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DISRUPTER SERIES: DIGITAL CURRENCY

AND BLOCKCHAIN TECHNOLOGY

WEDNESDAY, MARCH 16, 2016

House of Representatives,

Subcommittee on Commerce, Manufacturing,

and Trade,

Committee on Energy and Commerce,

Washington, D.C.

The subcommittee met, pursuant to call, at 11:00 a.m., in Room 2123 Rayburn House Office Building, Hon. Michael Burgess [chairman of the subcommittee] presiding.

Members present: Representatives Burgess, Lance, Bilirakis, Brooks, Schakowsky, Cardenas, and Pallone (ex officio).

Staff present: Leighton Brown, Deputy Press Secretary; James Decker, Policy Coordinator, Commerce, Manufacturing, and

Trade; Graham Dufault, Counsel, Commerce, Manufacturing, and Trade; Melissa Froelich, Counsel, Commerce, Manufacturing, and Trade; Giulia Giannangeli, Legislative Clerk, Commerce, Manufacturing, and Trade; Paul Nagle, Chief Counsel, Commerce, Manufacturing, and Trade; Olivia Trusty, Professional Staff, Commerce, Manufacturing, and Trade; Dylan Vorbach, Deputy Press Secretary; Michelle Ash, Minority Chief Counsel, Commerce, Manufacturing, and Trade; Christine Brennan, Minority Press Secretary; Jeff Carroll, Minority Staff Director; Caroline Paris-Behr, Minority Policy Analyst; Tim Robinson, Minority Chief Counsel; Diana Rudd, Minority Legal Fellow; and Matt Schumacher, Minority Press Assistant.

Mr. Burgess. The Subcommittee on Commerce, Manufacturing, and Trade will now come to order. I will recognize myself five minutes for the purposes of an opening statement.

I want to welcome all of our witnesses. Good morning, and welcome to the next hearing in our Disrupter Series. Today we will be examining digital currency and blockchain technology. This technology has the potential to disrupt a whole host of industries from financial services to manufacturing, supply chain management, and to health care records, by infusing transparency and trust in traditionally closed systems.

This is a new technology. The White Paper describing the first public blockchain application, Bitcoin, was published in 2009, and already there has been a billion dollars in capital investment over 1,000 firms, most of which are startup companies.

Having seen the development of email, development of the internet, transitioning of the United States economy to the digital space in the last two-and-a-half decades, I am interested to hear from our panel about what the development of blockchain technology means for the next 25 years of global commerce.

Bitcoin is the best-known digital currency and a good case study for the disruptive nature of the blockchain. The Federal Reserve Bank of Chicago highlighted how Bitcoin's blockchain

solves two basic issues with digital currency, by controlling the creation and avoiding its duplication. Bitcoin limits an individual's ability to copy and paste new money files to double spend -- we do that in the Federal Government sometimes -- to double-spend digital wealth through advanced cryptographic signatures.

The solution Bitcoin presents to currency may also be applied to other asset cases, including intellectual property, mortgages, and other property records. In a way, it provides a way to create singular possession online, mimicking possession in the physical world, but with a transparent and immutable ledger recording of the possession along the way.

While there have been issues through the development and growth of Bitcoin, including some of the Mt. Gox issues, the technology has withstood the stress of growth to date. In the same way that the internet has transformed communications, the adoption of blockchain technology has the potential to disrupt digital asset transfers.

Cyber security is at the forefront of this subcommittee's activities in this Congress. It is fascinating to see the possibility of another technological revolution on the horizon that could help address the trust and security issues that are

a daily challenge for individuals and companies in every sector of the United States economy.

However, to serve as an alternative to today's settlement mechanisms, the technology must demonstrate the scaleability needed to handle the volumes of transactions to flow through United States firms on a daily basis. I do hope our panelists will discuss their work and address the concerns about the viability of the blockchain moving forward.

I have heard about many potential use cases for this technology, including digital health records, where security and immutability are necessities. I would be interested to hear how blockchain technology could help individuals gain control over their health records and transparency into how those records are created and shared.

Today's witnesses represent a variety of interests in digital currency and blockchain technology industries. We will hear about what consumers can do today using digital currency. We will also hear about consumer protection issues that may develop. Even more exciting is the potential for consumer benefits that have yet to be realized for the firms that leverage the blockchain.

Currently, a number of regulatory bodies at the state and

federal level have weighed in or are considering action around Bitcoin and other blockchain applications. While there are serious concerns to be addressed with the anti-money laundering effects for digital currency, we should also be cognizant of the future applications of the blockchain technology that may improve transparency in both the public and private sectors. These future applications could be stifled if the regulatory environment becomes too burdensome on small companies trying to leverage this new technology.

Once again, I want to thank all of our witnesses for taking time to inform and educate us about the applications and future potential of digital currency and blockchain technology. I certainly look forward to a thoughtful and engaging discussion.

I will yield back my time and recognize Mr. Cardenas of California as the ranking member of the subcommittee.

Mr. Cardenas. Thank you very much, Mr. Chairman. I would like to thank all the witnesses for coming forward today to help enlighten us about your views on what we are going to talk about in this hearing today. In this hearing, we are looking at digital currency and blockchain terms that don't often enter every conversations. Although with today's Metro shutdown, the ride-hailing services using the blockchain may have helped people

get here to work today.

As we continue this subcommittee's Disrupter Series, we again run into the same key question -- how must yesterday's rules evolve to fit today's technology. Digital currency like Bitcoin lacks many of the features we usually associate with traditional money like the U.S. dollar. It doesn't come in paper bills. It is not issued or guaranteed by a government. Electronic transactions with digital currency may not require a bank to serve as an intermediary.

Digital currency has not been widely adopted in part because it has several changes. Digital currencies lack some of the protections provided for more traditional financial products. The value of currencies like Bitcoin has fluctuated wildly. Few merchants accept them at this point. Meanwhile, digital currencies have become associated with illegal transactions such as money laundering, ransomware, and the sale of illicit goods and services.

If digital currencies are to be widely accepted at legitimate payments, they need to provide sufficient safeguards for their users, and they need to come under an adequate regulatory regime to address unlawful use, particularly in terms of money laundering and financing of terrorism. But digital currency is really just

our entry point for discussion of a more fundamental innovation -- blockchain.

Blockchain is this concept of a digital public ledger to track transactions. It is an innovation that can have many different applications. Blockchain could have many other applications beyond digital currency. Proponents talk about blockchain's ability to cut out intermediaries. In some cases, this could be helpful.

At the same time, we need to think about what we may be losing in the process of cutting out this middleman. For example, in financial transactions, the middleman is the bank, and banks have rules and reporting requirements they must follow to prevent money laundering and financing of terrorism. If the bank is cut out, we need alternative means to detect such activity.

While blockchain is theoretically transparent as an open ledger, permissioned blockchain, where the ledger is private or in -- excuse me, where the ledger is private or invitation-only, could potentially enable anti-competitive activity. These are not arguments against blockchain. Rather, they are challenges for developers to address as innovation moves forward. Developers have a responsibility to protect user privacy, stop fraud, and prevent use of their products for illegal activity.

Carrying out these responsibilities may look different than it did for earlier products, but let's be clear. Compliance with rules to protect consumers or protect our security is not an inconvenience. It is a necessary part of participating in our economy. One of our roles on the subcommittee is to wrestle with how new technology affects consumers and interests with the law.

States are already figuring out how to regulate these new products and markets. Federal agencies are monitoring digital currency markets. These efforts require understanding the unique attributes of these new technologies. As we start examining this new space, I hope our witnesses can help inform our discussion and provide answers on not only how blockchain can be used but also how these uses interact with rules to protect consumers and protect security.

With that, I welcome our witnesses, and I look forward to the testimony today.

Mr. Burgess. The chair thanks the gentleman. The gentleman yields back.

The chair recognizes the gentleman from New Jersey, Mr. Pallone, five minutes for your opening statement, please.

Mr. Pallone. Thank you, Chairman Burgess. While some members surely have heard of Bitcoin, few have likely heard of

the recordkeeping software underpinning it called blockchain. Today we will have the opportunity to explore the benefits and risks of using crypto-currency sometimes referred to as virtual or digital currencies. We also will get an understanding of the benefits and risks of the blockchain for financial and non-financial uses.

Whether using Bitcoin, the most well-known and widely used crypto-currency, or another one, peer-to-peer digital transactions have the potential to reduce fees and wait times for consumer purchases. In addition, crypto-currencies can offer advantages to underbanked and unbanked populations, especially in regions where state-backed currency is consistently unstable and traditional financial services are less accessible. They also may offer users increased privacy in comparison to traditional payment methods.

However, at the same time crypto-currencies raise important issues that should be explored, they are not legal tender, and their value is not guaranteed by any central authority. Therefore, they have proven to be vulnerable to price volatility, deflation, and hacking. In addition, many existing consumer protections, such as requirements that banks have systems in place to limit consumer loss and detect money laundering, may not apply

to crypto-currencies.

