highly sensitive information about an individual. The massive developments in the field of genomic research begs the question: Have all legal, ethical and social considerations been made?

DNA contains information on a person's ethnicity and heritage, risks for developing specific conditions, life expectancy and personal traits such as intelligence and personality.[10] People, however, may want to keep these pieces of information private. A broad view of a person's genetic

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7 Encrypgen. LLC (2017). "Gene-Chain" a solution for enhancing privacy, security, and utility in genomic databases

8 National Human Genome Research Insitute (2016). The Cost of Sequencing a Human Genome. Retrieved from https://www.genome.gov/sequencingcosts/

9 Encrypgen. LLC (2017). "Gene-Chain" a solution for enhancing privacy, security, and utility in genomic databases

10 Ibid.

make-up creates a highly deterministic perspective on health. One potential consequence to this is that insurance companies may become severely selective, which may be to the disadvantage of the individual.

Hence, scientific progress may be at odds with patient privacy, which may lead to an underwhelming future for genomics research and development. Who is qualified to curate genetic information? Who can be held accountable if the data is hacked and used for malicious and unauthorized purposes? With several questions around the security and privacy of the current methods for managing genomic data, trust becomes a major issue. The entire field of genomics science now requires a method to safely store genomic information and securely retrieve the data for medical, personal or research purposes.[11] But is there a technological solution that can meet all of these requirements? The following section discusses the potential of Blockchain technology in providing a solution.

Why the Blockchain Technology Addresses the Dilemma

Typically, when two parties seek to exchange items of value, each party has its own individual ledger, which would record and interpret the details of the transaction. With each party having its own internal ledger, what emerges are varying versions and interpretations of the truth. In cases where the two parties are unfamiliar with each other and therefore do not trust each other from the outset, an intermediary is usually brought in to broker the exchange and to provide a layer of authority, authenticity, guarantee and security to the exchange. This arrangement is a typical one in the business of acquiring and sharing genomic data. Also, the need to have an intermediary and other security measures often entail costs.[12]

The Blockchain technology offers an advanced and technical model to send and record transactions involving sensitive data without the need for an intermediary.[13] This technology represents a distributed ledger that is almost impossible to alter and tamper with. Each party or user linked to the Blockchain network has access to a shared ledger of transactions that appears in a uniform fashion as with any other party or user in the network. Basically, every user in the network has access to a common copy of the list of transactions, promoting transparency and peddling a shared truth. As illustrated in Figure 1, the technology makes it possible for all historical

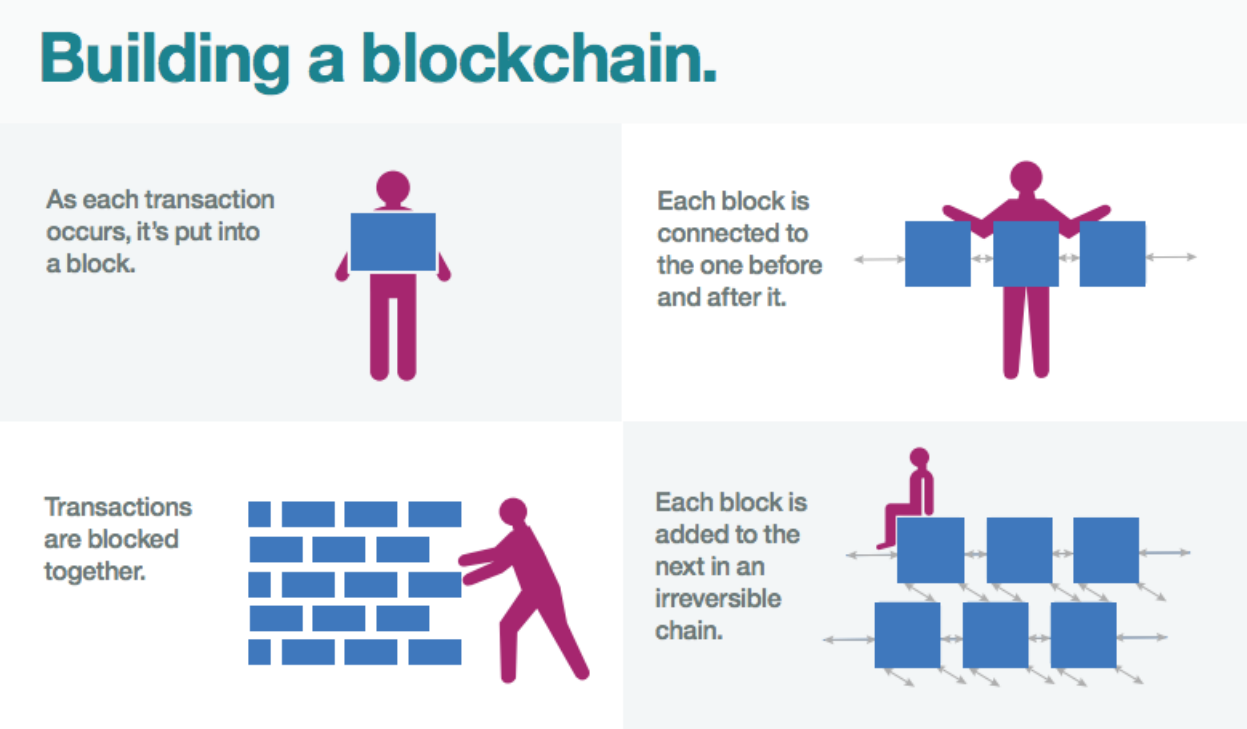
11 Lin, B. (2017). Blockchain: The Missing Link Between Genomics and Privacy? Retrieved from https://www.forbes.com/sites/patricklin/2017/05/08/blockchain-the-missing-link-between-genomics-and-privacy/#36db08f24b77

