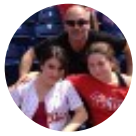

Edward Bukstel Follow
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Blockchain in Healthcare for Dummies

Blockchain seems to be showing up everywhere online as the answer to prevent hospital ransomware attacks and the critical technology to create ubiquitous electronic health records to streamline healthcare, improve quality, and save billions. How do we contemplate a fantastic blockchain future when many hospitals can't even generate a PDF containing a single patient medical record?

It is possible to begin imagining blockchain in healthcare by thinking back to a world where IBM System 36/38 and DEC PDP 11 computers by an assortment of serial RS-232 cables and an unknown assortment of custom cables with ridiculous pin-outs. Not only were there a variety of cables, but communications over these cables followed an alphabet soup of protocols.

- MIDIcontrol of electronic musical instruments
- MIL-STD-1553A/B
- Morse codetelegraphy
- PCI Express
- Profibus
- RS-232(low-speed, implemented by serial ports)
- RS-422multidrop serial bus
- RS-423
- RS-485multidrop multimaster serial bus…. etc….

These interfaces, cables, and communications protocols became much more streamlined with the introduction of TCP/IP. USB connections, WiFi, and Bluetooth have helped us forget about pin-outs and male / female ends. Imagine blockchain as a rudimentary analog to the migration from RS-232 domination to internet protocol. Considering this elementary foundation, it is possible to understand the excitement of a blockchain connected world.

Blockchain Solves Data Security and Ransomware Problems

But wait, in addition to a communications framework, blockchain incorporates crazy ridiculous security that could take the world's most

powerful supercomputers, working every second of every day, over 10,000 years to crack,. How is this security so strong? Well, imagine multiplying 2 prime numbers so large that if you typed the result of their multiplication onto 8.5 x 11 paper, the stack of paper would be large enough to go to the moon and back and further. Imagine the result of that multiplication of very large prime numbers as the public identifier for a person's electronic healthcare record. If you plugged the result into a supercomputer it could take forever to identify the 2 prime numbers that were initially multiplied together to create the result. It is also useful to consider that there are even more sophisticated security algorithms beyond the RSA Prime number example.

Blockchain Solves the Master Patient Identifier Problem

Not only is the blockchain way beyond PGP (pretty good privacy) offered by todays healthcare information systems, but the very nature of blockchain incorporates the equivalent of a Master Patient Idenfifier. Which means every person on the planet will eventually have a unique identifier at some point in time in the future. That unique identifier can be viewed as one of the very large prime numbers that created the stack of paper to the moon. Once you have this "Private Key" then you can unlock the multiplication result by simple division which, hypothetically opens up the health records contained on the "blockchain backbone." Imagine Neo, The Matrix, suddenly visualizing binary code flying all around, Now if you have a Chrome Extension that allows your browser to view blockchain, you and your provider, can actually view your medical record, your Fitbit data, your real estate holdings, and every temperature reading from your Nest thermostat.

What are the barriers in the current healthcare system to implementing blockchain?

The biggest barrier to the introduction of any new technology no matter how "disruptive" is inertia, and the $3+ Trillion US Health System does not adapt very quickly. One of the fundamental requirements for blockchain adoption is the use of an Unique Patient Identifier, or one of those really big prime numbers. Imagine Cerner or Epic modifying their respective systems to hold a "representation" of this patient identifier. When you go to the ambulatory MRI center, for a diagnostic procedure, there is NO interface with Cerner or Epic, the result simply gets shot out into the internet using blockchain as it's carrier. The prescription filled at CVS is also written to the blockchain with your personal identifier and so is another prescription filled at Walgreens. The blockchains flying around the internet are checked constantly for errors, Some of the error checking will incorporate a notation that the drug

prescribed at CVS has an adverse interaction with the drug prescribed at Walgreens. Messages from your Facebook profile regarding health conditions will also be found in your blockchain. The autocorrecting nature of the blockchain should ensure a correct record is always available upon request, anywhere in the world.

Estonia has jumped ito blockchain with both feet and issued 1 million personal identity smart cards to it's citizens Estonia moved to blockchain, since the country was brought to it's knees by Russian hackers in 2007. Imagine every hospital in the US being shut down as a result of a coordinated ransomware attack, or worse, a hack that deletes all patient information on every person in the US. It is theorized, that blockchain security would protect patient medical records, although there are scenarios where even blockchain might be unavailable to doctors and patients. It is certainly possible to imagine a scenario which overcomes the forces of inertia in healthcare and causes a technology like blockchain to become ubiquitous, until that catastrophic event, blockchain adoption is most likely an event that will occur over decades.