For example, current law ensures that you are not responsible for unauthorized credit card charges over $50. No such protections exist for purchases made with crypto-currency. Also, digital payments can be irreversible, making simple consumer transactions like returns and chargebacks more complicated or impossible.

While originally created for crypto-currency, the recordkeeping technology, blockchain, has gained enormous interest in the last few years with more than $1 billion raised in venture capital so far. In the financial sector, firms are looking at placing stock and bond trades on the blockchain. In the non-financial arena, the full range of possibilities may be endless. Blockchain is being tested for possible applications in health care, green energy, copyright, and voting, to name a few.

The blockchain can automate contracts, making them faster to complete. They can increase transparency in property rights disputes and help protect intellectual property. And, in many sectors, the blockchain may improve privacy protections, reduce human error, and lower administrative costs.

Just as with crypto-currencies, blockchain raises important

issues for us to explore. Some experts have pointed out that permission blockchains, in which only vetted and approved users can participate, may use anti-competitive tactics or price-fixing that would violate antitrust regulations. Others have suggested that the blockchain is too rigid for many potential applications. It does not include the necessary flexibilities to ensure consumers have basic rights, such as the ability to resolve disputes.

So I just want to reiterate that consumer protections must be considered as these new technologies are developed. I look forward to hearing from all of our witnesses about the current and future uses of crypto-currencies and the blockchain, and the consumer protections that go with them hand in hand.

And, again, Mr. Chairman, I thank you, and I yield back the balance of my time.

Mr. Burgess. The chair thanks the gentleman. The gentleman yields back.

Seeing no other members present who wish to give an opening statement, the chair would like to remind members that, pursuant to committee rules, all members' opening statements will be made part of the record.

And, again, we want to thank our witnesses for being here

with us this afternoon, for taking their valuable time to testify and educate the subcommittee. Today's witnesses will have the opportunity to summarize their opening statement, followed by a round of questions from members. Our witnesses for today's panel hearing include Mr. Jerry Brito, Executive Director at Coin Center; Mr. Juan Suarez, counsel at Coinbase; Mr. Jerry Cuomo, Vice President of Blockchain Technologies at IBM; Mr. Paul Snow, Chief Architect at Factom; Mr. John Beccia, General Counsel and Chief Compliance Officer at Circle Internet Financial; Mr. Dana Syracuse, former Associate General Counsel of the New York Department of Financial Services at BuckleySandler LLP; and Mr. Matthew Roszak, Chairman of the Chamber of Digital Commerce and co-founder of Bloq, Incorporated.

We certainly appreciate you all being here today. We recognize the significant expertise that is before our panel today. We will begin the panel with you, Mr. Brito, and you are recognized for five minutes for an opening statement.

STATEMENTS OF JERRY BRITO, EXECUTIVE DIRECTOR, COIN CENTER; JUAN SUAREZ, COUNSEL, COINBASE; GENNARO CUOMO, VICE PRESIDENT BLOCKCHAIN TECHNOLOGIES, IBM; PAUL SNOW, CHIEF ARCHITECT, FACTOM; JOHN BECCIA, GENERAL COUNSEL AND CHIEF COMPLIANCE OFFICER, CIRCLE INTERNET FINANCIAL; DANA SYRACUSE, COUNSEL, BUCKLEYSANDLER LLP; AND MATTHEW ROSZAK, CHAIRMAN, CHAMBER OF DIGITAL COMMERCE

STATEMENT OF JERRY BRITO

Mr. Brito. Mr. Chairman and Ranking Member, members of the committee, my name is Jerry Brito, and I am the Executive Director of Coin Center, an independent nonprofit research and advocacy center that is focused on the public policy issues facing crypto-currencies like Bitcoin and Ethereum. Our mission is to be a resource to policymakers and members of the media who want to learn more about digital currency technology and to develop legal research that meets the policy challenges this technology presents.

I want to thank you for inviting me to participate in this hearing. I would like to provide some background on the technology we are discussing. I would also be happy to answer any technical questions that you might have or to explain some of the regulatory activity that we have seen to date.

Now, digital currencies are nothing new. They have existed for decades from Microsoft points to Facebook credits to airline miles, and neither are online payment systems new. PayPal, Visa, Western Union Pay, these are all examples. So what is it about Bitcoin and similar cryptograph-based currencies that make them unique? Bitcoin is the world's first completely decentralized digital currency, and it is the decentralized part that makes it unique.

Decentralized means that there is no issuer, no central authority, and there is no company, no building, no server. Before the invention of Bitcoin, for two parties to transact online, to transact electronically, always required a trusted third party, someone like PayPal or Bank of America.

Why was that? Well, what would an online transaction have looked like without a trust intermediary? Let's think first about a cash transaction where no third party is needed. If I hand you a $100 bill, you now have it and now I don't, and we can verify that the transaction has taken place by looking at our hands.

If we try to do that online, what would that look like? Well, we would have to represent the $100 billion digitally, and we would have to basically create a $100 digital file, and I would attach

that $100 file to a message, much like I might attach a photo or Word document to an email, and I would send it to you.

You would then have the $100 file, but what about me? When I email a Word document to you, is a document deleted from my computer? No. I retain a perfect digital copy. So if it was a $100 file, I would retain the perfect digital copy of that same $100 bill, and I could send it to a second person or a third person or a fourth. This is what computer scientists call the double-spending problem, and we solve that problem by employing trusted third parties like PayPal.

When I send you a $100 bill using -- or, I am sorry, $100 using PayPal, I don't communicate directly with you. Instead, I ask PayPal to deduct that amount from my balance on their ledger and add it to yours. This means, however, that we must each have an account with the same party that we just. Bitcoin's invention is revolutionary, because for the first time the double-spending problem can be solved without the need for a third party. Bitcoin does this by distributing the necessary ledger among all the users of the system, via a peer-to-peer network.

Every transaction that occurs in the Bitcoin network is registered in a distributed public ledger which is called the blockchain. The global peer-to-peer network, composed of

thousands of peers, takes the place of the intermediary. You and I can now transact online without an intermediary.

Now, why would one use Bitcoin instead of a traditional payment system? There are many reasons, but chief among them is because if there is no intermediary transaction costs can be lower, making Bitcoin transactions cheaper and faster than some existing systems. And perhaps more importantly, though, Bitcoin allows for new kinds of transactions that were never before feasible, including micro transactions, self-executing contracts, and other innovations.

Bitcoin is an open network protocol. This means that unlike PayPal or a credit card network, you don't need permission to join and transact. As a result, Bitcoin is an open platform for innovation, just like the internet itself. In fact, Bitcoin looks today very much like the internet did in 1995.

So some dismissed the internet then as a curiosity, but many could see that such an open platform for innovation would allow for world-changing applications to be built on top of it. Few in 1995 could have foreseen Facebook or Skype or Netflix, but they could see that all the building blocks were there for some amazing innovations. Bitcoin is like that today. We can't conceive yet what will be the killer applications on Bitcoin and open

crypto-currencies, but it is pretty obvious the day will come.

Bitcoin faces some challenges, however, and chief among them is regulatory uncertainty, especially at the state level. If we think back again to the early internet, it was not until the government made it clear that it would pursue a light touch regulatory approach that internet innovation really look off.

Bitcoin today is in need of similar commitment from government. Therefore, as you consider regulatory policies that affect this infant technology, you should take care to measure their impact on continued innovation. If you need any further assistance as you consider digital currencies, please do not hesitate to contact us at Coin Center. Again, our mission is to build a better understanding of these technologies and to promote a regulatory climate that preserves the freedom to innovate using blockchain technologies. We are more than happy to connect you with the appropriate academics, experts, and practitioners in the space.

Thank you for your time, and I look forward to your questions.

[The prepared statement of Mr. Brito follows:]

**********INSERT 1**********

Mr. Burgess. The chair thanks the gentleman.

Recognize Mr. Suarez for five minutes for your opening statement, please.

STATEMENT OF JUAN SUAREZ

Mr. Suarez. Chairman Burgess, Ranking Member, and members of the subcommittee, thank you very much for the opportunity to testify this morning on the role that virtual currency may play in disrupting today's financial services landscape.

My name is Juan Suarez, and I am counsel for Coinbase, the world's leading retail Bitcoin exchange platform. Coinbase was founded in early 2012 with the simple goal of becoming the easiest place to buy and sell Bitcoin. At the time of Coinbase's founding, one Bitcoin cost less than $10, virtual currency had not entered the mainstream, and little to no venture capital had been invested into the industry.

Today, four years later, one Bitcoin is valued at several hundred dollars, several leading online merchants accept Bitcoin as a means of payment from customers all over the world, and over $1 billion of venture capital has been invested into the space. We believe the rapid emergence of Bitcoin, together with other decentralized virtual currencies, is attributable to certain core characteristics that naturally orient the technology towards innovation and free and open use.