12 IBM (2017). Blockchain 101 Infographic. Retrieved from https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=XI912346USEN&

13 Encrypgen. LLC (2017). “Gene-Chain” a solution for enhancing privacy, security, and utility in genomic databases

transactions to be recorded into “blocks” and all changes to transactions are updated and synchronized every 10 minutes.[14]

Figure 1. How a Blockchain is built



Source: IBM[15]

Blockchain has most commonly been associated with financial start-ups that deal with the digital currency called Bitcoin. However, Blockchain has applications across multiple fields and industries, one of which is area of genomics. It creates a digital network where meta-data can be searched and retrieved, which enable data sharing among researchers and security of personal and sensitive data. Using the Blockchain technology for genomics data utility can address four specific questions:

1. Who owns the data?
2. Where is the data stored?
3. How is the data donor’s identity and privacy protected?
4. How are the data exchanges/transactions audited?

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14 Thompson, C. (2016). How does the Blockchain Work (for Dummies) explained simply. Retrieved from https://medium.com/the-intrepid-review/how-does-the-blockchain-work-for-dummies-explained-simply-9f94d386e093

15 IBM (2017). Blockchain 101 Infographic. Retrieved from https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=XI912346USEN&

Who owns the data?

Cloud-based storage of genomic data, which is the typical model of storing and retrieving massive amounts of data, places the control in the hands of the institution or company maintaining the central server and database. When a patient uploads his or her genomic information on a Cloud-based platform, for instance, that information can pass through the hands of several other stakeholders (e.g. the data analytics firm, the server handler, the customer interface firm, etc.) before it reaches the hands of the intended audience, say, a clinical trial researcher who has sent a query. The patient or the original source of the information, however, is not in the know with regards to which stakeholders have viewed the contents of his or her personal information. If malicious or unauthorized activities take place as a result of having multiple stakeholders having access to that information, raising the question of who is truly accountable becomes futile.

With Blockchain, individuals can upload their genomic information and have the confidence that their data is safe and secure. When a researcher queries for access to a particular patient's data, the patient controls the degree of permitted access. The details of the transaction are also fully recorded into the chain. Any further exposure of that data, which is beyond what the original data source had permitted, can hold the querying researcher accountable. Moreover, data ownership has clear boundaries. Donors of the data can also deliberately control with whom they share their data, when, and for how long. In addition, the Blockchain technology can generate tokens or coins that enable data donors to be rewarded for their data exposure.[16]

Where is the data stored?

