

INTEROPERABILITY: HOW CAN BLOCKCHAIN, HEALTHCARE AND THE LAW WORK TOGETHER?

PANELISTS:

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ADEL ELMESSIRY, *UTILIZE HEALTH*

WILL BLACKFORD, *GEODIS*

*Moderated by Philip FitzGerald, Belmont Health Law
Journal*

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Mr. Philip FitzGerald: Ladies and Gentlemen, welcome to the Belmont University College of Law. On behalf of the Health Law Journal, thank you for coming out on such a rainy night.

My name is Phil FitzGerald, and I am the Editor-in-Chief of the Health Law Journal. Tonight's panel is on blockchain, healthcare, and the law, and hopefully how they can all work together. We have an excellent panel tonight, and I will get right to introducing them.

To my right is Larry Bridgesmith. Mr. Bridgesmith is an adjunct professor at law at Vanderbilt where he serves as the coordinator of Vanderbilt's program on law and innovation. He is a chief academic strategist at Odem.io, which provides education and training globally on blockchain, artificial intelligence, cyber currency, and interoperable technologies. He is also the co-founder of Legal Alignment, which utilizes artificial intelligence to streamline the delivery of legal services.

Next to him, is Adel ElMessiry. Mr. ElMessiry has a PhD in natural language cross-testing and machine learning, otherwise known as artificial intelligence. He serves as the Chief Technology Officer of Utilize Health, which provides complex care coordination solutions. Mr. ElMessiry has been developing technological solutions for the healthcare industry for the last twenty years.

And, next to him is Will Blackford. Mr. Blackford is a recent graduate of Belmont University College of Law. Mr. Blackford is currently serving as an associate corporate counsel at GEODIS, which is a global supply chain logistics company. And, he has previously worked with enterprise level blockchain networks in the healthcare industry. He has drafted and negotiated technology license agreements, complex data use contracts, and he has provided guidance on navigating healthcare laws and regulations. His article "Hashing It Out: Blockchain as a Solution for Medicare Improper Payments," has recently been published in our very own Belmont Law Review.¹

To get this started, we have a fact sheet up front that defines blockchain as a time stamped digital ledger with a decentralized network that has an immutable record. I am not really sure what that means. Mr. ElMissiry, if we could start with you as the PhD in the group to help explain it.

¹ William J. Blackford, *Hashing it Out: Blockchain as a Solution for Medicare Improper Payments*, 5 Belmont L. Rev. 219 (2018).

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Dr. ElMessiry: Thank you very much for having me here. Blockchain is just as it says. It is a bunch of blocks chained together. However, that simple fact of them being chained together is what gives it all its power. Just like you think about genomes in a helix that shapes everyone of us around here and the creatures of the planet, blockchain works the same way. The uniqueness is when you have two of those blocks. When you are building the first one, you take the hash and put it in the next one, and then you hash it and so forth and so forth. Which means that if you change any of those blocks you invalidate all of the others blocks. Hence, blockchain. A chain of blocks.

Mr. Bridgesmith: That's an expert talking right there. I would add that it is very difficult to conceive of the uniqueness of blockchain until you actually see it in operation and see how it can perform useful tasks. The first useful task of course is the one we all know as Bitcoin. It came about in 2009, I think, but blockchain technology preceded Bitcoin and they're not the same, but it is what enabled Bitcoin to become the cryptocurrency of note. There are so many other applications for blockchain where what you're looking for is the creation of a transaction with the least amount of waste in terms of those who are participating in it. [The characteristics of blockchain are authenti[c], verifiable, and immutable, meaning it doesn't change over time. So, think of a relational database like excel. Everybody knows excel. It is a database that maintains relationships between the cells and you can create all kinds of formula that adding a digit to one cell is going to impact many, many other cells. But, it exists in real time perpetually. Blockchain is an add-only database. meaning that once the first data has been introduced into the blockchain platform, into the database, it doesn't change. You can only add to it. That is one of the unique characteristics that makes it so useful for specific use cases, which I know we will get into. But, it is not the panacea for all technology applications that many have made it. Adel not only knows about it, but he has built blockchain platforms with cryptocurrency capabilities, so he knows the incredible power, the difficulty, as well as the need for practical application. And I think, hopefully, some of our conversation will demonstrate those applications.

Mr. FitzGerald: You mentioned this idea that blockchain can do many things. What are some common misconceptions of blockchain?

Mr. Bridgesmith: Here's a quote that I love, Naval Ravikant said that, "Bitcoin for Blockchain is a tool for freeing humanity from

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oligarchs and tyrants, dressed up as a get-rich-quick scheme."² So I mean, that really illustrates the two extremes of the hype around blockchain. But, it isn't a tool for everything. It has unique applications. Will has been a part of a company that also has made that application in healthcare with Blockchain.