These characteristics include the following. First,

decentralized virtual currencies are, by definition, distributed, meaning that perfect strangers may transact securely online without requiring the involvement of a trusted intermediary or a proprietary infrastructure. Second, virtual currencies are openly accessible via internet-connected devices anywhere in the world. And, third, decentralized virtual currencies typically operate via an open source software protocol, and any software developer can build and independently own applications that facilitate new and innovative interactions among users.

These characteristics are strongly reminiscent of the early internet, which began as an open network with modest underpinnings. They grew to revolutionize commerce and the way we communicate and which contributed untold billions or trillions of dollars to the United States economy.

Virtual currency, in our view, has the same promise. It has the fundamental capacity to expose entrenched financial services to unprecedented competition, to bring about new efficient and global consumer financial products, and, by virtue of very low marginal transaction costs, to unlock entire new industries never before realized.

Today we are still in the very early stages of virtual

currency. The most widely adopted use of virtual currency thus far has been as an asset class for investing savings or for trading, but there are a great many additional applications of virtual currency with enormous promise.

And to just give you two examples, first, simply, as a means of payment for a good or service. Bitcoin rails have several advantages relative to customary online payment methods. Bitcoin is truly global, so a merchant can immediately accept payment from customers worldwide. Bitcoin is a push payment method. A merchant need not collect, and a customer need not provide sensitive payment credentials to settle a transaction.

This reduces proliferation of a customer's personal information and reduces the risk of catastrophic data breaches. And as a push payment, like handing over cash, there can be no fraudulent reversals, which cost online merchants billions of dollars in avoidable losses each year. This translates into savings.

Today, prominent payment processors that have integrated Bitcoin payment rails advertise processing fees less than one-third the cost of fees charged by those same processors to process card transactions. A second use case is remittance for peer-to-peer payments. Bitcoin and derivative technologies

enable transactions that can be processed and settled at a cost of pennies, in some cases even less.

As of the time of this testimony, the fee associated with an average Bitcoin transaction is in the range of approximately 10 cents or below. That means a consumer can send, for example, $100 worth of Bitcoin anywhere in the world for just a few pennies. Today that same transaction would cost consumers around the globe on average more than $7 using conventional remittance services.

These and many other applications of virtual currencies are being actively pursued by thousands of developers all around the world, and we anticipate enormous innovation and growth in the virtual currency economy in coming years. And through the hard work of companies like Coinbase, together with core development teams, we can ensure that this innovation occurs in a safe and secure manner with cooperation among industry, consumer protection agencies, policymakers, and law enforcement.

Thanks very much, and I look forward to any questions you may have.

[The prepared statement of Mr. Suarez follows:]

**********INSERT 2**********

Mr. Burgess. The chair thanks the gentleman.

Mr. Cuomo, recognized for five minutes for your opening statement, please.

STATEMENT OF GENNARO CUOMO

Mr. Cuomo. Good morning, Chairman Upton, Ranking Member Pallone, Chairman Burgess, Ranking Member Schakowsky, and members of the subcommittee. My name is Jerry Cuomo, and I am the Vice President for Blockchain Technologies at IBM. And thank you very much for the opportunity to testify this morning.

We at IBM believe that blockchain is a revolutionary technology. With blockchain we can reimagine many of the world's most fundamental business interactions, and at the same time open the door to new styles of digital interactions that we have yet to even imagine. You are wise to include blockchain in your study of disruptive technologies, because blockchain has the potential to vastly reduce the cost and complexity of getting things done across industries, government agencies, and social institutions.

I also want to tell you what blockchain is not. It is not Bitcoin, the crypto-currency. While blockchain is the core technology that enables Bitcoin to operate, it can be used for entirely different purposes. Whereas Bitcoin operates as an anonymous network, blockchain can be used as a trusted network to handle interactions with known parties.

It is our strong feeling that the benefits of blockchain are

realized in its broadest use, across the broadest set of industries, from supply chain to trade settlement, from tax to land deeds, birth certificates and social security. This morning my testimony makes four points, which I will summarize now.

The first point is about how blockchain changes the game. At the center of a blockchain is the notion of a shared ledger. Think of this as one of those little black accounting books. However, this book has seemingly magical properties. You see, members of a blockchain network each have an exact copy of the ledger. New entries in the ledger are instantaneously propagated throughout the network. Therefore, all participants in an interaction have an up-to-date ledger that reflects the most recent transactions, and the transactions, once entered, cannot be changed.

Now, let me tell you why and how blockchain actually changes the game. Transactions can now be settled instantaneously versus in days. Cost is reduced due to elimination of middlemen. And because of how these transactions are stored on the ledger, the chances of tampering and collusion are greatly reduced.

My next point is blockchain technologies must be made enterprise-ready. The core blockchain technology must focus on security and privacy concerns that arise within enterprise use

cases. In addition, computer systems and networks must be architected so they scale up and can handle immense volumes of transactions. Simply put, we in IBM are openly working with a group of industry collaborators to build a new blockchain from the ground up, with privacy, confidentiality, scaleability, and auditability, front and center. This is what enterprise-ready means, which leads me to my third point.

Blockchain must be open. For blockchain to fulfill its potential, it must be based on non-proprietary technology. And doing so will encourage broad adoption and ensure compatibility and interoperability of systems. Specifically, this enterprise-ready blockchain must be built using open source software with a combination of liberal licensing terms and strict governance. Only with openness will blockchain be widely adopted and enable innovation.

We are participating with over 30 industry players in the Hyperledger Project led by the Linux Foundation to create an open, enterprise-ready blockchain.

And my last point is blockchain will greatly benefit from government participation. Blockchain holds the promise of enabling more effective interactions between government and business. For example, working as an invited member of an

enterprise blockchain, government agencies could be able to better collaborate in financial and commercial systems, and spot potential problems before they become critical, regarding everything from tax to land use.

So it is critical that U.S. companies and government agencies lead the world in demonstrating the potential of blockchain.

Now, I should add that blockchain isn't the answer to everything. There will be situations where it will improve efficiencies, but there will be others where it is simply not a good fit. Furthermore, we should not underestimate the technical and organizational challenges of building and adopting blockchain systems.

Blockchain is a classic emergent technology, but it is so strikingly different from what people are used to that many leaders are adopting a wait-and-see attitude. Now, we applaud judicious caution, but now is the time to quickly assess the potential of blockchain and begin experimenting. Therefore, we urge Congress and the Obama administration to study and discover the best uses of blockchain for the U.S. government.

We also want to pay attention to regulatory approaches to maximize its potential while protecting the interest of citizens. Blockchain may have begun its existence as the underpinning of

the crypto-currency, but now it stands in the open, a powerful tool ready to serve business and society.

And thank you again for your invitation and I would be glad to answer any questions you have.

[The prepared statement of Mr. Cuomo follows:]

**********INSERT 3**********

Mr. Burgess. The chair thanks the gentleman.

Mr. Snow, you are recognized for five minutes, please.

STATEMENT OF PAUL SNOW

Mr. Snow. Thank you, Chairman Burgess and members of the subcommittee for the opportunity to testify before you today. I am Paul Snow, the Chief Architect of Factom, a protocol to provide blockchain solutions to a wide range of problems above and beyond simple currency transactions.

Let me do something strange here. I am a developer, and so I am going to talk to you about what a blockchain really is and --

Mr. Burgess. Mr. Snow, I hate to interrupt. Just be sure your microphone is on. I think --

Mr. Snow. You know, I might be on now. Do I need to reset? Okay.

Well, I am going to do something strange here, and I am going to try to help you guys be developers like I am. I am going to actually explain to you what a blockchain is. Okay?

First and foremost, if you don't understand hashing functions, you will never understand blockchains. Now that is scary, so let me tell you what a hashing function is. any piece of data at all -- a picture, a video, even your signature, your address -- any piece of data at all can be mathematically

constructed to create a very small fingerprint, and that fingerprint is unique for that piece of data.

If I make one little change to that data, I will get a completely different fingerprint, and no fingerprint of any two data sets, no hash of two different data sets, has ever matched. This is called no collisions. There is no collisions. So fingerprint, certain data. Change it, break the fingerprint.

Now, we talk about blockchains, so what is a block? Well, block is a lot of data. It is a lot of transactions, but it could also be records, it could be records for a mortgage, it could be the process by which you validate a land title in a land titling system. It is just a bunch of data.

Now, we make blocks. We take a bunch of this data, and we put it together. That is a block. And guess what we do to it? We hash it. Now, what have we done when we hashed it? We have created a block of data you never get to change again, because if you change it, you will break the hash.