In relation to the issue on data ownership, the Blockchain technology also addresses the issue on data storage. In typical Cloud-based or hardware memory-based data storage, all the data coming from various data sources are warehoused in a centralized database. This means that when the central database experiences problems or is hacked, all the information stored there is placed at risk.

With Blockchain technology, the database is shared and is decentralized. Every member in the community has a copy of the most recent ledger and any additions to that ledger are recorded, reported and synchronized. In order to hack or manipulate one transaction, a hacker must go through the entire chain and affect the ledger copy of each member.[17] Moreover, the data sharing

16 Encrypgen. LLC (2017). "Gene-Chain" a solution for enhancing privacy, security, and utility in genomic databases

17 Ibid.

process is peer-to-peer in which there is no need to place the data in a temporary holding facility until such time that an interested party queries for it. The exchange can be instantaneous.[18]

How is the identity and privacy of the data donor protected?

One of the key issues that researchers are faced with is patients' lack of willingness to share their data due to having a lack of trust in the entity requesting for the data. Patients and potential data donors often get more comfortable and willing to share their health data when they know it will be put to good use during drug development and efforts to improve the quality of healthcare.[19] However, for many patients, the issue is not so much on whether the owner of the health data is clearly defined, but more on whether there is an assurance that their personal and financial data are kept secure.

How can a patient or data source's identity and privacy be ascertained? The method of data security varies between Blockchain and other typical Cloud-based databases. With typical databases that are maintained by intermediaries, genomic data is often de-identified, which means the health information of a person is stripped of personal attachments and identification, such as a person's full name, age, address, insurance details, or any other details that make the person identifiable. De-identification can be done through specific computer software techniques such as double blind referencing. However, de-identification still has a risk of being reversed. Using the same coding techniques, hackers can *re-identify* patients and thus place patients at risk of exposure and abuse.[20]

On the other hand, the Blockchain technology utilizes a special encryption system where the transactions uploaded into the network are associated with a unique coding tool called a hash. Each member of the network is also assigned an encrypted key, which serves as a digital signature that is required to authenticate access to a transaction. Furthermore, while the Blockchain is transparent and accessible via the Internet, members of the network can opt to make it private in which new parties interested to join and participate must comply with certain software and certification criteria.[21]

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18 Lin, B. (2017). Blockchain: The Missing Link Between Genomics and Privacy? Retrieved from https://www.forbes.com/sites/patricklin/2017/05/08/blockchain-the-missing-link-between-genomics-and-privacy/#36db08f24b77

19 PatientsLikeMe (2017). PatientsLikeMe Survey Shows Vast Majority of People With Health Conditions Are Willing To Share Their Health Data. Retrieved from http://news.patientslikeme.com/press-release/patientslikeme-survey-shows-vast-majority-people-health-conditions-are-willing-share-t

20 Malin B, Sweeney L. How (not) to protect genomic data privacy in a distributed network: using trail re-identification to evaluate and design anonymity protection systems. Journal of Biomedical Informatics. 2004;37(3):179-92

21 Encrypgen. LLC (2017). "Gene-Chain" a solution for enhancing privacy, security, and utility in genomic databases

How are the data exchanges/transactions audited?

Essentially, intermediaries broker trust since the parties involved typically do not have trust for the other party. Prior to making an exchange, people try to get know the other party as much as they can. In addition, people acquire the services of an intermediary that can authenticate the legitimacy, sincerity and intentions of the other party.

Through high level cryptography, the Blockchain technology enables immutability and removes the need for an intermediary. Since the Blockchain technology enables heavy synchronization, tampering with the Blockchain will be costly and time-consuming. All parties in the Blockchain network approve and validate a new transaction. So, any change or addition to the ledger is logged for real-time validation and auditing by all members of the community.[22]

Specifically, the Blockchain provides the opportunity to subject genomics data to Smart Contracting, which is an immutable way of processing a contract between two parties in the network. In a smart contract, the terms are transparent and uniformly presented between the two parties. The contract is also self-executing in which the terms are automatically fulfilled. Moreover, all the the terms of data access are followed, monitored and recorded such that each party can view the details of their transactions anytime. This creates an irrefutable paper trail that prevents future denial to the terms that have been agreed.[23] Therefore, the authentication of the contract is woven into the fabric of the chain and establishing trust in the other party becomes irrelevant. Blockchain promotes trust in the entire network and the cryptography algorithms.[24]

