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BEYOND BITCOIN: THE FUTURE OF BLOCKCHAIN AND DISRUPTIVE FINANCIAL TECHNOLOGIES

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PARTICIPANTS:

Opening Remarks and Moderator:

DAVID WESSEL
Director, The Hutchins Center on Fiscal and Monetary Policy
Senior Fellow, Economic Studies, The Brookings Institution

Panel Discussion:

MICHAEL BARR
Roy F. and Jean Humphrey Proffitt Professor of Law, University of Michigan Law School
Nonresident Senior Fellow, The Brookings Institution

BRAD PETERSON
Executive Vice President and Chief Information Officer, NASDAQ

BARRY SILBERT
Founder and Chief Executive Officer, Digital Currency Group

MARGARET LIU
Senior Vice President and Deputy General Counsel, Conference of State Bank Supervisors

P R O C E E D I N G S

MR. WESSEL: Good afternoon; I'm David Wessel. I'm director of the Hutchins Center on Fiscal and Monetary Policy here at Brookings. I want to welcome you all to this event, “Beyond Bitcoin: The Future of Blockchain and Disruptive Financial Technologies.” And this is, as you know, obviously on the record and is begin webcast. So if you don't want anybody to know what you say, don't say anything. (Laughter)

So we thought about this even for a very simple reason: to many of us bitcoin is somewhere between a fad and a fraud. It has been promoted by some people as a crypto-currency embraced by modern day gold bugs and survivalists who are united in their deep distrust of government, and their rhetoric suggested as much. And that's a very good story I can say as a former journalist, and I think that's why you've read and heard so much about it. But to focus only on that is to focus on the people who said that the internet was a fad and that the only possible commercial use for the internet was pornography.

So today we're going to set aside I think a little bit, although Barry Silbert may disagree with me, the long-term and I think remote possibility that bitcoin will replace the U.S. dollar someday, and instead we're going to try and focus on the technology that underlies bitcoin, the distributed ledger, the blockchain. I read a little Q & A on this subject and I loved the statement from the Director of Research at R3CEV, which is not a character in Star Wars, but it's a New York startup that's basically a consortium of over 40 banks -- Tim Swanson is the head of research at R3, says blockchain is a bit like gluten -- everybody talks about it, but no one knows what it is. So we're going to try and solve that problem today, or at least make a start.

There are people up here who can explain this better than I can and I'm going to let them do that, but basically the starting point is to think about a payment system, the way money moves around the economy, it needs trust. People won't accept payments if they can't count on the payments being of value. A loss of trust in a currency or in a bank can lead to a destabilizing run. And the question is how do you generate that trust in something called a distributed ledger where banks aren't at the center of it, but that the ledger, the record is distributed and sort of jointly and severally guaranteed by all the people?

Now, when we give money to somebody we know that I had the dollar, I give the cab driver the

dollar, he has the dollar, I no longer have it. It's not so easy to do that electronically and have people really trust that. So part of this is an effort to exploit a technology that allows us so that we both can't claim the same digital dollar if you will. It's complicated, it's not intuitive, it's unfamiliar to many of us. But I want you to put yourself in the position of where people were in 1993 when the internet was embryonic and Netscape came out with the first browser that really changed the way we use the internet. That was 1994, that wasn't so long ago. And we are now at the stage I think -- we're in the pre-Netscape stage, or maybe we're right at the Netscape stage, and so things that sound very foreign and complicated and maybe even a little bit scary, you can either say throw up your hands or you can try and understand it. And what we're going to try to do today is understand it. Now there are a lot of people in this room who are putting money into startups that they hope will exploit this technology. They're obviously enthusiastic or they wouldn't be putting their money there and they wouldn't be here. I was struck by a report by some economists at the Bank of England, which is not generally known for wide eyed irrational exuberance about Silicon Valley's latest idea, and they described the distributed ledger, the technology that underlies bitcoin, as "a significant innovation, one that could change the way money moves around the economy with less cost, less fraud, fewer mistakes, and more speed." And they say it has applications outside of finance as well. It's already being used by some universities to store student records in an encrypted form, so that an employer can check a CV of an applicant. And the Bank of England recently ran a competition for students to say come up with ways that blockchain technology might improve the life of people who live in the UK. And the winning team, four students from the University of Edinburgh came up with some scheme which they have not yet posted on line -- they're probably waiting for their patent to be filed -- that will somehow be used in the national health services blood supply chain to identify -- so there's an immutable record of how the blood supply thing is.

Now, our goal here at Brookings is to improve governance, and the goal of the Hutchins Center is to improve the quality of fiscal and monetary policy, broadly defined, and public understanding of it. So any new technology, particularly one that is invading something as important and as regulated as the payment system is going to raise questions of policy. How do we get the benefits, the efficiencies, the new products and services, the financial inclusion, without adding to the risk of financial instability, money laundering, terrorist finance, and hacking? How do we rewrite rules to encourage innovation, to foster

startups, new entrants, without unfairly disadvantaging regulated financial institutions upon whom our economy depends? On the other hand, how do we set up a system so these regulated financial institutions, the big banks and credit card companies, don't use the government, the regulators, the supervisors, to prevent the entry of a new technology that could erode their profits? What is a level playing field when the ground is shifting under our feet?

So these are the questions we're about to explore. We had a very lively discussion this morning with some of the people in the industry and in the government, and in the nonprofit sector who think about these things, and I think that one of the things I've learned is that this is the kind of thing you don't get when it's explained to you the first time or even the second time. So I look at this as a continuing effort to explain to people who kind of know in the back of their mind this might be more than a fad or a fraud, but explain to me again what exactly is this and why should I care, and is this the internet 25 years earlier, or is this something that is going to be the subject of parody and ridicule because everybody thought it was going to be great and it vanished?

I want to make one more point before I introduce our panel. This event is 100 percent funded by the Hutchins Center on Fiscal and Monetary Policy at Brookings. There are people we invited who have invested in the industry and we invited them because they've invested and they know something about it, but they had no control over the agenda, they didn't get to veto anybody. Glen Hutchins, who contributed the money that led to the creation of the Hutchins Center, has investments in bitcoin. I don't actually know what they are. He didn't have any veto over this and this isn't meant to serve his business interests. I'm very grateful for my colleague Seth Wheeler, who left the government recently, the Treasury, the Fed, the White House. I don't know why -- why did you stop there? You could have gone to the Justice Department (laughter) and the Department of Education. He left the government; he spent some time here at Brookings. He's about to go work in the private sector, but the company he is going to work for is not represented here today and anything he says if he opens his mouth is speaking for himself in his last waning hours as someone who is able to say what he thinks before he goes into private industry and is no longer a free -- you're in that great sweet spot -- you're not in the government and you're not in the private sector.

And also there are a number of people here from government agencies we invited because we're

trying to be a bridge between the industry and the regulators. Some of them may speak, some of them may only listen. Those who speak are not speaking on behalf of their institutions, but are trying to help us better understand that.

So enough of that. I'm joined up here by four people who are just a few of the people we had in the conversation this morning. Some of the people who were with us this morning are in the front here and I may call on them and I've invited them to participate in the panel. We don't have to wait for the formal Q & A. But we're going to start with these four people we have up here. Michael Barr is a Professor of Law at the University of Michigan Law School, he's a Non Resident Senior Fellow here at Brookings, and he spent some time in the Treasury during the evolution of Dodd-Frank, so he knows a lot about the financial regulatory system and he's an advisor to one of the companies in this space, Ripple. Margaret Liu is the Senior Vice President and Deputy General Counsel of the Conference of State Bank Supervisors. A reminder that we have an unlimited number of federal financial regulatory agencies in Washington plus another 50 at the state level. (Laughter) Barry Silbert is an entrepreneur who I first met when I was at the *Wall Street Journal*. He had some idea that seemed completely crazy to me about having some kind of market where privately held companies could change their shares but it wouldn't be a public market. It turned out to be a big success. He sold it to NASDAQ and so now he's an investor in the bitcoin space. As you'll hear he's got investments in 60 companies. And showing that he doesn't have completely good judgment, he's recently bought into the media business -- he didn't ask me first, but I told him last night it was a mistake because we know what it's like to own a media thing -- a newsletter, a website called Coin Center -- CoinDesk, sorry. And Brad Peterson, who has been involved in companies such as Ebay and Paypal, and was at Schwab, the discount brokerage firm, is now the Executive Vice President and Chief Information Officer at NASDAQ, which I made the mistake this morning of calling a stock exchange, but it's not, it's a technology company -- I learned my lesson.

MR. PETERSON: Thank you.

MR. WESSEL: And they are one of the users of this underlying technology. And so I thought it would be useful to hear somebody who is using this technology but is not out there buying bitcoins because he thinks the Federal Reserve is going to put us under in the next 15 minutes.

So I've asked first Barry to talk a little bit about the technology for people who don't really know

what this is, or have a limited understanding. And then I've asked Michael Barr to talk a little bit about the policy questions it raises. We're going to have a little discussion up here, I'm going to bring in some of the people who joined us this morning, and then we'll be happy to take your questions.

So I'm sorry to be so long winded, but if I really understood this stuff I'd be able to explain it much more succinctly. (Laughter)

So, Barry, would you start please?

MR. SILBERT: Sure. So I guess one more minute on digital currency groups. At DCG it's our mission to accelerate the developments of a better financial system. And what we do is we build and we invest in companies in the bitcoin and blockchain space and then we use our insight, our network, and our access to capital to grow those businesses. So as David mentioned, we've invested in 60 companies now located in 20 countries, which gives us pretty unique insight into what's happening in the space. And we did also just get involved in the media business by buying CoinDesk and are putting on a conference in May in New York that you are all welcome to join consensus.