Now, what do we do with a hash? Well, we will put it in the next block, and then we will collect some more data. Now, that is the chain in blockchain. It is a chain of blocks completely tied down and secured against any modification in the future by the hash that is in the next block in the chain. And as I progress

and collect more data, nobody gets to change the past, and that is really the magic of blockchain.

So what can I do with blockchains? I can do a lot of stuff. Can I secure a lot of data? Well, yes, because there is this other trick we can do with hashes, and that is we can have a tournament. How many of you have been to a tournament before? Have you ever seen a tournament bracket? You can follow your team all the way from the beginning, competing against thousands of other teams, all the way to its winner slot. Your team always wins, right? All the way to the winning slot and all I have to consider is that team and the team -- the games it plays in. I don't have to look at all of those other participants.

Ms. Schakowsky. Can Cub fans do that, too?

Mr. Snow. What is that?

Ms. Schakowsky. Can Cub fans --

Mr. Snow. Cub fans, yes, they can. Sometimes the chain is a little shorter.

So the idea is I can take a ton of data, and I can create one -- I can combine -- instead of games that are hashes, I can end up with one has at the end that secures a ton of data, and there is a small path to any piece of data that proves that data hasn't changed. I don't have to look at everything.

Factom is built on that. That is the protocol that I am building, and I build a collection of these Merkle Trees, these tournament brackets, for data that is collected, and I place that hash in a public witness. And the public witness in this case is Bitcoin blockchain, because it has the most secure data structure on the planet right now.

But we can also go put it in IBM's Hyperledger or in Ethereum or many other blockchains, and we create a basis by which you can write an application that runs in the context of a private chain within all the security that we need for some applications. And it can access vast sums of data, like weather data, like transactions on exchanges, huge sets of data, and prove that that data is historically correct and accurate. And that is basically the power of the blockchain is to create histories that you can trust that can be validated and verified and can be used across many different systems.

And I will be happy to answer any questions anybody has. And if you want to apply as a programmer, I can certainly talk to you about that, too. Thank you very much.

[The prepared statement of Mr. Snow follows:]

**********INSERT 4**********

Mr. Burgess. Yes. Not likely. Mr. Beccia, you are recognized for five minutes, please. The chair thanks the gentleman.

Mr. Beccia is recognized.

STATEMENT OF JOHN BECCIA

Mr. Beccia. Thank you, Chairman Burgess, Ranking Member Schakowsky, and members of the subcommittee. My name is John Beccia, and I am General Counsel and Chief Compliance Officer for Circle Internet Financial. We are a consumer company focused on making payments more secure, safe, and simple.

Circle is a member of the Electronic Transactions Association, the leading trade association for the payments industry. I am grateful to be part of the subcommittee's Disrupter Series. The blockchain represents one of the most important technical innovations of our time. It has potential to impact myriad industries, retail, media, health care, government, and energy, but today I am going to focus, really, on how the blockchain can impact financial services, talk a little bit about the benefits, risks, and the regulatory environment.

There is no question that payments can be improved. Traditional payments are controlled by networks that charge fees for transactions and have cumbersome processes that are subject to data breaches. Digital currency holds promise to improve payments, since there is no central authority and the value is stored across a distributed network.

So what are the benefits? For consumers, it can be used in a variety of transactions. It can be used to split a lunch tab with your co-workers, a mother sending funds to a daughter in college, or someone sending money to a relative overseas. Digital currency makes these transactions simple, less costly, and secure, and it also provides instant access to funds. It also offers privacy, because on the blockchain personal information is not disseminated.

Digital currency has the ability to reach unbanked and underserved communities. Cross-border transactions are offered at a fraction of the cost of typical remittance fees. Merchants also like this technology because of the benefits. It is not subject to interchange fees, chargeback risks, or the liability of storing customer information.

Blockchain technology is still in its infancy. While there are over 12 million people with digital wallets, more than 100,000 merchants accepting Bitcoin, and nearly 200,000 daily transactions, the majority of consumers are still learning about the benefits of Bitcoin. Like any other technology on the internet, adoption is going to take some time.

At Circle, we believe that money should be exchanged freely, the same way people exchange other information over the internet,

whether it is photos, messages, et cetera. Our social payments application allows consumers to make payments in multiple currencies on the Circle platform and to anyone anywhere in the world on the blockchain. It also is done in a fun mobile experience that uses tools like GIFs, emojis, and photos.

Incubation and blockchain testing among firms of all sizes is really setting the stage for the expansion of financial products, economic growth, and job creation. Now, there are some risks associated with digital currency, and I am sure you have heard about those risks, and the industry has worked very diligently to address those risks.

First, digital currency is subject to money laundering. Unfortunately, global AML laws are updated and really should be revised to account for 21st century technology. The transparent nature of the blockchain, however, provides us some more transparency to detect illicit activity. The industry has created risk management systems which are really innovative and have collaborated quite a bit with government to address these risks.

Second, which I believe is important to this committee, consumer education and protection is vital. The CFPB and the FTC have issued advisories on digital currency. Companies in this

space should have disclosures to provide clear language about fees, risks, obligations, and dispute resolutions. Consumers need to know their funds are secure, and that is why our customers have FDIC insurance protection if they are holding dollars in their account, and we have also secured private insurance for those customers who are holding digital assets.

Third, those digital assets really need to be protected, so companies like us who are acting as custodians need to have best-in-class protocols to ensure that we are protecting digital assets whether they are online or offline. And that is why we support the White House's recently announced Cyber Security Action Plan and feel that companies should work to make sure that all financial transactions are safe.

The regulatory environment for digital currency has evolved quite a bit over the last couple years. For companies like Circle, we need to be registered as a money transmitter at the federal level as well as licensed state by state. Whereas states like California have pending legislation on digital currency, New York has created their own BitLicense, and that was finalized last year.

We are currently the one and only company that does have a BitLicense, and we take that responsibility very seriously. In

addition, the Conference of State Bank Supervisors are coming out with regulatory principles, or have come out with principles, in an attempt to provide clarity among the states.

While we are encouraged by the regulatory framework, there is work to be done. Regulatory uncertainty and/or regulatory arbitrage makes it difficult for businesses to utilize this service and for consumers to feel confident in the service. We also encourage Congress to consider more efficient charter choices, both the digital currency-based firms as well as FinTech firms in general.

Disruption in payments is happening now. The lessons learned from digital currency and financial services can be applied to other industries, and we look forward to discussing that with you in question and answers.

Mr. Chairman, this concludes my testimony. I look forward to answering any questions you may have. Thank you.

[The prepared statement of Mr. Beccia follows:]

**********INSERT 5**********

Mr. Burgess. The chair thanks the gentleman.

Mr. Syracuse, you are recognized for five minutes.

STATEMENT OF DANA SYRACUSE

Mr. Syracuse. Mr. Chairman, Ranking Member Schakowsky, I thank you for inviting me here to speak today. My name is Dana Syracuse. I am counsel at BuckleySandler LLP, and I am the former Associate General Counsel of the New York State Department of Financial Services, which is the principal financial services regulator in New York State.

While I was there, I was responsible for helping to lead several initiatives, including bringing enforcement matters against some banking institutions for AML/BSA failures and violations of OFAC sanctions programs, helping to lead the department's effort in the area of cyber security, and also helping to lead the department's efforts in the area of regulation of emerging payment systems, including Bitcoin, blockchain, and my current practice at BuckleySandler focuses on these same areas.

For the sake of clarity, I want to break out what the regulatory environment looks like in the area of the payment system around Bitcoin, separate and apart from blockchain. I agree with my fellow panelists that the Bitcoin payment system really is revolutionary and has the power to bring into the financial fold the unbanked, the underbanked, and those who may

not have the benefit of a modern banking system.

It also has the possibility of being the catalyst of driving the modernization of our Apollo era payment system into one that is faster, less expensive, and more reliable. But the challenges faced by regulators in this new era is going to be how to create the appropriate guard rails that protect consumers, prevent money laundering, and impose proper cyber security standards while at the same time not hindering innovation.

In New York, with the drafting of the BitLicense, where we came out was not regulating Bitcoin, not regulating the underlying blockchain protocol, but rather taking a functional approach and regulating those who are acting as financial intermediaries, meaning those who are put, in essence, in a position of trust. So that includes the law companies, exchangers, and transmitters.

And because of the kinds of functionality that they were offering, the regulation, therefore, imposes certain capitalization requirements, anti-money laundering requirements, cyber security, which I think the importance of cannot be understated, and the other challenge is how to do this while at the same time continuing to help foster innovation.

And that is why the BitLicense has an on ramp for smaller companies, and it is something that I would encourage any other

states or regulatory bodies that choose to step into this area also include, because the fact of the matter is, you know, this is an area that has a tremendous amount of innovation, and it is, I believe, unreasonable and could be a hindrance to innovation to potentially saddle companies like that without outsized compliance functions that may not necessarily equate with the potential dangers that are there.