Mr. Blackford: I think in the healthcare context specifically too, a lot of people misunderstand how much data is put on the blockchain. I basically had to introduce the concept of blockchain to the L2s of our company. The lead attorneys of our company. Their first question was, why are we going to put all of this data on an immutable, unchangable record, for all time? What if there is a breach? I think that is one of the first misconceptions that you have to irradicate when you're having a discussion, especially in the healthcare context, that so much of the data in most of these uses would be off chain. You are perhaps putting on the chain the location, where to point to get to the data, but not that actual data itself. When you are doing a regulatory analysis, [this] really matters.

Mr. Bridgesmith: Well think of Bitcoin, and again Adel can get much more into the technology of this, but, Bitcoin was built on its blockchain. It is a platform that Bitcoin functioned on top of. The blockchain for Bitcoin has never been hacked, but some applications on the blockchain have. So, to Will's point, if the blockchain is to be this super depository of all critical data, alone, you've probably created a monster that you can't afford to keep functioning because its need for energy to do the work of the blockchain would cost far more than the value to be gained from putting all that data. So, you have to have an application that works on top of the blockchain, that is specific for a particular use. That is what Change Health and Adel have done.

Dr. ElMessiry: So, let's pick up on the point of why does blockchain need a lot of energy? I mean [with an] Excel sheet, you can just save stuff in it in a laptop and that's done. But, on the blockchain, like Larry and Will mentioned, you have to use a lot of energy and it is there forever and you cannot remove it. So why is all that energy required to create the block? This is where the uniqueness of the block comes in.

² [Naval Ravikant \(@naval\), Twitter \(June, 22, 2017\).](#)

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In computer science, the blockchain solves two problems. The first one is called the Byzantine General problem³. I have a city that is surrounded by four armies and they are trying to attack it, but they have to attack it together at the same time, so they want to send messages to coordinate the attack. But, the only way of going through is through the city. So how do you know, as a general, that the message coming to you is actually authentic and has not been tampered with? That means that the message has to be immutable.

The second piece is that - you all know about currency money right? So if [I] have one dollar, if I pay Larry the dollar, I cannot turn around and pay that same dollar to Will. Right? However, if I take a picture of that dollar, I can send it to Larry and then turnaround and send it to Will. That's called double spending. So I demonstrated that an asset can be spent in both places hundreds of times as much as you can [spend it]. However, blockchain changed that [issue] too by eliminating this problem.

The way they eliminated this problem was by doing something called Proof of Work. Meaning, they have to turn this entire thing into a mathematical problem that you have to solve for. That solving for, is called mining. So, you have a machine. I have a couple in my basement. I have two, for study purposes. *banter* Basically what you do with it is you have to sit there and find the solution. All the miners are competing to find the solution first, and hence, whoever does it, gets the reward for the block. Because of all th[ese] computations running very fast - how many here have played games on the computer? It heats up, the fans go in and draws a lot of energy. That's what's happening with the block. It computes all of this stuff, hashes it together, draws a lot of energy, and that also is what prevents it from being replicated or hacked very quickly because you need all this energy in order to create that block. So, [that] makes it part of why it is immutable in doing that.

Mr. Bridgesmith: And to Will's point earlier, the idea is not to put all of the data on a blockchain, but to merely reflect the transactional event that has taken place. That is going to provide you the security of blockchain, and not consume the energy of trying to manipulate all that data in a blockchain fashion.

Mr. FitzGerald: Gentlemen I'd like to ask you, based on its structure, what are some existing applications of Blockchain?

³ Debraj Ghosh, *How the Byzantine General Sacked the Castle: A Look into Blockchain*, April 5, 2016, <https://medium.com/@DebrajG/how-the-byzantine-general-sacked-the-castle-a-look-into-blockchain-370fe637502c>.

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Mr. Bridgesmith: Well, Will's a part of a healthcare application.

Mr. Blackford: So, I know at Change Healthcare, which is the company I was at previously, of course, we touted ourselves as the first healthcare company with a blockchain enabled solution. But I think the goal with that, was, well, we [were and] are [still] directed towards claims. I think claims are a natural area of healthcare where blockchain tends to lend itself to be a good solution. I say that because a lot of people are trying to take blockchain and apply it to every problem there is, instead of looking at the problem and seeing which [problems] are best suited for a blockchain solution. So I think that, what we viewed at Change Healthcare was, we can take the claims systems and allow our customers to have the ability to use blockchain systems and allow them to communicate with our systems to process claims. It did require [us] to have a blockchain in place for claims to process. So, I think it was with a look to the future, with there being future blockchain enabled solutions. But if they have those [systems], then we can allow those to communicate with our systems, and, being a huge clearing house of healthcare claims and data, it would allow us to do business as usual, which avoids a lot of the disruption that blockchain could potentially do to such clearing houses and claims overall.

Mr. Bridgesmith: So what was the magnitude of claim handling that that particular application has allowed for?

Mr. Blackford: That's a great question. I'm not sure how many claims are actually going through the blockchain currently. And, that's why we always had to say blockchain "enabled" solutions. And so, I'm not sure where we stand currently with building our own blockchain to handle that, but I do view the immutable and the verifiable records on blockchain [to] be great for claims and just to verify and to not get things switched up while we are processing those. I think that is the true value that Change Healthcare saw in it and I think a lot of healthcare companies are trying to stay on top of the technology.