So out of curiosity -- and actually, I should mention, this is maybe relevant. We just raised money ourselves from a really unique group of investors, such as MasterCard, CIBC, CME Group, New York Life, TransAmerica, Bain, (inaudible), and some others who they themselves are quite interested as well in what's happening with this technology and this innovation.

So whenever I get to speak I always like to do an audience poll. So by a show of hands, on the spectrum of bitcoin skeptic over here, to bitcoin believer, put your hand up if you're a bitcoin skeptic. Friendly audience. Okay, who's a bitcoin believer?

MR. WESSEL: Wow, we have a cross section of America here. (Laughter)

MR. SILBERT: Great. So my bitcoin 101, I don't need to do much. So for those of you who are not familiar with this terminology, so I use the word bitcoin as a kind of a general description of a concept similar to Kleenex and Xerox. There are 600 different digital currencies and lots of different protocols out there and so when I say bitcoin I'm talking about all of them. I'm certainly a believer in bitcoin. And so think about bitcoin as three things: bitcoin is a currency or it's a store of value, bitcoin is a financial rail on which money can move around the world, and bitcoin is a ledger on which information can be stored, ownership information as an example. And so why does it matter? It matters because if you think about

the opportunities for bitcoin as a currency from a global perspective in emerging markets, the ability for people to store their wealth in something other than a currency that is being devalued or debased year after year, that has some level of appeal. Kind of like a digital version of gold. Use case number two, a financial rail. Everybody who has sent money to a person cross border, certainly cross currency, can appreciate the friction of the costs associated with that. Bitcoin has the potential to make those types of movements of money frictionless and basically free. And that's quite transformative. And then thirdly, this use case, this ledger system. If you're involved in the financial markets you know how inefficient it is to move an asset from a seller to a buyer. There are opportunities in both the financial markets as well as outside to use this decentralized ledger to hold ownership information and in fact essentially disintermediating or eliminating any of the middle men that are currently being paid to kind of be that trusted authority on ownership.

So kind of where we are in the whole evolution of this industry… So bitcoin is based on a white paper that was released in 2008 by a person or a group named Satoshi Nakamoto. In 2009 was the first version of this code that was released to the public. In 2009-2010 and for the better part of 2011 no one cared about it other than a very, very small group of technologists that were experimenting with this technology. If you fast forwarded to 2011 there was some publicity around a website called Silk Road which was a website where you could go buy drugs and do other bad things. And that was really the first time that the bitcoin itself was attributed of value. We started seeing people kind of exchanging goods and services for bitcoin. And that was, I think, the beginning of what I call the early adopter phase. And that was when you started seeing angel investors like myself, you saw entrepreneurs getting involved and starting to build the businesses that were taking advantage of the opportunity that this technology presented.

Fast forward to 2013 is when the next phase started, which was the venture capital phase. So starting in 2013 you saw some of the most well-known investors, such as Andreessen Horowitz and Union Square Ventures, Benchmark, Excel, investing in this industry backing some fantastic entrepreneurs with great big ideas. And to date about a billion dollars has been invested in this industry by those venture capitalists. 2015 was the start of what I call the Wall Street phase. If you've been following the headlines, there's a lot of interest in especially the blockchain technology which we'll talk

more about. And in my opinion in 2016 we're going to start the narrative turning back to the benefits of bitcoin as a currency and as a store of value which will lead up to what I think will ultimately be mass global consumer adoption once all this happens.

MR. WESSEL: Thank you. I know that my colleague is setting up some chairs back there, but there are a few seats in the front here if you want to move forward. There are three in the front row -- I promise not to call on you -- and there are a few over here on the aisle. So please feel free to come forward if you like.

I should say that Barry believes that bitcoin as a currency, as a store of value, is integral to this and essential and will grow in importance. That is not universally held. There is a really interesting discussion in the industry about that and I'm going to ask Brad to talk about that in a minute, but before we do, Michael, can you help us understand what are the policy issues that this raises? What are the upsides and downsides of this?

MR. BARR: Sure. Thanks, David. Let me just say at the outside, David mentioned briefly I'm an advisor to Ripple Labs, but anything I'm saying now is only my own views and shouldn't be attributed to them, or to David, or to Brookings, or the Hutchins Center, or anybody else.

So David asked me to talk a little bit about the public policy implications. I want to talk first about some potential upsides and then I'm going to talk about some potential downsides. And let me emphasize as I'm talking about them the fundamental fact that nobody really knows. So this technology is still very much in its infancy and the directions that it might take I think are still very much up for grabs.

David mentioned, and Barry mentioned, these three kinds of functions for the underlying technology, the role as a currency, the role as rails or transmission mechanism for transferring value, of transferring money over time and space, and third, basic function of having a ledger, having a way of knowing what the accounts are in the system. I am myself quite a skeptic about the first of these uses. That is, I'm quite skeptical about the use of bitcoin and the underlying technology as being important for currency purposes. But I think I'm quite encouraged about the potential for the underlying blockchain technology and distributed ledgers. So the system for transferring the money and the way of accounting for it as being quite possibly extremely significant for the way that we send money and account for things in lots of parts of our economy. And I think it could really be quite transformative.

So let me talk a little bit about some of the potential upsides. One upside is simply reducing the cost and increasing the efficiency and speed of our system for sending money. We have a very outdated system in the United States and to some extent globally for sending money. And we spend lots of money sending money, money that we could spend doing other productive things in our economy. So one I think really quite in a sense low hanging fruit for the changes that are in this technology is to ring some of the inefficiency out of the system and to be able to send money more cheaply and more quickly.

That can also have implications for social policies. So if we can, for example, send money more quickly and more cheaply we can reduce the costs of sending remittances overseas. So if you're a worker in the United States and you wanted to send money home to your family it's still extremely expensive to do that in the payment system we have in this world and the technology that's available with distributed ledgers and blockchains can dramatically reduce the costs of doing that and the security of doing that.

A second potential implication is reducing for consumers the incidence of overdraft. Consumers spend $32 billion a year in overdraft fees. If you have instantaneous trusted transactions you can eliminate that kind of risk and cost. Another potential implication is around the way we use our mobile devices, our phones or the internet. We all basically give away our privacy to very large companies in exchange for being able to use the internet. If we can reduce the costs of transactions sufficiently we might be able to give consumers the choice of keeping their own privacy, having ownership of their own information, and paying very small fractions of a penny for transactions. It's not really possible in the current payment system, but if we squeeze down that cost efficiently we might gain more ownership of our own financial lives and of our own privacy, which I think would be all for the good.

We might be able to improve security. We might be able -- there are downside risks I'll talk about for terrorist financing and money laundering, but there are also upside potentials of using this technology to do a much better job catching the bad guys at a much lower regulatory burden on the financial system. And I think this should be certainly deployed.

We have the ability to use this kind of technology to improve financial stability. So one problem in the financial crisis was that it was very hard for both regulators and market participants to understand who owed what to whom and when, what collateral was where, what transactions had been engaged in that

exposed one part of the system to risk. And with this kind of technology on a distributed ledger, it could be deployed to make it easier for the whole market to see exactly what is going on in the financial system. And that could be significantly enhancing to the networks of trust that undergird our financial system, a way of building that trust because the information is all fully exposed and open.

Another potential upside implication is for corporate governance. So if we have used this technology of a trusted architecture and open ledgers we could significantly improve the ability of investors to see what is actually going on in the balance sheet of firms and to have more trust in the accounting of firms and a reduction in fraud and restatements at firms if we have that ledger that describes exactly the sequence of events that leads to a balance sheet.

We could even in my view -- this may be counterintuitive -- I think we could improve corporate governance and have a longer-term view if we use this kind of system to have firms reveal their balance sheet every single day to the public instead of managing for quarterly earnings. And that could significantly improve long-term corporate governance with daily kinds of disclosure.

So all of these things are examples of potential upside. They're all just ideas. What are some of the potential downsides? One of the potential downsides is not fully understanding the implications of a combination of factors in technology. So many of you have heard of high frequency trading or artificial intelligence in finance. There are aspects of this underlying blockchain technology that share three features with that, a scalability, automaticity -- meaning a machine does the work -- and immediacy, the transaction is instantaneous. That has lots of benefit in terms of the speed and efficiency I described, but it may also introduce new risks into the system that we don't really understand. And we don't really understand what the machine is doing and how it will react in particular moments. If you have a self-executing contract that changes, for example, from debt to equity in certain circumstances you might be able to use that to improve the strength of the financial system, but what if it triggers in ways that you don't expect in unanticipated circumstances. So there may be new risks.

There are certainly money laundering and terrorist financing risks with this technology in the same ways or in different ways, but in similar sorts of ways to the ways there are with other forms of payments systems. And we need to be cognizant as this system is developing that they're important regulatory oversights in place so it's not used for wrongful or harmful or scary purposes. There are risks

that the system itself could be vulnerable because of cybersecurity attacks, operation risk, weak governance, so-called mining pools that try and take over the bitcoin system, or other attacks, hacking attacks on the integrity of this distributed payment system. And there are potentially consumer and investment protection problems with consumers being able to understand, investors being able to understand exactly what's going on in transaction and to have those transactions protected in a sufficient way.

And lastly, there is a public policy risk that all of this legitimate concern about these various issues I've just raised leads policy makers to take steps that lock in the dinosaurs, that lock in old ways of doing things, that lock in dominance of banks, that lock in outmoded ways of sending funds. And if we kind of create a regulatory system that advantages the dinosaurs we're going to lose out on that potential innovation. So that kind of balance between openness to change and the risk of the innovations that I've described is one that I think is going to be an ongoing challenge.