I also believe that a uniform approach would -- across all the states would be a good goal. The Uniform Law Commission has an effort underway right now, and Mr. Beccia mentioned the CSBS model framework as another example.

Now, turning to blockchain, you know, there is -- the blockchain is the underpinning backbone architecture on which different applications can be built, Bitcoin being the most well-known. There is significant interest in the way banks and clearinghouses and exchanges may use blockchain to transform existing business models, whether they be through closed systems or on the public blockchain.

Significant time and money is being spent in understanding this. While blockchain is new, the kinds of functionalities that are going to come out of it -- securities clearing, identity management -- those are not. So the question that needs to be

asked is, you know, when these new functionalities arise, is there an existing regulatory framework that already answers the question or meets the concerns, if it is for protection concerns, the AML concerns, that government and regulators could potentially have.

The other important thing to take away from this is that regulation around the blockchain protocol itself would be a hindrance to innovation. It is ill understood right now, companies that are doing some of the creative work in there haven't reached I would call it market adoption yet sufficient to say that it is worth the candle of potentially saddling them with burdens that they don't need.

In conclusion, you know, regulation in the area needs to be smart. It needs to be the result of study. And I thank you and look forward to your questions.

[The prepared statement of Mr. Syracuse follows:]

**********INSERT 6**********

Mr. Burgess. The chair thanks the gentleman.

Mr. Roszak, you are recognized for five minutes for an opening statement, please.

STATEMENT OF MATTHEW ROSZAK

Mr. Roszak. Good morning, and thank you, Chairman Burgess and the distinguished subcommittee for the invitation to testify today. I would also like to commend your staff for the thoughtful engagement going into today's hearing.

My name is Matthew Roszak, and I am pleased to be here on behalf of the Chamber of Digital Commerce where I serve as Chairman. The Chamber is the world's largest trade association representing the blockchain industry. Through education, advocacy, and working closely with policymakers, regulators, and industry, our goal is to develop a pro-growth legal environment that foster innovation, jobs, and investment.

I am from Chicago, and I have been working as a venture capitalist and technology entrepreneur for 20 years, deploying over a billion dollars of capital and founding a dozen companies during my career. I have also invested in over 20 blockchain companies through my firm, Tally Capital, and more recently I co-founded a software company called Bloq, with Jeff Garzik, a technology visionary and core developer of Bitcoin.

Blockchain technology has captured the imagination of thousands of innovators around the world and created what I call

a generational opportunity for entrepreneurs and investors. That translates into once in a lifetime. So think railroads, automobiles, telephony, and the internet. It has the potential to play on that scale or even greater. From the recent covers of the economists and Bloomberg, if it feels like you are reading about blockchain everywhere, well, it is because you are, and there is a good reason for that.

The technology of money has evolved over the centuries from shells, wampum, salt, tally sticks, gold, and paper currency, to bits and bytes. Today banking and finance are in the process of being redefined as blockchain technology is creating an entirely new operating system for money and poised to be one of the most important inventions in the history of finance.

Trusted intermediaries will soon be disrupted and decentralized peer-to-peer networks will blossom reducing tons of friction and saving billions in transaction costs while unlocking financial access to the entire world, yet we are still in the early days akin to the dial-up phase of the internet.

In terms of Bitcoin's state of the union, and taking a famous quote from Charles Dickens' A Tale of Two Cities, "It was the best of times; it was the worst of times." This very much applies to Bitcoin today. Despite some of the sensational headlines,

investment and innovation in this industry has grown at an incredible pace. Venture capital surpassed a billion dollars last year, with some of the best and brightest entrepreneurs and professionals from Silicon Valley to Wall Street to K Street all racing in, along with over 100,000 merchants accepting Bitcoin for goods and services.

Bitcoin is indeed alive and well. And also named companies, such as Citibank, Deloitte, Foxconn, IBM, PwC, Microsoft, NASDAQ, and many more have all dedicated significant resources to exploring blockchain technology.

I would also like to highlight a challenge the Bitcoin community is currently facing. Something tells me this committee might be able to relate. Making decisions in a decentralized system is not easy. Bitcoin is experiencing significant growing pains as the number of transactions are increasing exponentially. This is a clear indicator of Bitcoin's success and a testament to its global adoption.

Now, the challenges reside in how to best increase the throughput of the system in order to support greater transaction volumes. Unlike a government or company, there are no members of Congress in Bitcoin, nor a CEO or board. That is all purpose-built and part of the fundamental power and beauty of

Bitcoin's math-based composition.

However, when there is friction in decision-making, that gridlock can sometimes be overwhelming, if the debates, fights, and passions involved are in many ways a feature of the system and not a bug. There is an opportunity on the horizon to create an open forum for building consensus with more constructive ways to outline goals, priorities, and risks, which would serve as an important barometer for stakeholders in the ecosystem. And there are plenty of well-known platforms to draw from, including W3C, ICANN, Wikipedia, Linux, and even the United Nations, where certain best practices can be explored and leveraged.

Extremely talented and brilliant people have solved some of Bitcoin's toughest problems. These statesmen usually work as volunteers, purely out of love for the technology. Through their Herculean efforts, the system's features, security, and especially its resilience have all improved dramatically. The system stresses, heals, learns, and evolves.

In conclusion, the amount of financial and intellectual capital being poured into this ecosystem, I see incredible promise and opportunity, especially with hundreds of startups betting their lives on blockchain, and believe this new technological frontier has the potential to benefit society and industry with

privacy, security, and the freedom of conveyance of data, which in my mind ranks up there with life, liberty, and the pursuit of happiness.

Thank you very much.

[The prepared statement of Mr. Roszak follows:]

**********INSERT 7**********

Mr. Burgess. The chair thanks the gentleman and thanks all of our witnesses. We will move into the Q&A part of the hearing. Each member will have five minutes, and we will go one round and perhaps longer. We may have a series of votes that interrupts us, but let me recognize myself for five minutes.

Mr. Syracuse, very fascinating testimony from all of you, but yesterday a situation was brought to my attention where someone was -- a crime was committed, and the crime was committed using something called ransomware, which I did not know about until yesterday. It is a fairly interesting technology that I guess criminals have developed, and the payment was instructed to be made in Bitcoins.

Now, it wasn't like a bag of Bitcoins be taken down to the wharf and left under a boat. It was, you know, where do you go with this stuff? And when I questioned, you know, "Well, why don't you just follow the digital trail?" he was like, "You can't do that." So can you kind of enlighten me and the subcommittee on what are saw of the law enforcement aspects here?

Mr. Syracuse. Sure. I mean, I think that there are a couple of things going on in that story. You know, firstly, virtual currency, Bitcoin, it is highly traceable. There are services in place that regulators and law enforcement have and need to

educate themselves of if this is going to be regulated that allow one to follow using blockchain forensics, the flow of funds from one exchange to another or from wallet to wallet.

The issue also is, at a certain point, that person is going to need to exit and get Fiat out. So that speaks to the importance of making sure that the exchanges -- the entry points and the exit points, the on ramp and off ramp -- are regulated. And also, that story, it is less about virtual currency and Bitcoin.

You know, Bitcoin is used as cash which can be used in criminal enterprise. Doesn't mean that you -- they kind of outlawed that, but it is a story about cyber security, and a larger conversation that needs to be had around regulation in that area and creating proper standards there.

Mr. Burgess. You know, maybe I have watched too many crime dramas on TV, but it seems like Clint Eastwood would have put an ink cartridge into the bag of money that stained the dollar bills, so that anyone knew when they were pushed across the counter that this guy is the criminal. Is there any way technologically to attach that sort of detection device to the Bitcoin transaction?

Mr. Syracuse. I think that there are coins that are known now that have been used in criminal enterprises that are, in essence, marked. But, yes, they can be programmed in such a way.

But the key thing is to make sure that these blockchain forensic tools are being utilized, so you could follow it, so you could trace the funds.

Mr. Burgess. Well, you know, again, that was interesting. That case just literally came before me yesterday as we were preparing for this hearing today.

Mr. Brito, did you have something you wanted to add to that?

Mr. Brito. Sure. One thing to keep in mind about ransomware, which is a very serious problem, is that it predates Bitcoin and decentralized digital currencies. We have seen ransomware as far back as 20 years, and what makes ransomware possible today is three things.

It is a breach of a computer. Essentially, you get hacked. Number two, cryptography. Essentially, your files on your computer aren't encrypted, so you no longer have access to them. And, number three, it is a payment method. So in this case it is Bitcoin. So you can pay the person who is in ransom.

Of those three things that are necessary for ransomware, encryption and digital currencies have incredible potential, you know, good uses, right? So cryptography is what keeps our bank balances safe. Digital currency, as we have talked, is what makes it possible.