Hacking into the Blockchain would require the manipulation of a significant fraction of the community members' validation process, which would typically cost much more than what could be gained by hacking the system. In other words, the shared nature of the Blockchain makes hacking not worthwhile. According to the Byzantine Generals theorem, it would take coordination of at least 30% of the access points to the network, which are called nodes, to successfully hack or manipulate a Blockchain network. Therefore, the larger the network, the greater the number of members who need to validate and authenticate each transaction, which augments the security and privacy features of the Blockchain.[25]

Encrypgen's Gene-Chain application

Genomic data is complex and sensitive. If the Blockchain technology were applied in the field of genomics, a specialized solution needs to be designed. The Encrypgen, LLC's Gene-Chain

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22 Encrypgen. LLC (2017). "Gene-Chain" a solution for enhancing privacy, security, and utility in genomic databases

23 Ibid.

24 Ibid.

25 Lin, B. (2017). Blockchain: The Missing Link Between Genomics and Privacy? Retrieved from https://www.forbes.com/sites/patricklin/2017/05/08/blockchain-the-missing-link-between-genomics-and-privacy/#36db08f24b77

application has been developed precisely for this purpose. Encrypgen provides next generation software for genomic data, which empowers patients and data donors and creates a safe environment to facilitate health, business and science. The Gene-Chain solution brings with it the beneficial features of Blockchain such as:

- The genomic database is distributed,
- Sharing is peer-to-peer,
- The network is virtually unhackable,
- A permanent and immutable record of transactions is created, and
- Transactions are searchable.

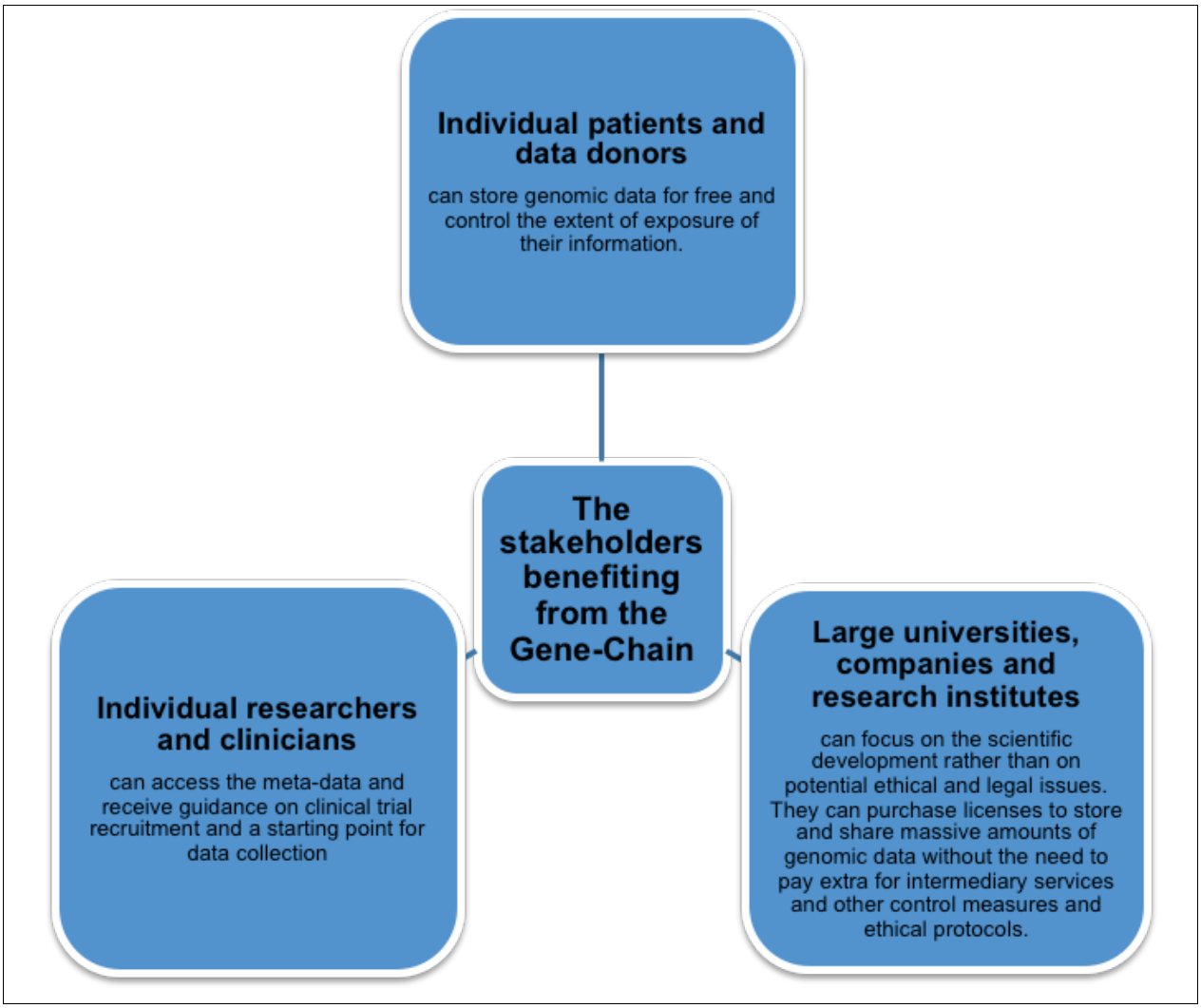
In the field of genomics, Encrypgen's Gene-Chain is revolutionary. The application is tailored to the nuances of genomic data and designed to be a central repository for genomic data that severely outperforms its Cloud-based counterparts. Furthermore, the application offers unique benefits on top of what is afforded to the Blockchain technology:

1. **Safe and searchable** - Patients and data donors are welcome to deposit their genomic data to the Gene-Chain for free. By doing so, donors are assured that their information is permanently stored in a safe and secure manner. Researchers and clinicians can then access genomic data with the explicit permission of the data owner and with the use of time-expirable keys.
2. **Ethical** - Companies, research centers and universities may purchase licenses to store data in the Gene-Chain to comply with local laws relating to consent and privacy.
3. **Empowering to donors** - The Gene-Chain enables real time and permanent tracking of transactions, placing the control and capacity to give consent in the hands of the true data owner.
4. **Secure and private** - Aside from the unhackable encryption mechanism of Blockchain, the Gene-Chain also adopts rotating reference genomes, time limited keys, compression algorithms aided by deep learning software as well as other sophisticated security measures.
5. **Platform-agnostic** - One of the main challenges with a centralized database for genomic data is the need to standardize the format of the information added onto the database. The Gene-Chain, however, is agnostic to the original formats of the data and the sequencing platform. The data can be stored and browsed in its original form. The Gene-Chain is designed to only store, share and secure it.

As illustrated in Figure 2, the Gene-Chain platform is able to offer unique benefits to various users in the Gene-Chain community.

Figure 2. The stakeholders benefiting from the Gene-Chain application[26]

26 Lin, B. (2017). Blockchain: The Missing Link Between Genomics and Privacy? Retrieved from https://www.forbes.com/sites/patricklin/2017/05/08/blockchain-the-missing-link-between-genomics-and-privacy/#36db08f24b77



The additional levels of security

Due to the breadth and degree of complexity of genomic information, it is understandable to have the levels of security, safety and capability be called into question. Three questions that may spring from scepticism in the potential of Blockchain technology are presented below:

1. Can users upload unauthorized data?

Patients and data donors can upload genomic data freely. Is it possible for them to upload data that is arbitrary or has been illegally obtained? To avoid such situations, Gene-Chain puts in place strict verification procedures to ensure what are being uploaded are in fact genomic data and index files. In the unlikely event that non-genomic data is included in the shared database, Encrypgen will have the ability to remove it using a private blockchain platform.