MR. WESSEL: Thank you. Brad, can you, in as practical terms as possible, help me understand what is it that this technology, the distributed ledger and blockchain, allows me or your outfit to do better or differently than we did before?

MR. PETERSON: Okay. And can I do a little poll too, like Barry did?

MR. WESSEL: Absolutely.

MR. PETERSON: So how many people in the audience have read the original bitcoin nine page paper? Holy cow. Okay. That's --

MR. WESSEL: This is not your typical Brookings event. (Laughter)

MR. PETERSON: So if you haven't I would encourage you to do it. And it's real easy to find the right one if you just go to Google and do bitcoin and PDF. The first thing that will come up. So you may have a chance with CoinDesk if you want to modify that search to the consensus, but --

MR. WESSEL: Yes, just change the name of the outfit to bitcoin.pdf. (Laughter)

MR. PETERSON: But it does show you the original paper and in that paper -- so before I answer that question, what I think has been combined -- and I'm now kind of looking at innovation differently, and I call it innovation by combination -- and what you'll see in that paper -- and if you've read it before I would go back and read it again and look for these things -- there are things that were developed and

conceived, very sophisticated deep thought, very -- some of the smartest people in society over the last 25+ years came up with these concepts that were not implementable because of either the costs of compute and the networking technology that existed at the time. So a lot of the solutions that are in financial services predated these ideas. And these ideas didn't come up in 2008, they were combined in 2008. So the innovation was the combination.

And on top of that, if you're an economist you can look for things that you'll recognize like, you know, supply and demand, how do systems find equilibrium as you modify supply and demand and competition. And then there's the monetary policy that's a programmable 140 year monetary policy that is outlined in this system that was put together. So the real interesting part about this is people thought out about it, and the day they think about it normally they write a white paper, but this group of people actually then implemented it and it's running today still. So it's a fascinating method of innovation, it's a fascinating global experiment. So if nothing else you should read about it and then see that it came to life and then try and understand what are the benefits and limitations. So the things that are there that you've seen before that have changed the music industry, peer-to-peer networking, took advantage of -- we all went out and broadband networks and we had excess capacity because we kept buying the latest PC and it could do a lot of things. Well, it turns out it was a great network (inaudible) that you created where you could transfer music files and the size of the music file happened to be small enough to be able to move over that network and you had things like Napster and Kazaa. And then the same people that did that -- so peer-to-peer networking, you'll read about that in that paper. So that's one of things. So a lot of financial services were not built with peer-to-peer networking, they were built on networking technologies that predated that.

I'll give you the other one, is Skype. So Skype was the other one. You built a phone company on peer-to-peer networking and a lot of us still use that today, but it didn't replace the whole telecommunications infrastructure, but it caused -- and music didn't go away and there are new models. You know, iTunes was the next generation of innovation and modification of that. So you have peer-to-peer networking, you also have securing. And by the way, peer-to-peer networking has some limitations in stability when you build it out. It has some very great benefits of resiliency as well. And the internet is a distributed network, but the Skype network had some vulnerabilities. So you have to look at say how

could we make a bitcoin peer-to-peer network more robust than it is today. And there is some work to be done there.

The other one is cryptography. And, you know, how secure is any algorithm and all the algorithms we used to use have been broken and then we upgrade and move to the next one. And there is some thought that quantum computers could break the algorithm that we currently use, that we all use, and all of our banking systems will be opened. So that's another risk that you can read about and worry about. We all do in financial services. But this used state of the art cryptography to secure information and all the innovation -- or I should say first generation automation in financial services, you see all the info, security and cybersecurity issues because didn't have those tools at the time. So this system was actually built with security. So as someone who implements systems in financial services I think it's really responsible how it was done. Whether it was done to hide from people, it also is very beneficial to protect. So it turns out it can be used on both sides. And oftentimes people say it can be used by terrorists, but it can also be used in a positive way to protect.

And then the other one is this proof of work, this notion of in there you will see that you're able to not have that double spend problem because you can go back very cleverly and prove that that is in fact the copy of -- or that is that asset or that -- whatever you're trying to describe, it is actually the one that you're about to transact. Very smart, but you can read about the problem with the bitcoin. Today it's wasting electricity, it's highly computationally -- it chews a lot of computation just to facilitate this notion of mining. So there is negative to that. But all those put together have created something that we can all look to and say I can take a copy of this official record and I can give it to someone that's distributed and they can read it and have confidence that that exists today. It's very powerful. So those simple things coming together would allow you to have the IRS -- well, I shouldn't use that one as the first positive one (laughter) -- so you would have your auditors to audit your financial records. You could give ENYPWC, and if you look at it, they're very interested in this, you could have much more integrity of financial records and the auditors would have a copy. So they would be able to look at the copy of their clients' transactions. It could be protected, it could be viewable by them. You could have a copy of someone who is interacting a ledger copy of it that is distributed to a different country. So you get incredible performance, you get efficiency of information, and you have controllability of who you enable to look at it.

So that's the starting point of read the paper, really try and understand why it's different from the traditional monolithic centralized database system. So companies I've worked for -- Paypal created -- had security, Paypal had efficiency because you can transfer money to someone else on Paypal with just -- it's all within one database. So incredible efficiency, but it actually is a centralized database. And so to this base Paypal is still trying to re-architect it into a more distributed model. This starts out from distributed from data.

MR. WESSEL: Let me just ask you two questions before we come to Margaret. So, Paypal, my son sent me some money on VenMo, on my mobile phone, didn't cost me any money in transaction fees. So what is it you're offering me as a consumer that I don't already have with this?

MR. PETERSON: With what we're talking about with blockchain?

MR. WESSEL: Yeah, what's the advantage? I can already do this

MR. PETERSON: Okay. Now you're branching to a different piece of this. So I think what blockchain has actually done -- and by coming together in the system that bitcoin is -- it's demonstrated that you can do this with a set of modern technologies that each one individually is available today and has probably been put together in a solution that you're talking about. So the innovation will happen where there is acute need. And I think you being able to transfer just money to me there are many different ways for us to do that. So I don't think that's the first place that gets (inaudible).

MR. WESSEL: Right. And what about -- just to go to the NASDAQ bit, is this going to make it better for me if I want to sell or buy a share of stock? What difference will it make?

MR. PETERSON: A huge difference, but I don't want to dominate on --

MR. WESSEL: No, no, that's all right. Just talk about that.

MR. PETERSON: Okay. So I'll --

MR. WESSEL: Just from the point of view of the buyer and the seller of the stock.

MR. PETERSON: Okay. Let me give you a couple of areas where I think there is acute need in that situation. So we can trade and everyone reads about there was a huge race to speed to be able to trade as fast as the speed of light. We're almost there. So you actually match buyers and sellers, but then when you actually consummate all the other things that have to happen -- and in the olden days it was you had to give someone a paper certificate and they had to give you some money for it. So

essentially it's pretty simple. And if you look at how all that simple transaction gets completed, it today takes three days. So you go, really? It really takes --

MR. WESSEL: I can buy the stock in minutes --

MR. PETERSON: Microseconds.

MR. WESSEL: But -- microseconds --

MR. PETERSON: Microseconds.

MR. WESSEL: -- but it takes three days before the settlement?

MR. PETERSON: Yeah. So you go okay, that's -- and there is a lot of then things that get tied up in that process. Like if I'm the person who's selling and I want to use that money, I can't use that money immediately.

MR. WESSEL: Because it has to go through some centralized system and another centralized system?

MR. PETERSON: Yeah. And that was all done. It's actually quite brilliant and very reliable, but it just takes way too long. But another one though that I think is really interesting is --

MR. WESSEL: No, so the advantage of the new technology is that could all be done relatively instantly?

MR. PETERSON: Yes. Instantly. And it should be, it should be done instantly.

MR. WESSEL: Right.

MR. PETERSON: And we can do that. So that's an interesting one. The other one is if you're a company and you're the CEO trying to run the company, think about activism today. You'd want to know -- and if you're a tech company -- tech companies always ask this question, you know, I'd really -- and we have a service that allows them to understand who their shareholders are. So they're working on behalf of the owners of the company, you'd want to know did I have an ownership change, is there someone new that I'm working for. You know, let's talk the positive way, I should know immediately. They want me to know that I should be working on their behalf immediately, and it takes them 90 days to get that. So that's even worse than the three days. So you can imagine that if I'm a company, a public company and I understand that these things are transacting in microseconds, my mind is going to think that I can also go read my ledger and see who my current shareholders are.

And then the other one is shareholder voting. We all vote, we all get these packets of paper -- it's the worst sustainability thing and we -- proxy voting should be -- we have iPhones and they should all come to us and we should be able to hit the voting and it should be done that way. And it's this really outdated process. And it's a billion dollar business for an incumbent, for just sending us wads of paper that we throw away, and then we don't even vote and we don't even have good records of proxy voting.

So those would be the three acute changes I --

MR. WESSEL: Okay. Okay. Alright.

MR. SILBERT: So can I address the (inaudible) question?

MR. WESSEL: Yes, but then I want to give Margaret a chance.

MR. SILBERT: So one, I assure you're paying for it somehow, you know. And I'm not -- I don't know what their business model is, but if you're not paying for it now that's not a very sustainable business model. Two, I imagine in order to send Venmo money two people have to have Venmo accounts. I imagine that in order to have a Venmo account there has to be some level of bank accounts, credit card connectivity which that eliminates the majority of the world right there. Bitcoin, blockchain, you don't need any of that.

MR. WESSEL: Right. Margaret, two questions for you. One is, what is the role of the state regulators in this incredibly global, fast changing, technologically mobile space? And how do you deal with the question that Michael raised about we want the good, but we don't want any of the bad?

MS. LIU: Thank you, David, and thanks to everybody for coming today.