Dr. ElMessiry: So let me then contrast with this use case. We always mention a use case meaning, what is blockchain good for in this case? So, [take] education. All of you went to school and went to college and have all your records right? But, a lot of the globe [go] to schools in which it is very hard for them to keep the records with them and it is very hard to prove the records here [in America]. I know this firsthand because I got some of my education overseas. When I had to move over here, I had to prove my education, that I

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speak English, and it takes a lot of time because they want to make sure that the piece of paper that I have is actually authentic and is not forged and not photoshopped, and so forth. [This creates] a lot of processing time, effort, and overhead, and so forth. So, that is another very good use case.

When you think about it [you] want something to be immutable, verifiable, very quickly distributed, and [something] that nobody can take away from you. Hence, ODEM⁴ does that for the educational field where they basically take those certificates and put them on the blockchain. Perfect fit. Also, the certificate itself is very small, hence the record is small. [This] means that you are not going to consume a lot of the blockchain and you can put it here and verify it. So, if you did not have this solution in place, the current technology would require you to go into a lot of different places and ask people to figure out where the record is. With blockchain, it is verifiable. If the [person] that has signed this belongs to this university, then it is by virtue true, 100%. You cannot forge that.

Mr. Bridgesmith: For example, MIT has now [delivered](#), at least in some quarters, all of its certificates and degrees in a blockchain certificate.⁵ Meaning, [] you have access to it immediately, forever, if you have a blockchain wallet, as it is called, in which you can deposit your blockchain assets, your credentials, your diplomas, your training as a future lawyer or whatever profession that you seek to pursue - to be able to access it and to make that all available to an employer without having to go through all of the intermediaries that would stand in the way of you gaining access to your credential, and it's authenticated by virtue of the fact the way it was created. So, the identity of the individual, the verification of the authenticity of the certificate, and the ability to access it without having to go through third parties is another application.

So, as in [healthcare, think about, excuse me, as in](#) education, think about healthcare. Because one of the things that blockchain is tempting us with is access to our medical data. As a patient with medical data, it's [quote](#) "my data," but I can't get it because it's been captured by some provider, some technology that that provider uses, and they have that data, that data is contained in their proprietary

⁴ ODEM, *What is ODM*, <https://odem.io/what-is-odem-education-marketplace/> (last visited July 31, 2019).

⁵ Lindsay McKenzie, *Seeking a Shared Global Standard for Digital Credentials*, *Inside Higher Ed* (Apr. 24, 2019), <https://www.insidehighered.com/digital-learning/article/2019/04/24/mit-and-8-other-universities-partner-shared-digital-credential>.

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silos, and that’s very valuable data, but I can’t get it. And I certainly can’t get it in all of the silos in which it resides. So what might blockchain do to help create true personal ownership of my health data so that I could decide who can have access to it and, if valuable, charge for it.

Audience Member: Are any healthcare providers using it for HIPAA compliance at this point in time?

Dr. ElMessiry: So HIPAA compliance is a really nice twist, and I’m sure that you are very familiar with that, legal counsel, and there’s a lot of hoops and loops around HIPAA⁶. So HIPAA means that you need to separate information of the patient from the data construct that you use in your system to work with that patient, right? So the answer in blockchain for that is to replace the identifier of a patient with a hash that is kind of like non-discernible to the patient at least from the examples that I’ve seen. And hence you can store the data and you still need two pieces of information: that hash, and access to a private database in order to resolve which patient this is for.

Mr. Blackford: I know specifically, this is an associated grievance, the bread and butter of, you know, HIPAA when it comes to corporate, any kind of corporate transactions. I think that, that’s a very interesting application when you’re looking at blockchain and the fact that most of it is regulatory and has a lot of set time frames, you know you have to respond to things in a certain amount of time.

And it is negotiable- a lot of times at Change Healthcare we would have people ask us for quicker response times on things, and I know we haven’t really brought up smart contracts yet, but I think, if we can take that, what we’d negotiate in a business associate agreement, for those of you who’ve had healthcare with Professor Farringer or other professors here- if you can take those provisions that you’ve negotiated and turn it into “triggers,” I guess, with a smart contract, then you have this self-executing code basically that whenever there is a breach, or some security incident, then you have all of that information available, you can send out notifications, it can do that automatically so you’re not having to look back and have your attorneys look at every single agreement and try to figure out what that is. So I think that’s an interesting way that HIPAA and blockchain could go together.

⁶ HHS, *The HIPPA Privacy Rule*, <https://www.hhs.gov/hipaa/for-professionals/privacy/index.html> (last visited July 31, 2019).

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Dr. ElMessiry: So let me then pick up from that point because we are using the term “smart contracts”⁷ in there, and I’m going to surprise all of you by saying they are not smart, they are not contracts anyways. The reason for that is they are pieces of code. The power of them is there is an embedded code within the network and they collected the powers because they are binding programmatically. So usually an example of that is ICOs⁸, where you come in and say “I being Wallet x zero blah blah blah come here and I’m going to give you one ether and lady has another wallet and he says “and in return for that I’m going to give you a thousand [other] coin out of that in exchange.”