2. Can a single network handle Big Data?

At times, the storage of genomic data is afforded by the donor who has no desire to migrate the data. Nonetheless, genomic data is massive and diverse and leveraging it would mean taking on Big Data. Indeed, placing or streaming Big Data on a blockchain presents one of the largest technical challenges in blockchain development. Hence, Gene-Chain is equipped with deep learning genomic compression techniques that facilitates the data security within the donor's storage space and involves blockchain links that enable data streaming or transmission. These compression techniques may be applied to other Big Data sets placed on blockchains and are thus potentially patentable.

3. How can payment be facilitated in a decentralized environment?

The majority platform utilized in Gene-Chain is MultiChain, which is an open source platform for the deployment of private blockchains that does not use smart contracting. For some people, a lack of smart contracting insinuates a problem when it comes to settling payments between users and donors. However, Gene-Chain has a "node zero" that is tasked to arbitrate payments between customers. In addition, the application utilizes the open source called Hyperledger, which drives cross-industry blockchain collaboration and is used for the validation of transactions.[27] The blockchain dedicated to Gene-Chain Coin transactions is also moderated by passive nodes that constant verify the blockchain.

The Value of a Gene-Chain Coin

The nature of the Blockchain technology enables the issuance of a cryptocurrency. For Gene-Chain, the currency to conduct commerce is called the Gene-Chain Coin. This Coin is a byproduct of hosting nodes (computers attached to the network that are tasked with verifying and relaying transactions) or mining the data within the blockchains (solving computing problems to validate and authenticate new transactions and blocks). Mining passive nodes can also be compensated with Gene-Chain Coins.

Are coins//tokens subject to Securities and Exchange Committee rules?

The Gene-Chain Coin is a currency that is exempt under the SEC rules. Since the Gene-Chain Coins are exchanged with an actual product (genomic data), these tokens/coins therefore do not behave like a security or loan instrument, rather it behaves as a currency. Encrypgen drafted

[27] Hyperledger (2017). Blockchain technologies for business. Retrieved from https://www.hyperledger.org/

the Simple Agreement for Future Tokes (SAFT) to serve as the legal framework that allows a team to legally raise funds through the pre-sale of tokens/coins.[28]

Let us explore how Gene-Chain Coins are utilized and how the value changes over time through the following questions:

❏ How is the Gene-Chain Coin used within the Gene-Chain network?

The Gene-Chain Coin is the medium of exchange for transactions that are recorded on the Gene-Chain. It serves as a form of compensation for data donors or payment from researchers.[29] This payment system thus allows individuals who own the data to profit from the act of sharing their information with professionals who seek it.

❏ Does the Gene-Chain Coin have value outside the network?

Gene-Chain Coins are exchangeable in standard cryptocurrency markets. While wallets containing these tokens will only be distributed at the conclusion of the token sale, the Gene-Chain application is potentially going to be the first multichain-based token listed on exchanges. This Coin can also be traded for other cryptocurrencies such as Bitcoin (BTC), Ethereum (ETH), Ethereum Classic (ETC), Digital Cash (DASH) and Litecoin (LTC), which means that Gene-Chain Coins hold practical value for buyers or consumers.

❏ How does the value of the Gene-Chain Coin grow?

The great demand for a more secure and unhackable method for sharing and storing sensitive genomic information is expected to drive up the value of Blockchain technology in the field of genomics. Consequently, the value of Gene-Chain Coins will also increase. If the value of this cryptocurrency increase relative to other currencies, then holders of Gene-Chain Coins can turn a profit. Since the supply of these tokens will be finite, any increase in the demand of a Gene-Chain Coin will raise the its value.

❏ How else can Gene-Chain Coins be acquired?

Another method to acquire Gene-Chain Coins earlier than the rest of the public, however, is via participation in the Gene-Chain's Initial Coin Offering (ICO). An ICO is a well-established fundraising process for Blockchain-based projects in which people who foresee the potential for

28 CoinList (2017). SAFT. Retrieved from https://coinlist.co/about/help/saft/0

29 Encrypgen. LLC (2017). "Gene-Chain" a solution for enhancing privacy, security, and utility in genomic databases

value growth are given the opportunity to invest in the project before others can.[30] Essentially, ICOs have a similar principle with Initial Public Offerings (IPOs) for publicly traded stocks. However, ICOs do not issue stocks, rather they issue cryptocurrencies.