So state regulators -- actually I should start with I am with an organization called the Conference of State Bank Supervisors. We are the membership, professional membership policy and coordinating group for the state regulators in all the 50 states, D.C., the territories. State regulators regulate a broad ecosystem of financial services, entities that operate in their states. This includes about 4,000+ community banks, non-bank financial services providers, such as mortgage companies in many states, payday lenders, money transmitters, and the list goes on. State regulators operate and implement state laws relating to financial regulation. And in the virtual currency space one of the things that the states are wrestling with, as are other regulators, is understanding the business models, understanding the opportunities and the challenges that Michael so well laid out, and figuring out how those fit into their

statutory requirements, their mandates, their responsibilities. I should also mention that state regulators in the financial area coordinate very closely with federal regulators, the Federal Reserve, the Office of the Comptroller of the Currency, FDIC, and the new Consumer Financial Protection Bureau. And so from a kind of day to day state regulator job, one of the things that our members do in the non-bank arena is we license these different entities. So licensing is a credentialing process, it's tell me who you are, what you propose to do in our state, and I as the licensing authority, state regulators, have the response of making sure that you are who you say you are, and that you have the requisite capabilities, resources, and financial strength to do what you say you're going to do because the state regulator's job is to protect the marketplace and the consumers. And some of these virtual currency business models fall under existing state licensing and financial regulation laws. And so state regulators are looking at this. You know, we understand this is a new area. Just listening to Brad and Barry talk about the different business models and the uses illustrates the complexity and how hard it is for regulators or for anybody to wrap their heads around it. And regulation by nature tends to be reactive historically. And so this is really I think challenging state regulators to think differently, but yet we do have a structure of existing laws and regulations. A lot of the risks that Michael talked about, and the opportunities, are the same ones you have with regular money and banking and financial services. And so it's about using some of the tools that we already have, but also engaging a lot without outside stakeholders, with academics, with think tanks, and with the industry to try to understand it and -- you know, there's a lot of balancing that's going to go on. Public policy lots of times is about balancing different priorities, balancing the risks and opportunities, certainly creating a space for innovation, but also recognizing that to have good innovation in the financial world you also need a stable marketplace to begin with. Because if the underlying marketplace is not stable, if people and institutions don't have trust in that marketplace, then you can't have innovation.

And so it's an ongoing process. I think that it's going to take time for regulators to kind of figure out the right way to encourage the good and manage out or mitigate the risks.

MR. WESSEL: It seems to me that some of this is about finding the right metaphor for explaining something which is foreign to many of us. Some of the innovation we've seen in the economy in the last 20 years started in largely unregulated parts of the economy. Google didn't need to go to the Department

of Justice to say it's okay for you to take the *New York Times* and the *Wall Street Journal's* advertisements. The internet did brush up against telecom regulation and we saw the tension there. In healthcare there is very little to stop a doctor from offering you some advice or some therapy, but if a doctor wants to use a medical device or a drug we regulate that through the FDA, the Food and Drug Administration, which is criticized often at the same moment for letting too much through and not enough through.

So, Barry, I wonder if you could help us understand, is the current regulatory regime in financial service in particular encouraging or discouraging this innovation, and if it's both where is it open and where is it causing problems?

MR. SILBERT: So if you look at it from a global perspective. So there are countries around the world that have said we banned bitcoin. Russia, China is not making up its mind. Today it's not banned, but tomorrow may be. You have countries such as the UK and Germany who are taking a very supportive, accommodative approach. And what I mean by that is it's -- they are creating a playground that, you know -- wrong term, but an area where startups and entrepreneurs can innovate an in experiment and kind of getting a bit of a free pass from regulators, you know, until such time as these businesses become more material. Here in the U.S., I think the regulators are all well intentioned. I think as demonstrated this morning when we were having a bit of a discussion or debate about what is bitcoin, is it a currency, is it a commodity, is it property, is it a technology, is it a service, is it a product, depending on how you answered that question really will determine which regulator is the proper regulator to regulate it. And so I think here in the U.S. there is a lot of learning going on, certainly a lot of education going on. I think the challenges that that creates though is entrepreneurs and investors that back those entrepreneurs, they don't like to sit around and wait for clarity and they don't like to sit around and wait for permission. So the best entrepreneurs that have the best intentions, who can access capital, are building. And they're trying to maintain an open dialogue, they're trying to be good corporate citizens. And they may be unintentionally getting involved in gray areas; some of them may be crossing the line and will be penalized for it. And it creates a very interesting opportunity and a real challenge for the regulators. Where I see it right now is the most -- the biggest challenge here in the U.S. right now is on the banking side. And what we have found is our 60 companies are having a real challenge getting a

bank account, regardless of the business model. These companies, they may not touch, exchange bitcoin and (inaudible), they may not custody money, which I think are the two highest risk things that they can do, yet because somehow someway they're involved in this bitcoin space they can't get a bank account. And that really is going to stifle innovation; and it's disappointing because the banks want to work with these companies. By and large these are -- these companies have raised a $1 billion of capital from some of the smartest investors in the world, yet the banks are saying we just can't or do not want to deal with the additional scrutiny that we're going to get from our regulators, so sorry we can't help you. And I'm hoping that through conversations like this we can advance that somehow.

MR. WESSEL: Michael, how much of an obstacle is it for a start up in this space that the regulatory system is fragmented and understandably cautious about this stuff? And what advice do you give to somebody in this space about how to navigate that since you can't really change it, if you're a small company.

MR. BARR: You certainly can't change it even if you're a big company or the government. We have a very fractured regulatory environment in finance. Many people have tried to change it for many years. It does present challenges. I think in part companies focus on particular uses of the technology and then pursue that strategy. So if you're a company that's working with banks on improving the efficiency of their payments within their bank, there's a pretty well established oversight system for that within the bank regulatory agencies. Or if you're trying to improve settlement times for securities transactions you can go to the SEC and there's a pretty well established system -- I'm not saying it's efficient, but it's well established -- for doing that. I think there are many issues and if you're thinking about blockchain technology and distributed ledgers on a broad kind of holistic ecosystem level there's not an easy way to navigate that system. I think there could be a role for the Financial Stability Oversight Council in bringing the agencies together to think holistically about the set of issues involved in blockchain technology. I think that there's a potential role for the Federal Reserve as the systemic regulator for payment settlements and clearance systems down the road to put in place a more holistic framework for the ecosystem. But I think for the medium-term there's going to be a lot of uncertainty.

MR. WESSEL: Margaret, can you give us some examples of how different states have dealt with these issues and what we learned from their experiences?

MS. LIU: Absolutely. And the beauty of having 50 states and 50 sets of laws, 50 state legislatures, is that there are opportunities for innovation and experimentation at a more local level so you can kind of figure out the good and the bad. And there are a lot of initiatives in a lot of areas that started that way. New York is one example. The New York Department of Financial Services came out with a kind of a soup to nuts bitcoin regulatory regime, kind of commonly known at the BitLicense. They pursued a long period of inquiry, held public hearings, and sought to do their due diligence. And this license is out there now. They sought to address some of the concerns through several drafts and comments from lots of different stakeholders, from law enforcement, to the investment world, consumer groups, and of course the industry. And one of the things that they have tried to do, and it's early days, so it's a regime worth watching because it is comprehensive, and because it's New York and New York is a financial capital of the United States. And what they've done there is, for example, to try to accommodate the feedback from startups and small entrepreneurs, they try to create authority for a conditional license which was intended to be -- I don't want to necessary correlate it with the industry's call for an on ramp, but it was an effort and a mechanism for creating a license that might not have as much as or might be different than the standard license. There are companies that are going through the licensing process. I know at least one or two companies have been granted a license.

There are many other states that are looking at their money transmitter laws because that is where the nexus is to certain virtual currency activities. And those are really the ones that more close to retail payments and consumer uses. You know, Texas, Kansas, North Carolina has been in the process of trying to modernize their laws. You know, the reality is that you do have state money transmitter laws that are 10, 15, 20, 25, 30 years old, and the nature of the democratic process is it takes a while for it to catch up. What you're also seeing is a lot of states, because they are interacting with virtual currency companies on a day to day basis is that there is a growing base of knowledge and experience with these companies, but a lot of it is learning still. California has done some things in terms of outreach. CSBS on behalf of all the states, we do a lot of dialogue with companies and with the think tanks that are in this space all contributing to the knowledge. David, you said earlier that you have to kind of hear about these things, you know, unless you're somebody like Barry who has been in it for so long and steeped in it. As an outsider you have to keep hearing about it and keep having these conversations to continue to learn.

And then the business model continues to evolve too. And so I cannot sort of underestimate the knowledge challenge for anybody, but particularly with regulators with responsibilities around public trust, around protecting financial marketplace, consumer protection, money laundering.

MR. PETERSON: David, on the BitLicense --

MR. WESSEL: One of my colleagues has the microphone, bring it forward because I want to get some of the panelists. Okay. Thanks. Go ahead please.

MR. PETERSON: So BitLicense. So we're in New York and I testified during the hearings. We were very involved in the drafting, well intentions, Super-intendant Lawsky and his staff I think really did a good job trying to reflect the reality. And certainty is better than uncertainty, and not regulation is perfect. Where that license fell short is actually on this on ramp. So the issue is one of our subsidiaries spent I believe $100,000 to apply for a BitLicense between legal and you have to do these background checks. And this is already a regulated business. And so $100,000 to apply basically. And the issue is if you're a startup with a fantastic idea and you build a product and you want to release it and you want to sell your product to people in New York State, you can't afford to get a license or file for a license, and you also can't raise money because they don't want to give you money because you may not get the license. And because there is not clarity around what is this on ramp look like, at what point do you actually have to get the license, we're seeing companies leave New York, we're seeing companies cut off New York residents from using the products. So there are good things, the license, sort of, but that's not really the model that hopefully the other 49 states follow.