So that is the code, AKA the contract, between us and it’s sitting there and it’s passive and as soon as I deposit the one ether from my address, from my wallet, the contract automatically will execute and will grab the lady’s coin and send it to me. So that’s the power that it’s binding at that point and it auto-executes at that point. However, if there is not enough coinage, on lady’s side, then the contract will not execute and if I do not send or send it from a non-compatible wallet, then the contract will do its job but I’m not going to receive it at the end.

So this is very acute because people confuse, [this] kind of like contract with an actual contract, an execution of which between programmers and lawyers and the legal profession and coding, where the boundaries are starting to really blend together.

Mr. Bridgesmith: Well, and I want to really second that because I think this is where lawyers are going to be incredibly valuable to those programmers and those that are creating smart contracts. And I, I too don’t like the phrase but it has taken hold- I don’t think we’re going to chase it out of the vocabulary.

But the fact that you can program conditional events that become automated once those conditions are satisfied by virtue of programming is a really powerful element to transactions. One of the first that I’m familiar with, just to illustrate how a quote “smart contract” might work, was performed by Clause, a smart contract blockchain company, legal technology, in the transfer of 88 bales of cotton from Texas to China and by virtue of the internet of things

⁷ Jake Frankenfield, *Smart Contracts*, April 26, 2019,

<https://www.investopedia.com/terms/s/smart-contracts.asp>,

⁸ ICO, *ICO Smart Contract and Tool Documentation*,

<https://ico.readthedocs.io/en/latest/> (last visited July 31, 2019).

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and the ability to place [sensors](#), within the shipment of cotton, the system was able to maintain constant awareness of the state of the cotton as it went from Texas [and](#) on a ship across the ocean to China so that once it arrived, if the conditions of the quality of the goods were satisfied, the transaction was immediately consummated.⁹

[And as](#) a result, there was time saved in terms of inspection and all the things on the receiver’s end, and a pretty significant amount of cost was removed [but the](#) contract that gave rise to that is something that we as lawyers would do in our commercial practices just as a matter of course. [And understand](#) how the smart contract programming then creates conditions which, once satisfied, automatically execute. That’s where we and the programmers have to begin to learn how to speak with each other. And to me, that’s the real opportunity that blockchain brings is to bring law back into a very highly prominent place in the world of computer science. We don’t have to become computer scientists, that’s what Adel does, but I need to know how to work with him and understand his language and [mind](#). So that is, to me, an enormous opportunity for lawyers.

Mr. FitzGerald: I’d like to drill down a little into more of the healthcare aspects. Specifically, something I saw coming out of the Trump administration was the “My Health E-Data Initiative.”¹⁰ Essentially, it was pushing to have secured interoperability between providers and data platforms and to provide patient ownership of medical records. What is interoperability in this context?

Mr. Bridgesmith: I’ll jump in there because this is, to me, one of the most important elements of emerging technology, the ability to create the automatic transfer, two-way transfer of data between two different technologies so that the user has verifiable, authenticated access to whatever data is needed to do their work.

So think of yourself as a lawyer, or as a doctor, or as an architect, or an accountant. How many technologies might you rely upon to get your work done? Not one, but multiple technologies. What if they could all coexist in a single platform and exchange data

⁹ [Sanne Wass, Landmark transaction merges blockchain, smart contracts and IoT, Global Trade Review \(Oct. 23, 2016\), https://www.gtreview.com/news/global/landmark-transaction-merges-blockchain-smart-contracts-and-iot/](#)

¹⁰ [Trump Administration Announces MyHealthEdata Initiative, CMS.gov \(March 6, 2018\), https://www.cms.gov/newsroom/press-releases/trump-administration-announces-myhealthedata-initiative-put-patients-center-us-healthcare-system](#)

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between them so that you, the user, need only sign on once, access the data from all of the technologies that you rely upon to do your work, and all of that data is maintained in a single site in addition to its origin site.

So the power of being able to be both efficient and effective with interoperable data has been plaguing the healthcare industry for decades. Because when I go to Vanderbilt, my data is contained in any number of technology silos and they don't talk to each other. And the history has shown that at any given [year] in the United States, some twelve to thirteen-hundred people die in hospitals solely because medical data that is helpful or essential to their care is inaccessible by the providers.¹¹ So, to be able to create that interoperability is a phenomenal challenge when the economics of keeping it to yourself as the proprietor exceed the value of sharing it with others and that's the challenge, I think.

Dr. ElMessiry: So I'd also like to complete this part about interoperability with data- who owns the data? Where does your data belong? Also, it is your data- you are the patient, you went to the physician, you had all those episodes, and you had all those claims. But the current fact is you own almost none of those, and it is basically hosted by whatever provider/payer that actually either treated you or paid for your treatment through the insurance that you have. So as a result, that's where you see those silos where you know part of the information is there and here, and in order for it to talk with each other you need to have permissions between each one of them to have it go.