An increasing number of investors and businesspeople are also noticing the investing power embedded within ICOs. American businessman, Mark Cuban, for example, who initially said that the Bitcoin was in a financial bubble has recently announced plans to invest in digital coins.[31] A key benefit to investing in a company that is valued primarily by a cryptocurrency, rather than fiat currency, is that the community of users within the network can set their own terms. The costs of maintaining a Blockchain are shared across the hosting nodes and the community members. Consequently, the increase in the Blockchain's value is also shared across the community of data donors, miners and users. The stake of the project remains in the hands of the individuals and entities who utilize, coordinate and maintain the network and thus create and drive the value of the network. People who buy in early through an ICO are not only granted access to unique investment opportunities that will make great contributions in the field of genomic research and development, but also they have the opportunity to be continually incentivized as the project's value increases.[32]

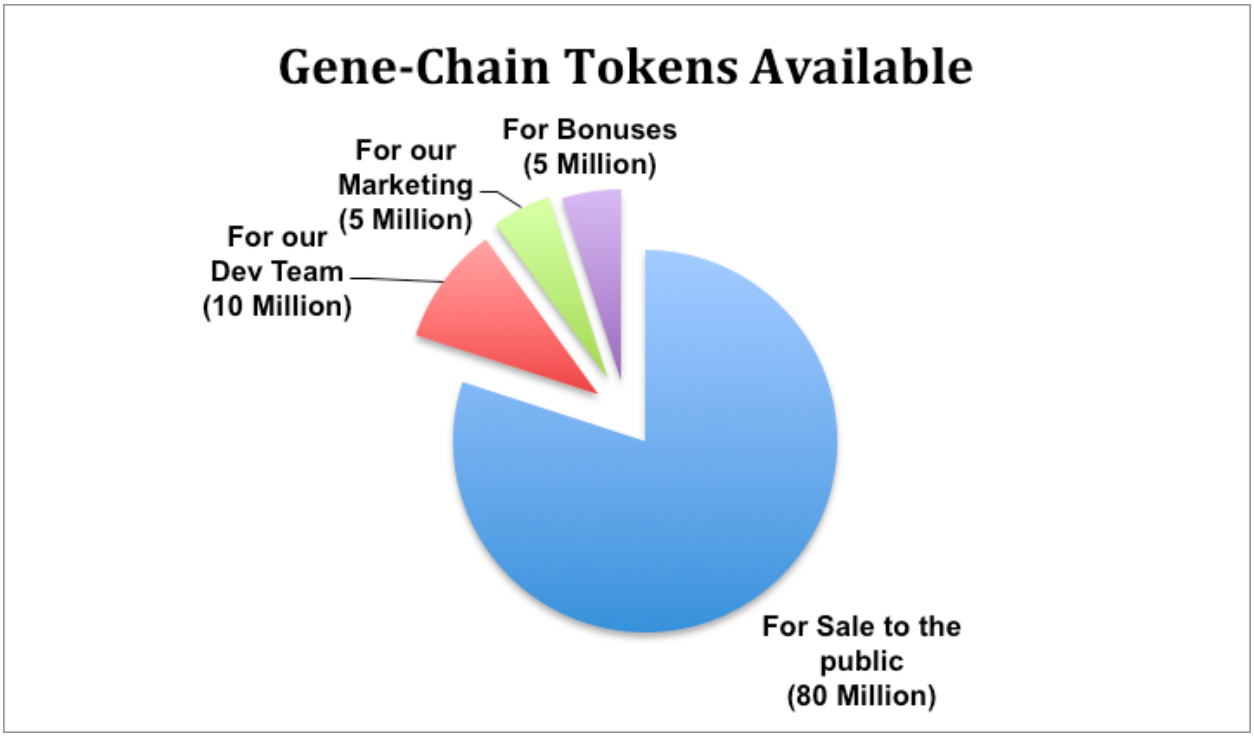
The Encrypgen website provides detailed instructions on where to address cryptocurrency payments in order to receive a digital wallet containing Gene-Chain Coins. However, people who are interested to invest in the Gene-Chain project need to know how much of the Coins are still open to the public. As illustrated in Figure 3, 80 Million out of the total 100 Million tokens is up for sale while the rest have been allocated for specific purposes. Bonus tokens will also be given out to top investors.