MS. LIU: So just a brief comment there. We've heard that feedback and I understand the position of the entrepreneurs, the smaller companies, and the startups, but when you think about it from a regulator's standpoint, particularly because the focus of these activities of the BitLicense are consumer facing activities. You know, if one consumer is poorly -- has a bad experience or there is fraud, that's the regulator's responsibility. So it's a balance. I don't have a right answer. And one of the things about the New York conditional is that it does leave the superintendant and the regulator the ability to set those conditions. And so I think that we need to give it time to see how it plays out. But, you know, when you're in a position of trust, handling something of value for consumers, and being paid to do that, there are certain costs of doing that business too.

MR. WESSEL: I'm going to ask a couple of the people who were in the thing this morning to talk a little bit. Robin, would you mind -- Robin Weisman is with Coin Center which is a nonprofit 501(c)(4) that's active in this area I know you've spent time in your organization talking to members of Congress and talking to regulators, what do you think is the biggest issue or question or caution you'd like to give the policy community so we don't blow this?

MS. WEISMAN: Thanks for the question. First of all I would like to say that all policy makers in D.C. have been incredibly open to learning and to having conversations. I think, as we were talking about earlier, the biggest probably challenge facing bitcoin today is the knowledge gap between the people that are responsible for making these regulations -- I'm looking at Margaret -- all 50 states. We spent a lot of time in a number of states helping make sure the people that have bills are up to speed on these issues, but it's very complex to understand and they're trying to update old regulations.

David, to answer your question, I think that the biggest challenge would be the knowledge gap. The biggest question really in the minds of regulators, as Margaret was saying, is how are we going to protect consumers. And that' also an interesting question because so far in bitcoin there is some consumer adoption, so there are some consumers to protect, and we have some real things we can be focused on today, but some of the other questions are more out there. Like how do you do AMLKYC on a decentralized --

MR. WESSEL: No acronyms.

MS. WEISMAN: Anti money laundering know your customer protections -- that's FinCEN's charge at the Treasury Department. How do our old rules really -- without even getting into specifics of which ones -- but how do the old rules, how do our existing rules that were designed for closed systems, that are well intentioned to protect consumers, how do we take the intent of those rules, how do we get there using these new technologies?

MR. WESSEL: Thank you. Ryan, you talked a little bit earlier, and I wonder if you could repeat for this bigger audience, how is this like or unlike where we were when the internet was in its infancy?

MR. ZAGONE: That's a great question. I'm Ryan Zagone with Ripple.

MR. WESSEL: And say your name so everybody can hear it.

MR. ZAGONE: Ryan Zagone with Ripple. There's a recognition here that there's many benefits to the technology. But unlike almost every other sector the regulatory framework must be in place for innovation to take root in financial services. And there is a broad recognition that that is needed. Now, we've faced the same issue about an uncertain technology in an uncertain time before. This isn't the first time that we've had to ask this question, and it was with the creation of the internet. We recognized it as initial use cases where negative to illegal, but it had much potential for benefits. And those are the benefits we've realized today. Now we addressed the internet in a very proactive way and it was led by the White House at the time developing a framework for ecommerce that had several characteristics. And it was consistency globally, that it was predictable and clear, that it included consumer protections, and it included security. That was a framework that was adopted by the UN and in Europe. So it was almost global in perspective. That was a way to look at an emerging technology and we can create a framework for positive innovation to occur while allowing space to step in when negative things did happen.

We proposed at Ripple taking that same framework developed by President Clinton, the framework on electronic commerce, and just replacing electric commerce with blockchain. That is the same situation we're in today and despite it being a very challenging position to put regulators in, we've faced this challenge before and we've responded very effectively.

MR. WESSEL: I don't want to cold call too many of my colleagues, but do of the people who were in our group this morning want to say anything? David or Matt or -- yeah? Okay.

MS. BORING: Hi, I'm Perrianne Boring with the Chamber of Digital Commerce. And to reiterate on your question what some of the biggest challenges are. One, it's also you have so many different regulators who are looking at this through very specific and different lenses. So, for example, at the CFTC, the Commodities and Futures Trading Commission, they have testified in front of Congress saying this is a commodity and they're regulating it under the Commodities Exchange Act. Then you go over to the SEC, the Securities and Exchange Commission, they're have been cases against companies who use bitcoin. And they look at it from this lens of a security. And then you go into the Treasury Department and you go to FinCEN who will regulate it like a currency. They will not validate it and call it a currency, but they regulate it like currencies. Then you go to the other side of Treasury to the IRS and they're

calling it property. That's just a few very quick examples of how complicated it's already becoming on the Federal level. And then when you also add in the different states, you have 50 states, 47 of them are regulating money transmission, and all these state regulators have different opinions on the best way to regulate virtual currency. It gets very complicated very fast.

And what we see as a threat at the Chamber is that if you have all these different regulators that are calling it something else and regulating it through a different lens all at the exact same time, for the companies who have to get licensed or go through this process it can be very difficult to become compliant with all the different regulators on the federal and the state level at the same time. So there's a huge amount of regulatory risk just through issues of coordination and consistencies with the various regulators.

MR. WESSEL: Well, I think a number of my colleagues here have already written many times that merging the CFTC and the SEC would be a good idea, even before bitcoin.

Michael, let me ask you a little bit about this. So, we've seen some business models in other industries that have been very disruptive, to use the now *cliché*d term. Uber is in a regulated industry, Airbnb is an industry which in some places is regulated, in many places it is taxed, and in those instances what happens is you have a startup, they grow very fast, they don't ask anybody for permission, they get in trouble, and they do the mea culpa -- we're sorry, oh yes, we'll pay taxes and yes we won't let rapists and child molesters drive our Uber cars and all that stuff. But are financial services fundamentally different? That is, we regulate it very highly and you can't go, whether you're one of Barry's companies or JP Morgan Chase, and say we're going to try this and if the government, the regulators say oh that's a no-no, we can say oh, well we're sorry. Is it more a case where you can't do anything unless you get permission first, and you can't figure out how to get permission first so you're in this awkward chicken and egg situation?

MR. BARR: I think it is a different pace. I mean we historically have regulated finance differently from other sectors of the economy. We do have this very fractured regulatory system that makes it harder. We have these problems of line drawing in finance and have had them not just because we have fractured regulatory agencies, but because there are different aspects or functions of financial products that raise different public policy concerns. So we think about them from different vantage points.

So I think that bitcoin is another example of a kind of financial product that can cross many different lines. We have that in securities now. We have products that are some features of securities and some features of insurance. We have products that have some features that are bank like and some features that are securities like. And the system has a very hard time coping with those in the sort of old school, old technology world. So I think that bitcoin is just the most recent and maybe sexiest example of a problem that's existed for hundreds of years.

MR. WESSEL: But how big a risk is it that we will lock in the dinosaurs?

MR. BARR: I think it's a huge risk. I mean I said this morning that I think that the biggest risk is actually that we develop a set of regulatory tools or failed to set developed tools, and so we lock in the old ways of doing things and we block off innovation and we don't get any of the upside. I think there's got to be a way that we can work together to focus on the severe downside risk cases. So money laundering and terrorist financing, systemic risk issues, you know, widespread fraud without deciding all the answers to the questions we really don't understand yet about the other applications of the technology.

MR. WESSEL: Brad, what advice would you give to wise and well intentioned regulators and policy makers to get the best out of this stuff and minimize the chances of getting the worst of it?

MR. PETERSON: Well, I think there is some common sense that can be applied. So technology --

MR. WESSEL: That's going to limit your Washington career. (Laughter)

MR. PETERSON: I know. I have limited skills in this area anyway. But I think unfortunately there is accelerating benefits and improvements and adoption of technology in society. So it's not good to go back in and think how it came at us in the past. And that has traditionally been the way we kind of model our okay, let me find that analogue and what did we do then and let me try and replicate with some minor tweaks. I think we have to become aware that there is an acceleration of adoption. And the regulators need to accommodate or adjust to the fact that it is accelerating because we do need regulation and I think the whole industry of how we regulate is getting interested in innovation itself.

So that would be my piece. Don't kind of think it's the pace is going to be the same. And there is a lot out there that you can educate yourself on. Singularity University talks about the different, how we're programmed to think linearly versus exponentially. And the fundamental technology that we have that's

changing healthcare, financial services, all the important industries in society, are subject to that exponential curve. And I think most people that are in Washington gravitated away from math and were, you know, great communicators, great history majors, political science majors. So I think you have to go back and whether you like math or not, math needs to be understood because it's going to -- you're not going to be a great regulator without understanding that fundamental change that's happening and it's not going away. So it's a reality. And I think once that is understood we're going to have a lot more convergence.

MR. WESSEL: Michael?

MR. BARR: I think that just pick up on the theme though, I think that one of the real challenges for regulators, I think the basic math is not the problem. The problem is you have --

MR. PETERSON: No, it's not basic, it's advanced math. That's the problem. (Laughter) You stopped at basic math, so we need advanced math here.

MR. BARR: No, I think it's a bigger cultural and social science sense. I think that sometimes an overly narrow focus on math can get us in a lot of trouble. I think the financial crisis, there was like some super sophisticated (inaudible) who made horrible mistakes. So I don't think it's just a math problem, it's trying to see a bigger picture. And the problem in seeing that bigger picture in technology, of which this is just one example, is this switch gets flipped very quickly as you described. So you have kind of this ramp period and then something takes off and becomes ubiquitous. And it becomes ubiquitous so quickly that the implications of it are not fully understood by the people who are doing it, let alone the people who are supposed to understand it to maybe regulate it.