A Confusing Case of Blockchain in Healthcare

Peter B. Nichol has written an excellent series of articles in CIO Magazine, In, *Blockchain collaboration defines the fabric of healthcare 2.0,* Nichol's highlighted companies at the forefront of blockchain in healthcare:

"Tierion lets you create a verifiable record of any data, file, or business process on the blockchain. Gem, the platform uses multi-signature, hardware security modules (HSMs), and cryptographic keychains to address identity and information access security, which acts as an application layer blockchain protocol. Factom and HealthNautica are looking to secure medical records and audit trails. Guardtime"

I wanted to see what cutting edge blockchain software developers were doing in Healthcare. The first company that I checked out was HealthNautica of Oakbrook Terrace, IL. I watched the Hospital Demonstration Video. I don't know much, but I know this has NOTHING to do with blockchain. The company claims the ability to produce batch or realtime computerized order entry. HealthNautica and blockchain are found in 1250 instances in a Google search. Large corporations, with significant healthcare footprints, such as CSC discuss HealthNautica and blockchain. On April 23, 2015, Factom, the company that landed the contract with the Estonian Government, announced its partnership with HealthNautica. The HealthNautica.com domain was born

on May 19, 2000 according to WhoIs. The Blockchain Partnership between HealthNautica and Factom was announced in April 2015. Yet there is no mention of HealthNautica's blockchain partnership with Factom or any work on blockchain in HealthNautica's Newsletter released in July 2015.

Factom@factomproject

On @newsbtc: #Blockchain to Revolutionize #Healthcare. @factomproject + @HealthNautica on the case.
http://www.newsbtc.com/2015/05/02/blockchain-to-revolutionize-healthcare/ … #bitcoin #fintech

It appears that Factom may have made a mistake in identifying HealthNautica as a partner in their April 23, 2015 Press Release, but the Factom / Healthnautica link is connected through Andrew Yashchuk who is identified on LinkedIn as a Board Member for Factom and HealthNautica

In October 2015 Factom received a $400,000 investment from Kuala Innovations in a transaction that valued Factom at $11 million.

Factom has forged successful partnerships in some key areas of interest, earlier this year they announced a partnership with HealthNautica. The President of Factom, Peter Kirby, stated that "one of our goals while developing this software was to offer a way to ensure the integrity of medical records, while still maintaining patient privacy."

On April 29, 2016, Kim Bellard referenced the HealthNautica Factom Partnership in a Blog Post in Open Health News, *Getting Health IT on the Blockchain Bandwagon*.

On February 19, 2016, Peter Kirby was quoted in a Bitcoin Publication, Elena Faucets, stating:

The same is said by the President of Factom, Mr. Peter Kirby, who believes that their company can bring impeccable integrity and privacy solutions for their new partner. "We are excited to insert Factom's technology into the healthcare industry, as one of our goals while developing this software was to offer a way to ensure the integrity of medical records, while still maintaining patient privacy," he said. "HealthNautica is a pioneer in digital health records, and we are thrilled to pave the way in the next generation of tamper-proof record keeping and audit trails with them."

Bitcoin company Factom recently incorporated blockchain technology into an Indiana-based medical data management company HealthNautica

Peter J. Karahalios is identified on the HealthNautica website as COO, and his LinkedIn Profile shows that he joined HealthNautica in 2004. Walter A. Polowczak is the Chief Technology Officer at HealthNautica. There is no mention of expertise in blockchain or bitcoin on the Healthnautica website or his LinkedIn Profile. There is no mention of blockchain or bitcoin proficiency on the LinkedIn Profile Page for HealthNautica

It is very possible that HealthNautica has some sort of healthcare blockchain technology interface to Factom in stealth mode, but in looking at the above documents it appears that the only one talking about HealthNautica's cutting edge blockchain healthcare technology is Andrew Yashchuck and Peter Kirby, both of Factom.

I didn't expect this review to be this longwinded. My apologies for the simplistic attempt to apply blockchain into today's healthcare reality. I will add additional research on blockchain in healthcare in a future post.

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