The third component, though, the breach, the hack, the lack of cyber security, that is where the real concern is. And I am happy to say that, in conjunction with the CDC, Coin Center and a lot of the companies in this space have created something called blocktion lines, which is a public-private forum between law enforcement and the companies in this space to begin to discuss and educate law enforcement about how they can do this kind of tracking to reach -- you know, get the bad guys.

Mr. Burgess. Are there places a criminal can go, countries to which they can go, where these traceability aspects are muted or disrupted?

Mr. Brito. So the traceability of the coins, as it were, on the network cannot be compromised. You can still trace the coins. The problem is that the off ramp and on ramp may be in a country that is not cooperating with law enforcement in other countries. But that, again, is an issue not of Bitcoin's issue, of cooperation between law enforcement.

Mr. Burgess. Mr. Suarez, just briefly let me ask you, how do you determine the value of a Bitcoin? Is it all one unit size, or what is -- are there various sizes?

Mr. Suarez. Well, the value of Bitcoin is determined in the same way that the value of really any kind of digital asset or

commodity is determined, which is effectively through supply and demand. And so the price of Bitcoin on the coin-based platform today, which is probably something in the low $400 range, is really just a function of how many people are willing to purchase Bitcoin and how many people are willing to sell it.

To your question about fractions of a Bitcoin, the reality is you can transfer fractions of a Bitcoin, very tiny fractions of a Bitcoin, just as easily as you can a full Bitcoin, or many Bitcoin. And that opens up very exciting possibilities.

So, for example, one of the issues I think that was discussed today is the concept of micro payments online where I can viably send you two pennies worth of value or 10 pennies or 50 cents worth of value because I am going to tip you because I like a comment that you made on my internet form, for example. And that is not a technology or that is not a payment form that is viable today, because the cost of those smaller payments would exceed the value of that transfer. So we can transact in tiny fractions of a Bitcoin.

Mr. Burgess. That is very interesting.

The chair recognizes Ms. Schakowsky of Illinois, five minutes for questions.

Ms. Schakowsky. Thank you, Mr. Chairman. I apologize for

being late. I did get to hear most of the testimony.

I wanted to ask questions about consumer protection also and financial fraud and abuse. There is all kinds of protections set up to guard against financial fraud and abuse through traditional currency transactions. Banks can flag suspicious activity and limit withdrawals, which make it harder for a thief or a fraudster to empty out our bank accounts.

And I understand that those kinds of checks may not be in place for digital currency, but I did -- and another example would be that the consumer protections required by the Truth in Lending Act may not apply to loans or credits of digital currency, raising questions about transparency and about fairness.

So, Mr. Syracuse, I wanted to ask you, you have experience in the public sector and in this kind of regulation. If a consumer needs to contest a purchase made, for example, with Bitcoin, say the product they bought is defective or the service was never performed, are they protected in the same ways that they would have been if they had used a credit card or a debit card?

Mr. Syracuse. Not necessarily. But depending on what exchange or what facilitator they are using, they may have those policies in place. You know, I would be curious to -- the answer is not necessarily.

Ms. Schakowsky. Not necessarily. And are those kinds of risks, then, disclosed? Do consumers --

Mr. Syracuse. Yes.

Ms. Schakowsky. -- make assumptions, do you think?

Mr. Syracuse. Yes. So under the BitLicense, there are certain enumerated disclosures that need to be made. So disclosures about volatility, disclosures about the irreversibility of a transaction, they have to be made.

Ms. Schakowsky. And in what form -- you know, I get all of these privacy disclosures and all of these things that just say "punch agree" if you agree?

Mr. Syracuse. Well, that is the issue is at what point does one kind of turn a blind eye to it? And then the other issue is, in this digital environment, you know, how much information can one actually absorb in that little screen? You know, I think that there should be a conversation around what consumer protection looks like in the digital age as our banking functions shift from brick and mortar to an increasingly mobile environment. I think it is going to be kind of a necessary area to roll up our sleeves.

Ms. Schakowsky. And what are those things, other ways that the digital currency exchanges and wallets can be better protected, and what would that look like? Sure. Mr. Snow, sure,

and then Mr. --

Mr. Snow. I would like to change the conversation just a little bit, because it is in fact true that digital currency is non-refund -- what am I trying to say? Non-reversible, yes. It is a non-reversible transaction. But blockchains do have the potential for the consumer to have a much more assured understanding of what they are purchasing.

So let me tell a really short story about a friend of mine who builds computer parts on a sideline. He is retired, so now he spends hours and hours in a bedroom building little kits. It is what intel engineers do, I guess.

And one of his parts, if it is not an authentic part, the whole board that he creates, bricks, it kills itself. And he can work at it, beat on it, and bring it back to life, but his customers get really upset if it has a non-authentic part on his board. So he bought a bunch of chips from Alibaba, you know, the Chinese eBay sort of thing, and they assured him he was getting valid chips. And he put them on the board, and they weren't valid.

And then when he goes to their consumer protection group, the manufacturer always wins. Therefore, he just had to go find some more parts and replace all these chips.

Now, here is where the blockchain can help you. Because you

can create a public notified ledger of where parts came from, the manufacturer of the real genuine part could have put on a chain, "These are parts I have sold to Company X." And Company X could put on that same chain that it sold these parts to Company Y.

And then Company Y could be the guy that my engineer friend is talking to, and he says, "I want authentic parts," and they say, "Yes, you have these three parts. And, see, they are in this chain, and I can cryptographically prove that there is a path of legitimate parts that came from the manufacturer to this guy, and he is about to sell them to me."

Now, others would say, "Well, he could turn around and still send you the bogus parts, right?" But, see, the trick is, when the next customer said, "Sell me some parts," Company Y would have already said, "He sold the legitimate parts to my friend." He would have to represent the real parts as clones.

And so you are in a position where we can create audit trails for consumers that exist in places well beyond our jurisdictions to prove that when you are buying goods and services, drugs, food, that it is coming from where it is stated that it is coming from, and limit the ability of middlemen to pass off clones and knockoffs as the real product.

Now, that doesn't help at the refund level.

Ms. Schakowsky. I am going to -- we are going to -- we are about to --

Mr. Snow. It does help to --

Ms. Schakowsky. -- get a gavel here, because we have gone over time. So I hear you saying, though, that you can -- we can build into the creations of consumer protections, but I am not convinced that we don't need some assurances, outside regulations, some sort of framework that we all agree to, and I think the conversation, unfortunately, can't continue now.

But I think that is the conversation we need. How do we do it? And maybe some of it is embedded and some of it is imposed.

Thank you.

Mr. Burgess. The gentlelady yields back. The chair thanks the gentlelady.

Mr. Lance, five minutes for questions.

Mr. Lance. Thank you, Mr. Chairman.

What privacy concerns should the public consider when the public is thinking about buying digital currency? To the panel in general, anyone who would like to respond. Yes.

Mr. Beccia. So I would just note there is a couple of things that come up in terms of privacy in digital currency. First, there is a lot of questions about the anonymity of digital

currency, and, you know, digital currency does offer benefits to consumers. It offers financial privacy.

So when you are doing a digital currency or Bitcoin transaction, you are not giving over your credit card information or your personal information in that transaction. So if you are buying something on a merchant that accepts Bitcoin, like at Overstock.com, that is just a cryptographic type of code that you are providing them and not that personal information.

So it is actually a benefit in terms of from a consumer perspective. But on the flip side, where regulators look at it and are concerned as far as the anonymity, and so not understanding either where that money is going or who that customer is. And so what we kind of do to mitigate the risks are, obviously, similar to any other financial service, we have to really know who our customers are.

And so we have detailed AML programs, and we look at the unique risks of our customers. Our customers are mostly online customers. They are customers from multiple countries, and they are conducting digital currency transactions, which are a little more complex. So we need to create systems that are a little more technically advanced to address that.

Mr. Lance. Thank you. At the moment, the public can invest

in gold or silver or currencies. Does the public have the ability to invest in these digital currencies? Yes?

Mr. Suarez. Yes, Congressman. So absolutely. So one of -- the platform we operate, for example, will allow customers to establish a coin-based account, indicate how many Bitcoin they want to purchase, and then to send us money in purchase -- to settle a purchase transaction.

And so the simple answer to your question is, yes, there is an existing retail platform that allows customers to purchase Bitcoin.

Mr. Lance. And the price fluctuates, I presume, as is true of any other currency?

Mr. Suarez. That is exactly right. And so most of our customers today, at least at Coinbase in the United States, are attracted to the volatility of Bitcoin, because they are investing effectively in an asset whose value they anticipate will go up. And so a lot of savings energy is being poured into that.

Obviously, there are many more applications of virtual currency beyond that, but that is the initial use that we see.

Mr. Lance. Thank you. Are there differences between a public blockchain and a private blockchain? Mr. Cuomo?

Mr. Cuomo. Yes, I will take that one. So I think when we

typically think about blockchain, we associate Bitcoin. But the interesting thing is that the blockchain is a design pattern that can be applied very broadly.