Figure 3. Distribution for 100 Million Gene-Chain Coins

30 Cheng, E. (2017). Mark Cuban, who just called bitcoin a bubble, says he plans to invest in another digital coin. Retrieved from http://www.cnbc.com/2017/06/29/mark-cuban-who-just-called-bitcoin-a-bubble-says-he-plans-to-invest-in-another-digital-coin.html

31 Cheng, E. (2017). Mark Cuban, who just called bitcoin a bubble, says he plans to invest in another digital coin. Retrieved from http://www.cnbc.com/2017/06/29/mark-cuban-who-just-called-bitcoin-a-bubble-says-he-plans-to-invest-in-another-digital-coin.html

32 Griffith, E. (2017). Why Startups Are Trading IPOs for ICOs. Retrieved from http://fortune.com/2017/05/05/ico-initial-coin-offering/



Encrypgen's goal is to raise 1000 BTC. As of June 29, 2017, approximately 340 BTC has already been raised (comprised of 109 BTC, 2010 ETH, 22 DASH, 58.76 LTC, and 109 ETC).

The Conclusion of Token Sale is scheduled for July 2018.

The Future of Healthcare with Gene-Chain

With the promise of data security and donor privacy with Blockchain technology, Gene-Chain is expected to offer tremendous value to patients, researchers, physicians and genomic data enthusiasts. Insights gleaned from the analysis of the genomic data accessible through the Gene-Chain database can be used to inform the development of personalized medicines and targeted therapies and drive improved diagnosis, prescription and delivery of treatments in the future. Moreover, its technological features can be extended towards use in other scientific areas such as proteomics, metabolomics and transcriptomics.

Furthermore, we stand at the precipice of a DNA knowledge revolution. With the complete mapping of the human genome, scientists now also have access to portions of the human DNA sequence that are considered as "junk" since they do not contain protein-coding genes. Nonetheless, these junk DNA are part of the DNA sequence and may reveal findings about human evolution and a prospective outlook on population health, which will have therapeutic and clinical implications for the future. Learning and discovery within the human DNA is far from over.

Supporting the Gene-Chain project of Encrypgen can help bring healthcare and the life sciences closer to the such discoveries.[33]

The Gene-Chain is now live and pre-populated with thousands of genomes. Individual patient and data donors are welcome to use it as a safe and secure repository for their genomic information. Companies, universities and research institutes can also still enjoy the introductory rate for license fees.

By 2018, Encrypgen will be launching the social media portal and upload page in which individual patients and data donors can deposit their genomic data for free. At the same time, the company will be integrating geo-located consent procedures to support and protect user participation in clinical studies.

Conclusion

The Human Genome Project presented the beginning of a revolutionary era for genomic discoveries and advancements. However, data is only as valuable as the actionable insights gleaned from it. The real potential of genomic data in scientific and medical advancements has been underwhelming due in large part to issues around data security and donor privacy. Optimizing the potential within genomic databases will require collaboration between stakeholders and a great thirst for technological utility. The Blockchain technology represents a tremendously promising solution to the data security and privacy hurdle. This technology is a shared ledger of transactions that removes the need for a centralized data storage facility and an intermediary that can broker an exchange. Hence, a specialized application like Gene-Chain, which has been developed by the software developer Encrypgen, LLC and is based on the Blockchain technology, exhibits the core features of a shared ledger: safe, secure, immutable, trackable, virtually unhackable, transparent and heavily synchronized. Specifically, the Gene-Chain application supports a more ethical approach to sharing complex and sensitive data and empowers data donors by shifting the ownership and control of the data over to them. The Gene-Chain is truly revolutionary in that the power to create value in the network is controlled by the community of users and participants. Early adopters and ICO participants, especially, can take advantage of the early valuation of Gene-Chain Coins, which is bound to increase as passive and active nodes are integrated and as more transactions are recorded into the shared ledger.

33 Encrypgen. LLC (2017). “Gene-Chain” a solution for enhancing privacy, security, and utility in genomic databases