That's why when you go to the physician every time you've signed those papers, they make you sign them in triplicates, like "I agree to this my name is actually there I'm not lying" and all of that stuff. And then, what makes the problem more difficult is every company or establishment has developed their own terminologies. So when you talk about items, you say "I have three of this medicine"- three what? Is it one box? How many counts within that box? And all of that.

So up until today we're still having problems trying to unify all of the stuff to reconcile all of these. So that makes it very difficult to work through and hence has given rise to a lot of middlemen, middle people, that make their own living by kind of saying, "oh he

¹¹ Fred Schulte, *Death By 1,000 Clicks: Where Electronic Health Records Went Wrong*, Kaiser Health News (Mar. 18, 2019), <https://khn.org/news/death-by-a-thousand-clicks/>.

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means that, no he means that” and do that all day long and hence lots of waste and stuff like that, I’m sure you’ve seen that.

Mr. Blackford: Do you think that the, and I’d like to pose this to you, I think the public-private key distinction, do you think that assists in this, with patient access? Because you can, and I know we haven’t discussed this a lot, but you have the public key that’s outwardly, externally facing and then a private key almost like your PIN number with your credit card. I think that’s also something that’s very important that blockchain provides. Do you agree with patient, with patient data at least, with ownership?

Dr. ElMessiry: Yes, and also to further this more, the only way that blockchain would work correctly in the healthcare arena is if it’s centered around patients. So imagine for a second that as a patient, your wallet is basically where you keep all the history that happened. So your transactions are basically your interactions with the healthcare system. And also, one hospital has ten interactions, another has twenty interactions, and a physician has two interactions- they all are in your wallet. If that is the architecture used to take this forward then, you as the patient would be able of permissioning either from the get-go and saying like who can see what out of there, or not permissioning and blocking people from seeing that. But you would have the control over the data, which will help resolve the interoperability issue.

Furthermore, it has economic benefits for you as a patient because these, what we use today, why is that very important? We hear a lot about A.I. and machine learning and all of that stuff, which is my favorite subject to talk about so I could tell you for two hours. But the A.I. is basically useless without data. So it needs data, it craves data, the more data you can give it the better it is in predicting and performing for you.

But if your data is owned by you and it cannot be basically taken away and sold, like what we have seen with like big corporations and so forth, their names hence will not be mentioned, so then you control the data and you control the flow ~~of the~~ “spice” kind of thing within the system, and hence you can make change happen.

Mr. Bridgesmith: And this is I think, a very important part of this conversation as well, because as Adel said, A.I. cannot work without data and lots of it. So, if my healthcare data is not going to be of greater benefit to me as a person and to the community at large by sharing it with a large accumulation of healthcare data, so A.I. can

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begin to look for trends, patterns and be predictive and do all of the things that A.I. does, is it attributable to me? I mean it's an **identify** question, and therefore I don't want to be identified if I share my healthcare data with just any or everyone. So, how do you separate the data that's attributable to me from the data that might be useful for an A.I. application to improve the delivery of healthcare to all who might share my conditions. And that goes by a host of different names, and we haven't solved that problem yet, but it has to be solved for A.I. to be able to use what we would call anonymized data that cannot be attributed to the person to whom it pertains, but has all of the attributes of information that could be added to a very large pool of data, so A.I. can do its work and help practitioners whether they be lawyers or doctors or accountants, do a better job of bringing counsel to their clients or healthcare to their patients.

Mr. FitzGerald: So, from maybe a practical standpoint, from either a patient or a doctor's perspective, would there just be one more form to fill out at the doctor's office saying, "we sign over our data to you," or "we take control over it"?

Mr. Bridgesmith: Probably,

[laughter]

Mr. Blackford: Maybe the doctor will be signing this form, right?

Mr. FitzGerald: I wanted to get to one thing that you brought up Will, about the public and private key, and I know we really didn't talk about that. Could you give a bring explanation of what that is?

Mr. Blackford: I don't really know how to explain it other than I think bitcoin is honestly one of the easiest ways to explain this. In bitcoin, everyone has a public key that you use. If I was going to give Larry any amount of bitcoin, I would use his public key to send it, then for us to access it, just like a PIN on a credit card, I would need to know my private key and keep that private to me, in order to gain access to my wallet. So I think that's it at its essential- feel free to expand on that, but I think that's the essential part of that and it's critical in almost the first step of security when it comes to the blockchain.

Dr. ElMessiry: So let me relate that to something you use all day long. Most of you have bank accounts, I'm hoping. If you look at your bank account today you have a couple of things. One, you have your bank account number, right, and then you have your username and password to access that. So how many of you would not give

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me your bank account number? There is nothing I can do with your bank account number basically without your consent on that, right? That’s your wallet address, what exists right now. So it’s basically saying, where is your account, it’s a number here, anybody can have it, only thing you can do with it is deposit money into it, and in the case of bitcoin you can actually look at my transactions, and whose been sending me bitcoins and how much bitcoin am I spending on my gaming habits. That is one thing, but your username and password are kind of like your public key and private key. So, the password is like you private key, that means this is the only key that when it is combined with your public key you can actually unlock the account and you are capable of transacting on it, out. So it can take out amounts and send it to anybody else. And hence lies the big problem, because if you happen to forget your private key all your funds are gone, there is no bank system, nothing can actually get it out- Vitalik¹² himself cannot do that, with the exception of “forking”¹³ which is very hard. The other thing is if I get to see your private key and I can go online and immediately access your account and take all your money away from you and then you have no recourse whatsoever.

