Healthcare and Blockchain

Prepared by Omid Meh (om5345)

1 Abstract:

Healthcare is one of the largest and most complex industries. Wall Street Journal predicts that United State "will soon spend close to 20% of its GDP.[1]" Despite having some of the most talented and educated people, however, healthcare has been lagging in terms of innovation behind most other sectors. For instance, to this date, most of patient record communications are done over the phone, mail, and fax. In this proposal will review some of the problems with the current healthcare data management, and will explore how Blockchain can help resolve those issues.

2 Current vs Blockchain:

Despite investments in the healthcare IT departments and the emergence of technologies such as EHR – Electronic Health Records – and EMR – Electronic Medical Records- the healthcare industry has been lagging behind other industries in terms of technology for the most part. The complexity of the healthcare system, the large number of entities which take part in the systems, and their attempts to maintain their power has been some of the main impediments to the advancement of technology in this field.

Some of the current issues with the existing healthcare system are as follows.

1. Trust (Gotta trust whoever has your data / there are tons of breaches / vulnerable to attacks / no backed up data)
2. Weak identity management
3. Extra cost of managing data and personnel time needed to communicate them over phone/paper

2.1 Interoperability

In the current healthcare model, each medical group keeps their patients' data within a different system. These systems are not designed with interoperability in mind, therefore, making it impossible to share data from one party to another or transmit / grant access from one medical provider to another.

Let's look at some of the problems with non-interoperable systems for healthcare.

[1] https://www.wsj.com/articles/why-americans-spend-so-much-on-health-carein-12-charts-1533047243

2.1.1 Inefficiency

Since the systems are not compatible with each other, the typical way to exchange information is through email and fax. This is extremely inefficient as we need personnel to fulfill these requests for patient data transfers by hand.

Using a Blockchain, we hope to simplify this process and streamline the data sharing process where anyone can access any data that they are authorized to see, thus eliminating the need to manually fax and email the data. We hope to also save money here by removing inefficiencies.

2.1.2 Redundant testing (siloed patient data)

As mentioned above, the with the current system of sharing data over email and fax, the turnaround time for patient data is too high and even prohibitive in cases such as emergency. This leads to doing redundant testing where find the existing records is too hard or slow.

By using a Blockchain technology, we how to solve this issue by making the data available were it's needed immediately so that the turnaround time is never a problem again.

2.1.3 Human Error

With the current method of data transmission over phone and fax, the authentication process often happens over the phone. This makes it very easy for targeted attacks against patients. Once simply needs to have a few basic information about the patient to successfully call a facility and ask for more data. This is a command social engineering tactic and the current healthcare system is vulnerable to this attack.

Using a blockchain would eliminate this problem completely. For an entity to interact with the system, they need to establish their identity to the system, therefore making it much harder to impersonate a legitimate party and asking for more data.

2.2 CUSTODY

A problem with the current system is that patients' data is not owned by the patients. Instead, different medical facilities own different part of the patients' data. This fragmentation and lack of transparency introduces lots of issues. Let's take a look at a few of them.