And when we start to apply it to managed things of value -- that can be land deeds, any kind of certificates, birth certificates, death certificates, contracts -- things that are managed by, let's say, regulated environments, it is attractive to start thinking about a blockchain that is permissioned. All right? Not just anonymous, right?

And the beautiful part about the blockchain architecture is it allows for this. And the way I am thinking about it is a dial, right, where you can dial in at one level very tight permissions, so think about it as a membership club. To get in, you have to at the door show them your ID card and you are allowed to come into the room and transact.

But a permissioned blockchain could also be permissive, right? You can open it up and be somewhat liberal. For example, two parties exchanging carve-in numbers may have a certain level of permission to exchange cars with one another. Maybe one is an auto manufacturer; maybe the other is an auto dealer.

But the Department of Motor Vehicle -- and you might only be able to see those cars that pertain to you, right? So you will

have permission to only see the things on the blockchain that are relevant to your transactions. But the Department of Motor Vehicle, when it came in through the door of the club, of the car club so to speak, it was given broader permissions as an auditor in that blockchain network. So it can see more, and it can actually be able to provide an auditing service.

Mr. Lance. Thank you. I certainly know who IBM is, BuckleySandler. These other entities, are these new to our commerce in this country? Bloq? Factom? Coinbase? Are these relatively new organizations?

Mr. Snow. We are a really, really old blockchain company of about two years.

Mr. Lance. I see.

Mr. Snow. It is a very new space. Most of us are fairly new.

Mr. Lance. I see. Thank you. My time has expired.

Thank you, Mr. Chairman.

Mr. Burgess. The gentleman yields back. The chair thanks the gentleman and recognizes the gentleman from Florida, Mr. Bilirakis, five minutes for questions, please.

Mr. Bilirakis. Thank you, Mr. Chairman. Appreciate it so very much. Thanks for holding the hearing as well.

Mr. Roszak, many have raised concerns regarding the potential for terrorism financing due to the ability of users to make anonymous transactions. Address that, please.

Mr. Roszak. Criminals --

Mr. Bilirakis. Address the concerns, yes.

Mr. Roszak. Yes. Criminals have always been early adopters of the newest technology, whether that goes back to the days of NASCAR and having a faster car or cell phones or the internet or, in this case, digital currencies being used for terror finance and money laundering.

As we have heard on this panel, the traceability of digital currencies is more and more profound. The Chamber of Digital Commerce co-founded the Blockchain Alliance, and we are working with law enforcement to help them provide the forensics and tracing for certain issues that come about with those use cases. But those are the very fringe use cases, and, quite frankly, digital currencies, especially Bitcoin, is not a great use of funding for criminal activities like that.

Mr. Bilirakis. Thank you. Anyone else wish to address that? Yes, please. We will go here -- down here.

Mr. Brito. Sure. I would add that to date we have not seen terrorist financing using digital currency, although it

absolutely is a possibility. What we see instead is the use of prepaid cards and other centralized methods that can truly guarantee anonymity, and we see the Director of the Financial Crimes Enforcement Network at the Treasury Department testify before Congress in a hearing about digital currency that cash is still the number one way that folks launder money and conduct terrorist financing.

Mr. Bilirakis. Who else? Briefly, please.

Mr. Syracuse. I would also just add that, you know, it is probably more of a concern in the traditional banking environment. I know that when I was with New York DFS we brought major enforcement actions against banks for failing to follow sanctions programs.

And also, you know, to date, the virtual currency community, the Bitcoin community, is actually -- the ones that are licensed have been very responsive, and the figure that I heard to date was that something like 5,000 suspicious activity reports had been filed. So to the extent that you are dealing with a regulated institution, hopefully it is capturing bad activity.

Mr. Bilirakis. Go ahead, please.

Mr. Snow. One thing to understand is Bitcoin is a public ledger, and so the larger your organization is, the more

transactions you have. The more transactions you have, the more ability forensics has to look at the blockchain and see the picture of your organization. This means that Bitcoin blockchain is decidedly a terrible use for large criminal organizations.

And this came out in the Department of Justice's digital currency conference that they had last year at the Federal Reserve Bank in San Francisco, and the FBI and numerous agencies stood up and said basically, "We can dig these organizations out of the blockchain. So we really would like them to use it. We can capture them."

I do think that individuals, small fry, might get through a lot easier with digital currency, but the larger the organization, the more opportunity to trip up and the more opportunity to catch them.

Mr. Bilirakis. Thank you very much. Very informative. Next question, again for Mr. Roszak, what advantages are there for consumers to utilize Bitcoin and other digital currencies, rather than traditional ways to send and receive assets today?

Mr. Roszak. Bitcoin, for example, is used for a variety of use cases, both as a currency and a store of value. From a currency standpoint, it could also be used for micro transactions. So think of a nickel going over the internet is expensive today.

Using Bitcoin or digital currencies, it is very cheap, very efficient, secure, and fast. And a nickel might not sound like much, but a nickel from 50 million people starts to add up. Part one.

Part two, remitting money around the world is a very expensive endeavor, time-consuming endeavor. Right now, the remittance industry is about a half a trillion dollars in size. That can get turned upside down with remittance saving lots of money and putting that back into the global economy.

Mr. Bilirakis. Thank you. Next question, why is the price of Bitcoin so volatile and is there fluctuation in purchasing Bitcoin? Or does fluctuation occur for the funds already purchased and available in a consumer's eWallet? I know that the Chairman addressed this to a certain extent, asked this question, but yes.

Mr. Roszak. Fundamentally, Bitcoin is in a price discovery phase, and it is a supply and demand dynamic. And we are still in the early days of Bitcoin. There is 15 million, plus or minus, Bitcoins outstanding today. It has got a market value of about 400, so it is a $6-1/2 billion currency today.

On a relative basis, that is small. But if you look at historically, it has been one of the better performing currencies

on the plant. And as you have heard, the amount of investment and innovation that has been planted in this industry is still yet to be seen. And so we are at the front end of this.

Mr. Bilirakis. Thank you. You wish to --

Mr. Beccia. I was just going to point out a similar thing, that it is a supply and demand issue. And it is a fact that, really, the users are using it or looking at it as early adopters more as an asset rather than a currency or a payment vehicle. And I think long term, as we see more people using it for payments, which I think is really the use case, we will see a greater stability in the price and we won't see as much volatility.

But in the meantime, I think that for consumers it is important for companies in this space to, one, educate consumers about the price volatility, and then do things to make sure that those risks are mitigated.

So as I mentioned earlier, for example, a company like Circle, we allow our users to also hold their value in U.S. dollars, which is not subject to volatility, but still have the benefits of making transactions on the blockchain. So there will be different innovations that will take out the price volatility, but I think long term, from an economic perspective, we will see less fluctuations.

Mr. Roszak. One final point in terms of financial access. So buying a cup of coffee or a pair of jeans here in D.C. with Bitcoin is not going to change our lives. But if you are a soccer mom in Brazil, a goat herder in Ghana, or a taxi driver in Indonesia, you have a super computer in your pocket, and you could buy Bitcoin, and that allows you to participate in the global economy. So financial access is a huge driver of digital currencies globally.

Mr. Bilirakis. Thank you very much.

Mr. Burgess. The gentleman's time has expired.

The chair recognizes the gentlelady from Illinois for redirection.

Ms. Schakowsky. Thank you. Mr. Syracuse, I wanted to ask you a couple more questions. In your testimony, you stated that regulators should focus on the uses of blockchain rather than their underlying technology. In New York, you led the process of developing the BitLicense program, as you stated in your testimony, and this process focused on the use of Bitcoin for digital currencies and included a two-day hearing with a wide range of stakeholders.

So what were some of the issues that were discussed in your hearing?

Mr. Syracuse. I think at the hearing there were -- you know, there were discussions of, obviously, the technology, how does it work, the extent to which Bitcoin -- kind of Bitcoin, the currency, should be regulated and what different aspects of the ecosystem should be regulated.

And the result of that was this kind of functional approach, which was figuring out what are the traditional functionalities that kind of fall within the jurisdiction, which would mean financial -- those offering financial services and financial products.

Ms. Schakowsky. But were there existing laws that covered or --

Mr. Syracuse. No.

Ms. Schakowsky. -- could cover?

Mr. Syracuse. So this is another one of the debates which was whether or not to put virtual -- to regulate this area under existing money transmission law or create something new. And where New York came out was that for our law, our New York State money transmission law, would only govern transmission of money from Point A to Point B and wouldn't capture the exchange companies or the wallet companies.

Now, that is not to say that other states would be able to

capture that kind of functionality under their own money transmission laws.

Ms. Schakowsky. And have some of the other states been doing that or not?

Mr. Syracuse. Some other states are. Some other states are. So I believe North Carolina, New Hampshire, and a handful of others are attempting to do that. And that is a perfectly valid approach.