Mr. FitzGerald: Gentlemen, I would like to ask you what are some more of the potential uses for blockchain that you guys see- Will?

Mr. Blackford: I think I see, I know something that when we’re explaining it that gets exciting and I think healthcare in general is getting excited about value-based care instead of transactional-based care, especially in the internet of things where everyone’s got their Apple watch and all of the wearables that get us through our day now, I see it as a way to push toward the value-based care in the fact that the doctors can be tracking how well we’re doing, what we’re eating, you know, on My Fitness Pal, what our EKG is- I guess now on the Apple watch- and see how our health is improving over time.

Let’s say a doctor has given you, you know, a diet regimen and an exercise regimen, your Apple watch can now track you throughout the day, and see is your heart rate improving, is your diet improving, what’s your calorie intact like? That gives them more data that they can use. And then let’s say there’s a point based- let’s add gamification on that of that- if there’s a point based system and

¹² Wikipedia, *Vitalik Buterin*, https://en.wikipedia.org/wiki/Vitalik_Buterin (last visited July 31, 2019).

¹³ Jake Frankenfield, *Hard Fork*, February 6, 2019, <https://www.investopedia.com/terms/h/hard-fork.asp>.

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you're involved now in your health. And then, from a Medicare-Medicaid standpoint, let's say that we start attributing, "okay, well we're seeing an upward- we can take the data- we're seeing an upward progression with their health, we can then monetize that, let's pay the doctor based on how well his regimen is working in your life. And I think that's one exciting application that I see.

Mr. FitzGerald: One thing that I heard is that blockchain was purported to be able to reduce the instances of healthcare fraud, particularly in false claims and overbilling. Would anyone care to tackle that?

Dr. ElMessiry: That goes to the fundamentals of why blockchain and how you think about uses of blockchain in general. When you think about fraud, how people are committing the fraud, so they're either sending a transaction or saying basically here is a claim that they saw me at the clinic and they gave me a certain procedure, hence they have an ICD-10¹⁴ code on it and then they can get billed based on that, however they haven't seen me and there has not been any of those actions happen. Now, take that same example and move it to the blockchain. If every patient now has their health record on the blockchain, in order for you, Mr. Physician, to see me, I have to take my private key and give you permission on that transaction, which means I physically have to be there, or I have to give you the permission to do that. And hence, you cannot simply send the claims with forged signatures to the payor, so that they would pay you. And hence, that's how you can reduce the fraud.

Another way of doing that is also detection. Because the transactions are immutable and they are distributed on multiple ledgers at the same time, the same principles that happen today on your credit card. So, when I was flying out to a conference in Europe, I got called by the credit card company, "hey we have detected fraud actions and we are going to stop your credit card because it's being used in France." It's like, "no, please, I need it!" But they detected that- how did they do that? They saw the pattern of usage and detected something that is an anomaly. Apply the same thing on healthcare, and if I am trying to commit fraud, and I'm slowly entering some data because that data is free for me to add, so that then I can come in and submit a big claim for that, I'll not be able to do that if it is on the blockchain.

Mr. Bridgesmith: If I can add to that. We think of identity in forms of driver's licenses, and passports, or government issued

¹⁴ CDC, *International Classification of Diseases*, <https://www.cdc.gov/nchs/icd/icd10cm.htm> (last visited July 31, 2019).

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documentation. Well, that’s true for the civilized world, but there are between two and three billion people on this planet that have no government-sanctioned identity.¹⁵ What blockchain can provide is an immutable identity that is not government controlled. By virtue of DNA, blood, fingerprint, facial recognition, even the blood vessels on the back of your hand are unique to every individual. There are hosts of ways to identify who you are without reference to a government document. So to be able to provide people who have no means of verifiable, authenticated identity that- then we have a much better handle on who claims to be who for the purposes of benefits or healthcare or insurance coverage, in addition to whatever governmental documentation that they might have. So that verifiable identify is a feature that blockchain serves very, very well, and it digitizes an immutable identify that we carry with us forever.

Another thing I think in terms of applications in healthcare, as in law and other industries is what we refer to as the supply chain. In other words, getting a product or a service to a customer who wants to pay for it, involves many layers of service and exchange and numerous transactions. And the more transactions there are, the more middle men and women that there are between the purchase and the sale, the more expensive the transaction becomes. And what the supply chain is, is the collection of all of those transactional components that provide the cost to the good or service to the consumer who chooses to purchase it. And it’s not a direct, necessarily, pay to the person who’s providing the good or service. There are all of these pieces that have to be satisfied by intermediaries along the way. And what blockchain can do in the supply chain is question whether any intermediary is adding value to the transaction, and if not, execute them out, not in a terminal state but in terms of taking their piece of that transaction and automating it. That’s the essence of a smart contract, is the automation of those components of a transaction.