2.2.1 Mutability / Data integrity

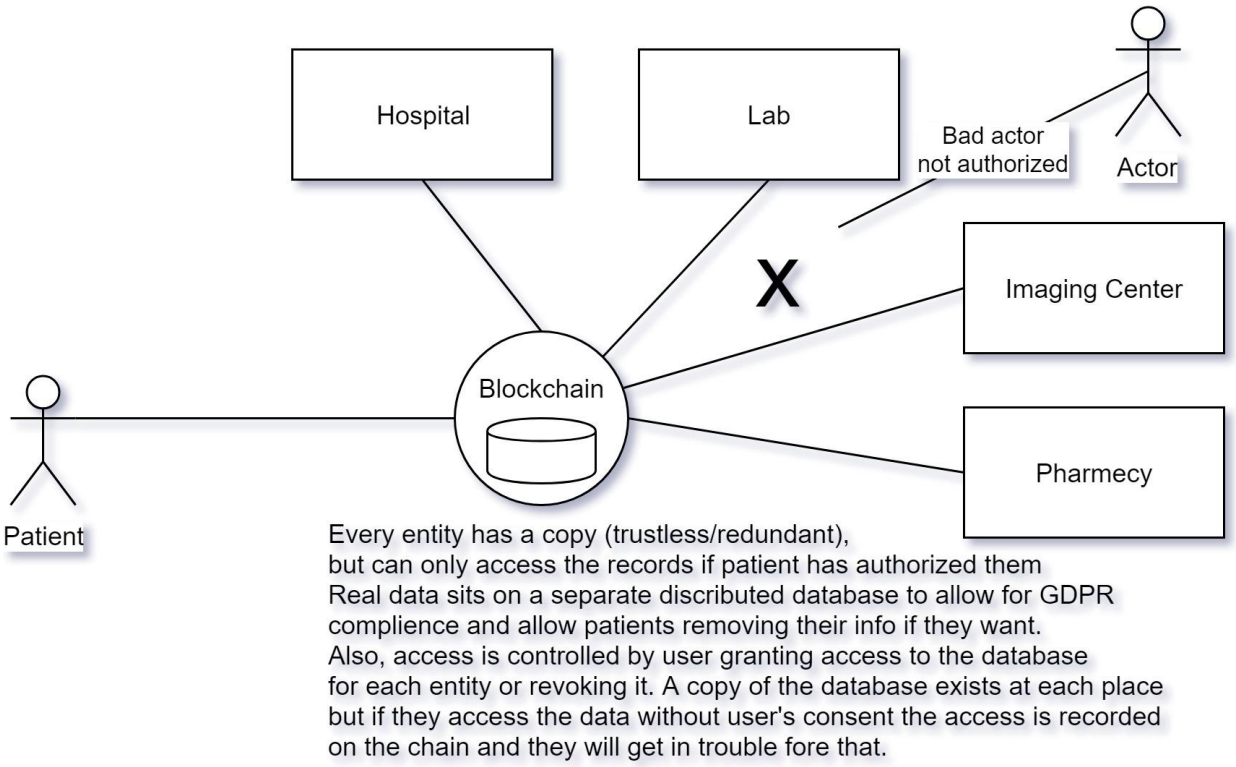
When the data is owned by different entities without transparency, it allows the possibility of tampering with the data, it is possible for a providers to tamper with data to cover up a mistake for instance, and due to lack of transparency, it would be hard to find out. On the contrary, our Blockchain system will provide full transparency and clear chain of event, therefore preventing any tempering with the data.

The blockchain system also inherently provides protection against data corruption by providing distributed redundancy. This provides priceless value in times of natural disasters and infections by malicious software such as ransomwares.

2.2.2 Data Ownership

As of now, the is owned by different facilities and users don't have control over what happens to the data. Patients' data can be shared, sold, and mined by the provider or 3rd party entities without the knowledge of the patient and without any compensation to the patient. With our system we hope to bring the data ownership back to the patient. The patient will be then able to grant access to their medical record when the chose to, and they can revoke the access as well when they chose to. They can also then control if they want to share their data for compensation or simply not grant the access.

3 HIGH LEVEL SYSTEM DESIGN



4 CONCLUSION

Healthcare is a complex system with many moving parts. Attacking to change to whole system would require the buy-in from all the stakeholders and is almost impossible, therefore we are attacking a smaller part of the problem here: the data management aspect. However, by solving only this one piece we hope to save a significant amount of resource by reducing overhead, reducing redundant testing, reducing theft and ensuring data integrity. Additionally, we hope to bring the data ownership back to the customer who are truly the real owners and

letting them decide who can access and who can’t access their data instead. Although not solving everything that is wrong with our healthcare system, I believe this will be a big step in the right direction.