Ms. Schakowsky. What factors unique to digital currencies did the department think were important in developing new regulations?

Mr. Syracuse. Well, the way we initially kind of got interested in it was we were getting inquiries from our money -- the money transmitters that we regulated saying, "Is this money? What should we do with it?" And then that kind of launched our inquiry. So we sent out subpoenas, we started meeting with numerous members from industry, law enforcement, academics, and the thing that was interesting was the way these new service providers were popping up in the ecosystem.

And then we started wrestling with, well, what are the anti-money laundering concerns? What are the consumer protection concerns? Cyber security, you know, the BitLicense

weaves in a cyber security provision. New York State now is trying to lead the effort in having a nationwide conversation about regulation in cyber security. That is a very important factor.

Ms. Schakowsky. Absolutely. Mr. Beccia, earlier you seemed to want to make a point and didn't have time. I wondered if you wanted to say anything now.

Mr. Beccia. I thought the consumer protection point was very important, and so just to give you a little more of a flavor of what companies in the space are looking at. I think, obviously, from a state standpoint, states like New York and others, and that are regulating this either as money transmission or from a separate licensing perspective, have right in their regulations very detailed consumer protection protocols, whether it is disclosures to marketing materials at the point of sale, dispute resolution, and whatnot. And so we are very, very cognizant of those.

I think also there is protections for customer funds, which are vital, and so every state -- we have to segregate our customer funds, we have to have surety bonds for funds, and things like that.

At the federal level, I think the CFPB and the FTC are very

engaged here, and so they have issued warnings and advisories. They have started to collect complaints on their portals. And I would expect to see more regulations in terms of disclosures and things that are important and things that are -- you know, you see at more traditional financial services and apply them to digital currency.

But I think, really, the big picture here is that, you know, we operate in a regulatory environment that is very similar to financial services. We are still the one and only company that has received a BitLicense, and so I can tell you, having gone through that process, it was almost like getting a bank charter. And so New York took a very thoughtful approach and was very thorough in terms of things that Mr. Syracuse mentioned, the very important risks, which are AML, consumer protection, and cyber security.

And so I think, you know, not only do we have those which are similar to financial services, but on top of that they are really dealing with the specific risks for this industry.

Ms. Schakowsky. Thank you. Thanks all of you.

Mr. Burgess. The gentlelady yields back. The chair thanks the gentlelady.

We do have a series of votes on, but I wonder if I could just

go down the panel and ask for your thoughts on what is going to be the game changer that consumers see, what application of blockchain technology. Mr. Brito, we will start with you, and then we will just work down the line.

Mr. Brito. Sure. I think if I knew, I would be out building it and making a fortune. So --

Mr. Burgess. Wait a minute. Wait. You are not suggesting this isn't a productive use of your time.

Mr. Brito. No.

Mr. Burgess. Being in front of the United states Congress. Come on. This is where I live my life. Please proceed.

Mr. Brito. That said, you know, as with the early internet, I think the killer applications are going to come from left fields, maybe things that we can't expect. But if I had to take a guess today, I would say it is going to be in areas where technology excels and does things that our current payment system and our current sort of asset systems do not do. And to me those are micro transactions and macro transactions.

So the ability to have very, very small payments that today our existing payment systems do not allow to be efficient or economic. Imagine, you know, if you think about the web, the business model of the web is essentially either charging you a

monthly big fee, for video, for audio, for articles, or showing you advertising.

The only reason we have that choice of business models is because we can't pay directly a few pennies for this one article or this five minutes of audio. This technology for the first time makes it possible.

The other is macro transactions, really big cross-border payments that today are expensive and take a long time because of the expense and inefficiency in the corresponding banking system.

Mr. Burgess. Mr. Suarez.

Mr. Suarez. Thanks, Mr. Chairman. That is a great question, and I also don't know the answer to that. But when I think about some of the core attributes of what substantialized virtual currency offers, for example, you can engage in a transaction without having to disclose your confidential payment credentials, and so there are security advantages there.

The cost -- as Mr. Brito was just mentioning, it opens up opportunities for all sorts of micro transactions that are, you know, just economically not possible using credit cards. And you think about the global scale of this, which is like the internet. Anyone can plug into it. Literally, anyone in the world can

develop applications on top of the Bitcoin protocol. You start to appreciate the enormous potential.

So I think a lot of the opportunity lies in micro payments. There are people working on technology to allow micro payments in browser, and that is what Mr. Brito I think was getting at, where you can visit a webpage and automatically transact a micro payment to click through to read something rather than having to view ads or have a pay wall.

There are enormous potential, as my colleagues have discussed, in terms of using it as a clearance or property transfer mechanism. And so I am not sure which of those is going to take off, but it is going to be something I think very impactful.

Mr. Burgess. Very well.

Mr. Cuomo.

Mr. Cuomo. Yes. Thanks for the question. Great question. You know, I think for every one payment, coin-oriented use case, there are thousands of non-payment, non-coin-oriented use cases. So what really captures our imagination at IBM are some of the use cases that might happen around things like internet of things where they intersect with everyday life.

So think about insurance and liability. Think about the new autonomous vehicles, self-parking vehicles out there. So who is

liable if a self-parking vehicle crashes? All right? So I think what we can give back to our citizens is finer grain with the blockchain, finer grain liability insurance, such that when you are in control of the car, it is immutably recorded on the blockchain that you are in control, you are driving.

And when the software takes over in your car and starts parking, that is immutably placed on the ledger, such that if an accident occurs while, you know, the car is self-parking perhaps, the manufacturer is liable or the person who wrote the software. So when you start thinking beyond coins, you know, what the possibility is, it is just amazing.

Mr. Burgess. Mr. Snow, and let's be brief because I have only got a couple minutes left before I have to go vote.

Mr. Snow. Well, you are beginning to know me, because maybe I am not always brief. I do believe that the idea that you can know the history and the history can't be changed and you can distribute that to all corners of the earth will create new ways to organize projects and companies and efforts.

And so you will see a dramatic reduction in the overhead of corporate oversight essentially to create products, goods, and services to people. It is basically distribute everything, and what that looks like I will --

Mr. Burgess. We will have to wait and see, won't we?

Mr. Snow. -- like everyone else, I don't know.

Mr. Burgess. Mr. Beccia.

Mr. Beccia. Yes. So very quickly, thank you, Mr. Chairman. So when you think about the early days of the internet and how long it takes for real innovation to evolve, I think you are going to see the same thing here, but it is really exciting. I think when you look at the payment space and you look at the risks, you look at the regulations that are needed, it is amazing where we have come even in a short period and where we can go.

But I am really also excited about the other use cases. So when you think of having real estate transactions, recordkeeping systems for those, for securities, for smart contracts, things like that, I think, you know, there is endless possibilities there.

Mr. Burgess. Wonderful. Mr. Syracuse.

Mr. Syracuse. I think my fellow panelists have touched upon most of the salient points, exchanges, the ability in insurance, the ability in big data to put ownership of one's identity and credentials information into their own hands, so it is an asset that they are able to then leverage.

But I think the truth is, the people that know the answer

to this question are probably sitting in a dorm room at MIT or a dorm room in another part of the world, and the key thing for us is to make sure that nothing that, you know, we do as regulators will prevent or hinder that, and will create an environment where that can grow.

Mr. Burgess. Yes, Mr. Roszak.

Mr. Roszak. We have heard a lot of great use cases for the movement of money, digital currencies, tokenization of assets. And one of the greatest assets that can be employed into this new railroad is digital identity, how we manage that identity, the privacy, the security, and make each transaction unique, whether you are buying something at the convenience store or applying for a job or going to the hospital or applying for a mortgage.

Each of those interactions takes a different part of your digital identity, and this technology enables you to really take control of that and do that privately and securely.

Mr. Burgess. Since the observation was made that someone in a dorm room right now is maybe working on that, whatever that next technology is, I will just offer that at some point in the future to have my individual medical records only accessible by me, but the larger, the identified data available to researchers, FDA, whoever wants to study the cross-hybridization between this

medication and cardiovascular disease, the Vioxx story from several years ago might have been very, very apparent had that capability been available.

I want to thank all of you. You know, some mentioned the internet of things. I have just got to tell you, when we had the internet of things hearing, we had things here. When we had the drones hearing, we had drones here. I was so looking forward to finding out whose face was on the Bitcoin, and I still don't know even after the end of this hearing.

But seeing as there are no further members wishing to ask questions, I again want to thank our witnesses for being here.

Before we conclude, I would like to submit the following documents for the record by unanimous consent, a letter from Ripple. Without objection, so ordered.

And pursuant to committee rules, I remind members they have 10 business days to submit additional questions for the record. I ask our witnesses to submit their responses within 10 business days upon receipt of those questions.

Without objection, the subcommittee is adjourned.

[Whereupon, at 1:20 p.m., the subcommittee was adjourned.]