So the supply chain I think is going to be a natural target for blockchain applications in every industry, including law. So how much “waste” is attributed to any particular legal service by virtue of all of the hands that have to touch it and the overhead that has gone into providing that service? Is there waste that can be executed out of the transaction? And blockchain might provide a tool to do that as well.

¹⁵ The World Bank, *JD4D Data: Global Identification Challenge by the Numbers*, <https://id4d.worldbank.org/global-dataset> (Last visited Aug. 5, 2019).

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Mr. FitzGerald: I'd like to hear from each of you on this topic. Blockchain is this new technology with a lot of new startups working with it, there's a lot of companies developing new divisions to tackle it. What is a lawyer's role in this developing technology, like in a startup, dealing with entrepreneurs, or maybe on a larger corporate enterprise?

Mr. Blackford: I think a great skill to learn right now, especially for the law students in the room, is being a good listener. And I think that is critical when you're dealing with startups. I know I was speaking with a group actually of entrepreneurs that came from Belmont that are working with a student course load application, and they were wanting to know, and they're trying to build on the blockchain, and they wanted to know my advice on whether they should do an ICO or what not. And I think listening to them is important, because you learn what their goals are and don't apply your own assumptions on what the goals are. I think as lawyers we tend to assume things about where the business is headed and what they're wanting to do, so I think anytime we can sit and listen first to what their objectives are, and then try to be efficient with how we approach legal care. Sometimes they're not looking for- you know you're going to assume that they're wanting contracts and they're wanting to jump in on forming an LLC and getting everything started when really sometimes they're looking for business advice and connections and mentorship instead as the starting point to then lead to business formation and what not. So I think that's a critical skill.

Mr. Bridgesmith: There are several things in what Will said that I couldn't agree with more, and he mentioned the word efficiency. To be honest, our profession as a business has gotten rich on inefficiency. By selling time rather than value. If we can change our orientation to the client perspective on the value of our engagement with them as legal counsel and focus on efficiencies with the knowledge that the more we know about our business, the better it can be performed and the more we know about the data generated by performing that business, the better we can price our services. So, what I have seen in recent years are major law firms that are creating entrepreneurial practices.¹⁶ Meaning for a fixed fee, the law firm will do for that startup a number of formation type things, and you know what you're getting when you buy it as a business person, and the lawyer is providing it at not a loss, but by

¹⁶ Ken Callander, *Value-Based Pricing of Legal Services*, *Above The Law* (Jun. 17, 2019), <https://abovethelaw.com/legal-innovation-center/2019/06/17/value-based-pricing-of-legal-services/>.

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virtue of the efficiencies they have focused on, perhaps an improved profit. Because they can beat their costs, the more efficient they become. To me that's a major mindset shift that we as lawyers have to engage in in order to be client-focused and listen, as Will said, to what problem it is that they're trying to solve, as opposed to what solution we would like to super impose upon what we think is the right answer, which is really to our detriment. It's an opportunity for us to really improve our service delivery. But from a technologist's standpoint, what are lawyers' value to you, if at all?

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Dr. ElMessiry: So, I am obviously not a lawyer, but I am a serial entrepreneur. So, I've been through the startup cycle several times, six or seven now, and I have two pieces of advice. One is for students -- while you are still studying and have ample time and so forth -- is seek to understand what the other side is going through. So, it's not more about the legal domain; it's more about coding domain, and the company, whatever they are [dealing] in -- I'm assuming technology. So, try to understand how they are working through it. What kind of -- go to a meet up, a technology meetup -- they have free pizza so it's great -- and just feel the vibe, feel what they are thinking, how they are thinking through it, because you will find a different universe, different people thinking differently, and trying to do that will inform your perception and inform how you make a decision when you are talking with the people.

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The second part, kind of from a technology company -- I think having legal advice is essential from day one. And that's where those [both values] can come in is listening to the problem and trying to understand the needs of the client in the sense that they don't have an open budget, they probably are still eating at McDonald's because they cannot afford to go anywhere else. So you want to be able to give them a listen, and then give them advice that will result for [what] they have right now, so that you now have cultivated a client down the road that would help and will grow, come back and say, "you told me to go do this one first, and it worked for me, and now I want to utilize your full services and I'm willing to pay for all of that stuff."

Mr. Bridgesmith: I firmly believe that we're moving into what some have called a collaborative economy, meaning that problems are solved in a multidisciplinary fashion more and better than by bringing a single discipline to the table.¹⁷ So, we as lawyers need to

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¹⁷ [Jacob Morgan, *Why The Collaborative Economy Is Changing Everything*, *Forbes* \(Oct. 16, 2014\), <https://www.forbes.com/sites/jacobmorgan/2014/10/16/why-the-collaborative-economy-is-changing-everything/#1df67b6c28a1>.](https://www.forbes.com/sites/jacobmorgan/2014/10/16/why-the-collaborative-economy-is-changing-everything/#1df67b6c28a1)

learn how to work with technologists, and I was surprised -- I spent about a week in Silicon Valley in May, and talked with a lot of technologists and almost to a person I heard them say, "we need lawyers, we need law to be able to avoid the traps that we might create for ourselves in building technology. And we need law to be able to advise us in our business interests."