MR. WESSEL: And it's going to happen over and over again.

MR. BARR: It happens all the time. We've seen it many, many times. I'm not saying there's anything unique about this, but if you have a ubiquitous automatic immediate system it generates new risks. And we don't understand them until we see them and it's often too late. So we're asking regulators -- I just asked regulators to do something that's very, very hard, which is wait and not address maybe all the fundamental questions. But from a regulator's perspective it may be too late. So they wait, they're protective of the innovation that's happening, they are not protective of the dinosaurs, they're open to the

ideas. And then it turns out you have this ubiquitous immediate automatic technology that blows something up and it's their fault. So I think it's important to recognize that tension.

MR. WESSEL: So are there any other people who were in our morning session who want to say anything before I turn to the audience?

All right, have at it. Brendan has a mic here, is there another one? And the gentleman here on the aisle. So let's -- tell us who you are and ask a question. I know there are a lot of bitcoin enthusiasts here. I want to prevent speeches from being made.

BISHOP HARLEY: Good afternoon to everyone. My name is Bishop Harley and I'm a Bishop of a few churches. And you mentioned something about dinosaurs. One of the dinosaurs about I wanted to ask a question about how you're going to address is the evangelical thinking concerning computers. And all I hear in the churches are about Revelation 13, Daniel Chapter 2, where there is a one world order coming together concerning money, currency, and et cetera. So how are you going to address the church and calm them that this is not leading into -- and it may sound funny to some, but that's a major belief in America, that this is not a part of the anti-Christ system that would cause people to say hey, without this number you can't --

SPEAKER: That is a question for Barry.

MR. WESSEL: Yeah, it is a question for Barry (laughter), but I think there -- but you're not the anti-Christ. But I think there is a problem here that bitcoin has around it this aura of it may be what the Bishop said, it may be that it's a bunch of libertarians who are trying to -- and anarchists. Is that an obstacle to the adoption of the technology and how do you talk to people about it in a way that's constructive?

MR. SILBERT: Well, I think it's a feature not a flaw. And I think people would be a lot more concerned if this was with, you know, all due respect to Goldman Sachs, if this was a Goldman Sachs effort I think there would be a lot more -- and I'm using Goldman Sachs as kind of like the octopus/squid kind of -- or whatever that thing was.

MR. WESSEL: We got the implication.

MR. SILBERT: Yes. And I think it kind of comes down to a fundamental review of the history of money. And if you look at money over centuries, it's been what society decides it is. Money has been

rocks, it's been wampum, it's been salt, maybe it's been gold, it's been coins, it's been dollar bills. We're going to a cashless society regardless of what everybody thinks of bitcoin. And so society globally speaking has decided that bitcoin is worth $6 billion today. Society may just decide tomorrow that Ripple is worth $6 billion. Society may decide that this is all just a fad and a Ponzi scheme and a Pyramid scheme. And I think because this was developed by -- let's call it the more libertarian side of things, in the whole spectrum of what things to be worried about in our financial system, I am comfortable that it came from that side. But, you know, look, ultimately no one is here -- I'm certainly not here to evangelize bitcoin as money. I'm here to support a true innovation that I think will promote financial inclusion, that will improve a system that is fundamentally broken, and but also mostly society will decide if this is the right solution or now.

MR. WESSEL: Okay. Why don't we take two or three questions and we'll get some answers? The woman on the aisle here and then there's a gentleman in the white shirt behind her.

MS. ALLEN: Thank you very much. Victoria Allen, Booz Allen Hamilton. So when I look at the blockchain market nowadays when it comes to finance, I look at the west coast, I see a ton of EC money going in that's focusing on the consumer and is trying to disrupt the financial system, and I see a bunch of money going in from big institutions on the east coast that's trying to preserve that position, with all respect to NASDAQ.

So who is going to win -- 10-15 years from now is it going to be a radically disrupted financial system that we're seeing, or is this technology going to be absorbed and successfully integrated into the system such that we see it strengthening and broadening the system to build greater inclusion on all these good things?

Thanks.

MR. WESSEL: Good question. The gentleman in the white shirt.

MR. PALMISANO: My name is John Palmisano. My question is for the government regulators or anyone really. Let's suppose I set up an exchange, I'm using blockchain and smart contracts. I'm not domiciled really anywhere. Let's say Ireland, for example. What are the governmental regulations that I confront since in a smart contract nobody knows really if I'm a buyer or a seller or what country I'm in,

maybe not even know where my IP address is for all I know? So what am I concerned about in terms of governmental regulations? And who specifically, at least in the United States, which agency?

MR. WESSEL: And the gentleman here in the front.

MR. O'REILLY: Mark O'Reilly with IBM. I've got a question about the potential for the unbanked. And in the United States, for example, some might not know about a third of the country is unbanked. So what opportunities do you see with this technology to serve the unbanked?

MR. WESSEL: All right. So the woman from Booz Allen asked the ultimate question. Does anybody have the guts to answer it?

MR. SILBERT: Yeah, I'll take it.

MR. WESSEL: Okay.

SPEAKER: Sure, we can answer both sides, yeah.

MR. SILBERT: I mean look, I'll go on record saying that in 10 or 15 years the dominant financial players are going to look nothing like what they look like today. We're going through a transformation of our financial system or banking system. Banks are being disintermediated, attacked from every side, every angle, and I think part of it is their inability to innovate given very tough kind of regulation. Is bitcoin going to be the catalyst? I certainly don't know, but this is so early. We're so early in this, the evolution of this technology. I went through -- you know it came out in 2009. People really didn't care about until 2013. Companies just started getting funded 2014-2015. And so it's really too early to tell and it's the reason why we've made investments in 60 companies, not 6.

MR. WESSEL: Brad?

MR. PETERSON: So there is incredible inertia in financial services. So I think the timeframe that you outlined, many of the firms that we know today will still be in existence and will have strength in themselves and this will be a catalyst to modernize and improve the security. So I think they're going to be far better and stronger, some of them. But then I think some of them, there are going to be some new services that are just going to absolutely be phenomenally useful and we're going to all use these new services and they don't exist today. So I think there is going to be some new entrance that we're going to all go wow, this service was built was technology that exists today and is so much better than the service it replaced.

So that's my prediction, is some of these firms are absolutely going to make it. I think a credit card itself is really outdated as a -- and I started my summer internship, I was running the embossing machine. So I manufactured credit cards and they locked me in a vault because I had these blank pieces of plastic that I (laughter) -- and I also had a little machine when they jammed up, you know, I could create another one just on the fly. But they locked us in a vault for that. You know, it did not have the security as we all know that it could have. And then the telecom industry itself, we used to drive over the Bay Bridge and get cloned on Treasure Island. They'd just sit there and you'd clone the first generation. And the telecom industry put a SIM chip in in the mid 90's, so 20 years ago, that we're just getting now today in credit cards.

So financial services can improve with this technology, this security. Some of the existing firms are going to absolutely modernize and be around. That's my prediction.

MR. WESSEL: I just wanted to report two things that were said at our roundtable this morning. One was that 80 percent of the new companies in this space will not be around in 5 years, but they will have had enormous impact on the economy. Netscape is history but it had a huge effect.

And the second was Glen Hutchins, who I mentioned is an investor in this space, says he's investing in this because he thinks there's a five to ten percent chance this could be one of the biggest technologies in his lifetime, but five to ten.

Michael you wanted to speak on this question? And I want you to talk about the unbanked.

MR. BARR: On this question, yes, and then I'll talk about the unbanked. So I think that Brad's basically right, that the betting is on the current system kind of being more efficient, but being kind of like the way it is because that is sort of the way the world works. But I do think there is a significant risk or upside potential, depending on how you look for it, that it really could be transformative. And I think this kind of technology in a broader sense, is like what we're seeing in many areas of life. So not just in finances for sure being disintermediated in cool and I think interesting ways, in part by peer-to-peer platforms, in payments, in credit, and elsewhere, potentially elsewhere. But that disintermediation is to me at least the same that we're seeing in all walks of life. So if you think about trust in the system, trust used to be, you know, you had a big institution and you put your faith in that big institution. Government, trade union, a political party, whatever, and that kind of trust is not how we establish trust anymore. We

have networks of trust, and all those old systems of organizing trust I think are breaking down in society. This is just another example of that.

So if you were to think long-term about the way trust is established in the future, really long-term, I think trust networks in all these areas of life are the way to think about it.

MR. WESSEL: Okay. Now you've written a book about the unbanked. What's the potential for this?

MR. BARR: I didn't plant this question. (Laughter) I think that -- look, right now the uses of this are far removed from serving the least well off. But I do think there's enormous upside potential for that to be transformative. It's one of the reasons I got interested in this area in the first place because I think if you can drive down cost and improve the immediacy of payment, you can -- not that you necessarily will -- but you can improve access for low and moderate income people. You can help bank the unbanked with lower cost services, you can help improve financial management so that people can better match their income and expenses, so that when they get paid their money is immediately available for them to use. You can help reduce the cost and improve the security of remittances so people can send money home for much cheaper to their families. So I think all of these are ways potentially of improving consumer protection and improving access, but we have to intentionally choose that path, it's just not going to happen because, you know, we think it's a good idea.

MR. WESSEL: Margaret, are you equipped to deal with the question from John Palmisano about -- I don't quite get it, but if I sign a smart contract and I'm in Ireland does anybody know where I am or who I am? (Laughter) What the hell do we do about that?

MS. LIU: I'm not sure how well equipped I am. I think that speaking on behalf of state and banking and financial services regulators what you -- your question though points to I think one of the things that regulators are very mindful of, which is avoiding unintended consequences. But maybe I'll hand it over to Brad.

MR. WESSEL: Brad?

MR. PETERSON: Yeah, so having worked in the telecom industry and seeing that every country had their own telecom company. And really wireless communications does not know borders. I think we're seeing another situation where the technology itself does not lend itself to being regulated by the --

whether it's 50 states or whether it's by country. And you think about the transfer of ownership, bitcoin is a great example that you don't care which country a person is in, you can effectively transfer to them. I think a lot of financial assets would benefit from that technology as well in terms of facilitating transfer of ownership. So therefore this notion of regulations is going to somehow stop that from happening. I think it's that the horse is out of the barn with bitcoin and it happened in telecom and it's going to happen in financial services. And we will see natural groups where it's unregulated start to interchange, you know, financial transaction, but eventually countries are going to have to figure out that they don't have control over this anymore. So from a country standpoint --

MR. WESSEL: That's supposed to be reassuring?

MR. PETERSON: No, it's just (laughter) -- we dealt with it with -- if you think about the telecom industry, it's dramatically restructured based on the realities of the technology. So financial services will do the same.

MS. LIU: I would like to jump back in on that briefly. And I think that there's a difference between the technology and what different folks do in companies and business do with the technology. At least speaking on behalf of state regulators there is no state regulator that is looking at regulating the technology, but it becomes the -- states generally in a lot of different -- most regulatory regimes are based somewhat at least on activities. What are you doing with it, you know, are you using the technology to offer a wallet service and are consumers in Maryland or California or Texas using that? You know, even if the technology doesn't have like a home or a jurisdiction that, you know, it necessarily sits in, you have a consumer that you're providing a service to. And so --

MR. WESSEL: Yeah, right. But it erodes the ability of the state or national authority to control that because I can get an account -- we see --

SPEAKER: Well, let me give you an example.

MR. BARR: I think there's tension. I mean there's tension in that, but that tension has been around since finance has been around.

MR. WESSEL: Right, right.

MS. LIU: Right.

MR. BARR: I mean finance has always been global; there has always been this tension between the state and the private actor in regulating that. And I think that if you look at this example, this is just a slightly more acute, new example of how it's really hard for nation states to regulate global affairs.

MR. PETERSON: So I think when you drop it down to the cost of a transaction, when it's under a penny, you can actually do fundraising. So you think about some of the early lending companies that are out there, you know, the prospers and the lending clubs. The person who's lending the money gets a return. If you're in a traditional bank you get no return, right, your money just sits there, it's safe, but it gets no interest. You don't get any interest paid. So you can actually have your risks, so be completely transparent to you and you can have an incredibly efficient lending system that is completely modernized. And when you can buy stock -- so today you can only by stock -- only wealthy people can buy stock, accredited investors, but if you're stock investment could be as much as your Starbucks in the morning you don't have much consumer protection risk. So if I can invest -- now all of the sudden a company can raise a tremendous amount of money because they can raise money $5 from 100 million people and it was cost inefficient, cost prohibitive to do that before. So this exists and someone will do it. That's my point, is someone will go -- the next big company will raise through 100 million people, a $1, you raised $100 million. So that is available. So how do you -- do you need to regulate that?

MR. WESSEL: The gentleman in the middle here and then -- is there a mic in the back? So why don't you go to the woman in the back with the black -- no, you.

MR. SHAFFER: Hi, Bill Shaffer. We've got a company called Epok. It runs on SMS, so you can buy bitcoin and send it to anybody in the world.

SPEAKER: How is it spelled?

MR. SHAFFER: E-P-O-K. So --

SPEAKER: I was with a startup called E-P-O-C-H, so. (Laughter)

MR. WESSEL: We're running out of names.

MR. SCHAFFER: So we are registered with FinCEN as an MSB because we're selling a thing.

MR. WESSEL: What does that mean? What's an MSB?

MR. SCHAFFER: A money service business, versus a money transfer operator, which is important. My chief compliance officer was from the CFTC and the SEC. I'm on my third bank. Tell me

what can I do differently, right? So these banks, they're de-risking because of the massive fines they had because of money laundering, right? So that's been around way before bitcoin. So I'm in this spot where the banks have no interest in it, even though I'm doing everything I possibly can from a regulatory perspective.

And as far as the unbanked, our customers are unbanked here and they're sending money wherever. It goes to Africa to the unbanked. They get it on mobile money on their phone, right. They're walking down the street in Nairobi, they get $100. You know, what can I do differently from a banking perspective?

MR. WESSEL: Thank you. The woman in the back.

MS. VAN CLEEF: I'm Carol Van Cleef with Manatt Phelps and Phillips and the Chamber of Digital Commerce. And I'd like to offer a couple of observations and ask a question. First, to the gentleman who raised the question about the churches, there's a really nice easy -- as the daughter of the Methodist minister and the mother of a Episcopalian priest I have had many discussions about how this will make raising money in the churches through tithes, offerings, and so on a much more efficient and cost effective process.

MR. WESSEL: Incentives.

MS. VAN CLEEF: Moving on to a comment that was made earlier about why is this area different than an Uber or the internet development, there are a couple of statutes that do make this fundamentally different when we're talking about the currency aspect of the transaction. There's a federal statute that makes it illegal, it's a federal crime, to operate a business that's not registered as a money service business or is appropriately regulated at the state level, which thanks to the efforts of Margaret and her organization, they've really helped bring a lot greater clarity. There is also another provision that many people are not aware of, it's also a federal crime to engage in deposit taking if you're not a bank. And I've been in conversations with bank regulators in the past week who have actually raised questions about models in this area as to whether they are engaging in deposit taking. So we've got some major hurdles to deal with to clear away some of the I would say noise at this point, but it's a little bit more than noise, with respect to one aspect of this ecosphere we're dealing in.

I think there's been great strides made in the last two years in clarifying the different verticals that we're operating in, from currency to use over for securities exchanges, what's a commodity, and so on. There is a lot more that has to happen. And I guess the question that I would have is how can we get back to where we were two years ago when there was an incredible amount of entrepreneurial zeal in the community? It's become much more mature now, it's not the same level of excitement, the same level of buzz when you go to a conference. But how can we make some strides? Maybe educating the regulators more, the policy makers, as well as maybe educating those who are getting into the business as to what the hurdles are that they have to encounter.

MR. WESSEL: Are you suggesting that there's less zeal because the regulators have been uncooperative? Or that people have just lost their immature enthusiasm, or what?

MS. VAN CLEEF: I think that there are a couple of factors that have come into play, but it's clear that the efforts from the law enforcement and the prosecutorial community have had a significant impact on the fundraising that is happening in the area. And as soon as those funds start to dry up -- and this began really probably summer of 2013 timeframe, or '14 -- I'm losing track of time here. But we saw a real change in the flow of funds and the question is why did that change happen.

MR. WESSEL: Okay. I think there's a question right here, the gentleman here in the blue shirt.

QUESTIONER: Hi, my name is (inaudible). I am a Fintech investor. There was news recently about Zimbabwe adopting the Chinese yuan as (inaudible) central banker recently. And there is some risk that the development of small countries' central banks will be reduced to not as most or some significant percent of transactions occur in bitcoin. Would that have an impact on monetary policy control within countries? And that's like a global impact. What do people think?

MR. WESSEL: All right. And there's one, a woman here in the front.

MS. KELLY: Thank you. Thanks for having this. My name is Lorelei Kelly; I run the Resilient Democracy Program with the New Edward M. Kennedy Institute for the Senate. The question I have is more related to the blockchain, which I see as sort of a citizen facing possible integrity engine for information. Possibly rebuilding the information architecture of Congress based on this kind of tool, because -- I don't think I have to say it has an information integrity problem and a low trust problem. But one thing that you could do that I think they would be really open to is go to one of the financial service

subcommittee and set up something simple, like a stack exchange based on a blockchain model for some very simple low hanging fruit topic, so they see how the technology works. Is this possible? Have you seen this happening for policy support and policy decision making with information in any entities, United States, elsewhere?

MR. WESSEL: So, I want to answer -- give a stab at two of the questions before I turn to the panel. I think Zimbabwe is a leading indicator of nothing. They don't basically have a functioning currency and they're not going to be able to use the yuan and their problems go well beyond anything that any central banker can solve.

I think that there is a problem, a threat to small countries maintaining their own currencies. It is not bitcoin, it's like life and the dollar. So this may be one manifestation of it. When you look at the fundamental forces that are going on there it's not coming from technology, it's coming from other things. That's what globalization does, it makes it harder to be an island unto yourself.

Our attempts to get somebody from FinCEN here today didn't work out, so I just want to mention one thing before I turn to the panel on these four very good questions, there are a bunch of people who formed something called the Blockchain Alliance, which is people in the industry and people in the law enforcement community who are trying to find a way to work through these issues so that basically -- my words not theirs -- we can less bad stuff and more good stuff, and we don't inadvertently have less good stuff in our attempt to get less bad stuff. How can law enforcement agencies use this to their advantage, where is it a threat where isn't it a threat. There's a number of lawyers who have been at the Justice Department who are now working on that. None of them are here so I don't know if anybody can speak to your issue, but I think this is -- in the terms of the trade -- this has become a known issue and people are trying to figure out what to do about it.

Barry raised the question already of companies that have anything involving bitcoin not being able to get bank as a customer. Is that a question that comes up in your --

MS. LIU: It comes up a lot.

MR. WESSEL: And what's the answer? What's the solution?

MS. LIU: Well, I don't know about that. What I can say is that for -- so state regulators are in a position different than a lot of their federal counterparts because they regulate banks, charter and

supervised banks, but they also license and regulate a broad range I said earlier of non-bank financial services entities. And one of the things that we've actually been working with FinCEN on and with our other federal counterparts is around this issue of the de-risking of banks. And you have to remember we are coming out of a major financial crisis that would have nothing to do with a lot of the business activities we're talking about today, but writ large at 50,000 feet was about financial institutions taking too much risk. And so that is, you know, just in the rearview mirror for regulators and for everybody else. And so that's kind of the reality of the environment.