So there's an enormous recognition of need, and as suggested, there are all kinds of ways to connect with the other disciplines that might be of value in your legal practice. There's a blockchain meetup that meets every month here in Nashville, and the technologists have their hearts set on making Nashville the blockchain capital of the world.¹⁸ They may succeed because healthcare is such a big part of our business here. But the point is, going and being a part of that educates me to the uniqueness of their perspective and problems that they face, and if there's something that I can do to assist, it makes me more valuable to them. So breaking down our silos and becoming more collaborative across our disciplinary boundaries I think is really critical.

Mr. FitzGerald: Thank you very much. At this time, I'd like to open it up to some questions if we have any. Feel free -- we have a panel of experts if anyone has any questions about blockchain, healthcare, and the interaction between those.

Audience Member: So, you talked about the opportunities with lawyers there, but something I'm thinking as a potential counter-argument is that once you helped to establish the legality of a given function of a smart contract, you have now made yourself obsolete. So is that a reasonable concern?

Mr. Bridgesmith: Well, it's a concern -- I think it's a misguided concern, and here's why. It's going to happen. So, where there are efficiencies, a global economy will find those efficiencies because "better, faster, cheaper" is how you succeed and survive in a global economy. So the more I can be of value as a legal advisor to a company or a business that is using smart contracts -- to help them understand what the legal principles are at play and to be able to work with the technologists in order to accomplish that goal, greater value to them by being able to be a partner to the process of creating a smart contract application that is going to be of benefit to the client. So I'm improving my value, not losing opportunity, I'm actually gaining opportunity.

¹⁸ *Nashville Blockchain Meetup*, Meetup, (last visited Aug. 5, 2019), <https://www.meetup.com/Nashville-Blockchain-Meetup/>.

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Dr. ElMissiry: If I may add to that, back in the nineties, I used to pay \$24.99 to make a trade, a stock trade, and I had to speak with a banker. Nowadays I can make it through my phone, and it costs me absolutely nothing, but the bankers are still here, right? So it's similar to that. If you think about it, the transactions are going to happen on it when it expands. It's not like you're going to write one contract; you're going to write many, and each one will govern [lifting everything's up]. So even with the educational process, you don't create one contract and it governs all educational process. It has to be a unique contract for every case, for every university, and so forth. That requires thought. Why does it require thought? Because unlike a conventional contract where you can sign, and then appeal, and change, and all that stuff, and a judge will throw it all away, it is nothing like that. Once you sign it into the network, into code, it's gone forever, so you cannot change it, it would be very hard. So by you giving your advice on how that contract will affect the legal ramifications of all of the stuff, then I can basically write better contracts, and engage in them knowing the consequences versus engaging in them unknowingly and lose a lot.

Mr. FitzGerald: Any other questions?

Audience Member: For blockchain and- as you were saying- healthcare fraud reducing, those kinds of issues, how would it deal with an example where the provider's billing for services that are slightly different from what's provided? Not so much the obvious example where a patient was never there, but something just a little different enough for them to fly under the radar. And if they do get it on the chain, if the point of the chain is that you can't change it, does that have implications down the road when its discovered?

Mr. Blackford: Very good question. And I think that also goes to, that's not to assume that blockchain would be a good solution for that. You know, I think a lot of the time, I feel like I'm telling our business people that, "it's great that you want to pursue blockchain but that might not be the best solution for this problem."

And I think you hit on a note with the immutability, it seems to terrify us as healthcare attorneys because we think, "okay, if there's a breach..." and there's a lot of instances where we need to delete whatever happened, you know remove it, and once the cat's out of the bag you can't put it back in right? So we fear this immutability. So in that instance, I don't know if you guys have a different answer, but that may not be the best solution for that. But

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I don't think immutability should always be feared as much as we view it.

And I think that goes to something we didn't touch on very much, but we won't go into -- public versus permissioned versus private blockchain. There are different types of blockchains if you're interested in that, I would look into perhaps permissioned or private blockchains and how they can still function and have a lot of the benefits, but still allow for some security and allow for some editing that may not be able to take place on a public chain.

Dr. ElMessiry: I agree with a lot of what Will said, and I would like also to add another thing in there. A gun is a gun. It could kill wrongfully, it could kill lawfully used for self-defense. So it's the same action that happens, but the legality aspect around it is quite different. So that's one part of it.

The second part of it is that, remember that I talked about that A.I. needs more data and blockchain has immutability so A.I. can work very nicely with lots of data that comes there. So when you report a slightly different interaction, that will be collected, and then that will be compared to whatever materials you've used in the hospital and so forth. So the pattern will emerge from there that those things don't add up. And hence, that's how we do fraud detection on issues like those using the blockchain. In the end, it's a human problem. So the human will be there and unless the human is acting ethically, they can always find a way to breach any system. There's no system that's not breachable.

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