One of the things that we've been trying to do in a lot of different settings is talk about the licensing process as well as the collaboration with FinCEN as part of the credentialing, to help to kind of figure out a way for banks to better calibrate their own risk. We talk with our federal counterparts a lot about this and we're looking at ways to help banks assess and develop tools for banks to assess their own risk, just like the FFIAC just came out with a cybersecurity assessment tool for depository institutions. You know, is there a way to come out with a self-assessment tool for banks to help them assess the risks of their own customer base, but also assess and evaluate how well they are managing those risks, because I think the state regulators feel like, you know, for a bank it shouldn't be a global decision across an entire industry or defining any bucket of businesses. It should be about an individual institution, it's customers, and can that institution measure its own risks. And this is an evolving area. I mean it's touching a lot of different spaces. It's also reaching into the question about border communities and, you know, that definitely has an impact on cross border -- you know, when I say border, the U.S.-Mexico border and movement of goods and services there. And so it's a big topic for a lot of regulators.

MR. WESSEL: Brad, is there any practical way to set up a little blockchain demonstration inside an agency, or inside the committee -- of a committee?

MR. PETERSON: Yes. Actually, Microsoft is, in trying to catch up with Amazon, they actually have with their cloud service, Azure, have a lot of the companies that have product to demonstrate, have gone to Microsoft and they have it spun up in Azure. So you could actually go there and say okay, which one is appropriate for us to experiment with. And very low cost, wouldn't have to go through any government IT shop if you just get permission to say we're going to play here. And I wouldn't put anything too, you know --

MR. WESSEL: Confidential?

MR. PETERSON: Yeah, confidential there, but you could play. So that is the beauty of the cloud. And Microsoft is very much supportive of -- a lot of the leading companies right now taken the time to go through and set it up there. So it would be very low cost and you could play around with it in a matter of days.

MR. WESSEL: I'll take a couple of more. There's three questions in the back there.

MR. PETERSON: And I don't work for Microsoft.

MR. WESSEL: If you did I wouldn't have let you speak. So there's three guys there. Why don't you do those and then we'll take a few more.

MR. CHECCO: Thank you. Larry Checco. Three very simple questions I think. What is a bitcoin worth today? Is it stable? And if it's not, going back to David's original example, like give a dollar to the taxicab driver, he's got my dollar, he knows the value of that dollar. If I'm doing this with bitcoin, I know people who invested and lost a lot and made a lot. It's not -- it doesn't seem to be a parity there and I'm just wondering -- that's my complaint about the trust factor in all of this. I mean what's backing a bitcoin?

Thank you.

MR. WESSEL: Can you pass the mic to the --

MR. PULSIFER: Hi, Alan Pulsifer. Question for Margaret please. You said earlier if one consumer is ripped off that's the responsibility of the regulators. And I'm wondering if it has to be all or nothing like that. I mean there's a whole community out there, there's Better Business Bureau, there's Yelp, there's Google, there's the internet. I wonder if there might not be a role for if a consumer is interested in doing business with an unregulated or unlicensed business maybe they should have that option, maybe they should be able to take that risk upon themselves, as long as they know in advance -- the business says we're not licenses, maybe you shouldn't be taking away that consumer choice. So I'm wondering what you would think about that?

MR. WESSEL: Thank you. And there was somebody else -- yes?

MR. DOUGHERTY: Hi, my name is Carter Dougherty; I'm a journalist. I just wanted to throw out a question there about you've talked about the dinosaurs, by which people usually seem to mean the banks in a very passive sense, oh, if we do these regulations, you know, that will lock the dinosaurs in

without suggesting at all during this presentation the dinosaurs might have something to say about this. And I know it's shocking that regulation might turn political from time to time in this town, but I mean that's -- the reality is incumbents make a colossal amount of money off of the simple task of moving money that it's impossible for me to see that regulation doesn't get drawn into this. You know, we used to say in my first job in Washington covering regulation, the point of business was generally either to slow it down, stop it, or use it to screw their competition.

MR. WESSEL: Barry, do you want to take the bitcoin-currency is it stable?

MR. SILBERT: So to answer your question, the price is 432 right now, 431. (Laughter)

SPEAKER: There is a lot of different -- if you just go to -- if you have an Android or an Apple product you can download a bunch of different apps that will track it for you, and they're free. So it's kind of fun to do. So if you want to get real-time you can do that.

MR. SILBERT: Our new company CoinDesk (laughter) has a bitcoin price index. It was a softball.

MR. WESSEL: Yeah, it was, it was.

MR. SILBERT: So best performing currency in 2011, bitcoin, 2012, bitcoin, 2013, bitcoin, 2015, bitcoin -- not 2014. And I think you should not be viewing it today as a functional currency, you should not be viewing it as an alternative to the U.S. dollar, it's not a unit of accounts, it may not be a great store of value, but if you live in places like South Africa, Venezuela, Brazil, Argentina, Ukraine, Russia --

MR. WESSEL: Zimbabwe.

MR. SILBERT: -- Zimbabwe -- and the list is long and it's growing very quickly -- you may not love the volatility of bitcoin, but at least you know it's not just going in one direction. And I think it's fair to say that the only way that bitcoin can fulfill its promise of being a financial rail, as being a way to provide a platform for services to the unbanked, the only way that it can really be transformative is if there is a lot more of bitcoin out there in circulation and a lot more volume and velocity. The supply of bitcoin, it grows at a fixed predictable rate. So the only input into that is the price. So a fairly unpopular opinion that I love to make as frequently as possible is the killer app today for bitcoin is speculation, but if the price of bitcoin goes up, over time the volatility should decrease and then it becomes this fantastic enabling technology that I think will change the world.

MR. WESSEL: Margaret, why do you stop consumers from engaging with unlicensed businesses if they know what they're doing? (Laughter)

MS. LIU: Well, laws and regulations exist in part to address sort of an imbalance or an asymmetry in information, if you will. And so in a world of perfect information, as I recall some of my first year law professors talking about, you know, you wouldn't need that much. But the --

MR. BARR: When you get to the second year we say it's a little bit more complicated. (Laughter)

MS. LIU: Thank you, Professor. And so the reality is that you have laws that prevent that right now. And I think that though that's not to say that there aren't opportunities, you know, particularly at the state level for experimentation. But the reality is that for that type of thing to happen right now, you know, the company would be breaking the law to engage in business with the consumer.

MR. WESSEL: And I think the risk is to the industry that if a few people get ripped off and that ends up on the front page of every newspaper in the country --

MS. LIU: Right.

MR. WESSEL: -- the industry dies. So it's not only a question of -- it is of course ultimately protecting unsuspecting, uninformed consumers who may think they know what they're doing but don't, but we know that it can have huge ripple effects.

Michael, can you speak to Carter's question about the possibility that entrenched interests will use regulation to stop innovation because the innovation threatens their profits?

MR. BARR: I unfortunately think Carter is right. One of the reasons why I said it the way I did, entrenching the interests of the dinosaurs or locking in the dinosaurs, is that the dinosaurs have enormous power. They're very big, they're very established, they run the current payment system, they extract a lot of profit from the current payment system, and wringing out the cost from the payment system means reducing their profits. And they don't like that and they will fight like crazy to keep the advantage they have in the current system. And I think that's a significant risk in the regulatory environment we live in. I mean it's one of the reasons why I think fundamentally, in addition to addressing the substance of finance, we need to address the substance of the role of money in politics.

MR. WESSEL: Let's take a few more and then we're going to end. There's two gentleman here, one in the T-shirt and the one in the gray sweater.

MR. SARGEANT: Hi, I'm Winslow Sargeant. With regard to the unbanked I think that that problem has already been solved in terms of mobile money. What are your thoughts in terms of not just looking at the unbanked, but more looking at the role that cell phone companies should play because we all have a cell phone, the majority of the world has a cell phone with a number, so that number could actually be your "bank account number", and so that cell phone carriers can become more dominant in terms of the role that mobile money will play, whether it's bitcoin, whether it's the way that we transact. So I think that that should be a focus.

MR. WESSEL: Okay. And the gentleman in the bitcoin T-shirt? Stand up so everybody can see it.

MR. MCKIBBON: Matt McKibbon. I work for a company called UBIQUITY LLC and we're doing real estate transactions on the blockchain. So what do you see in terms of the non-financial applications moving forward, such as identity, voting, real estate, and will that administration in general move forward? It's an immutable public ledger, so what else can we put on this ledger?

MR. WESSEL: Right. Good question. Okay. Want to take the mobile phone?

MR. BARR: Yes, I'll start with -- I think we have a long way to go in solving the problems of unbanked and underbanked households. I think there is still a lot of progress to go. I think one avenue that is fruitful is to give -- and this is true not just for low and moderate income households, but for all of us -- to give individuals more ownership of our own identity and more ability to choose who we share that identity with and for what purpose. And an aspect of that can be a universal portable bank account number. There's been a lot of progress in the UK on this. There is much more to do there and there has been almost no progress here. I think we could make enormous difference for the lives of people if we empowered individuals to own all of that themselves.

MR. WESSEL: Barry?

MR. SILBERT: So in Kenya there a concept called M-Pesa which is run by Safaricom. Some of you may have seen a 60 Minutes story on it a few months ago. It is an interesting I guess example of how a telecom could provide value through mobile money transfer, but the day after that 60 Minutes report Safaricom cut off one of our companies, BitPesa, from the M-Pesa network for really no good reason because our company was enabling the movement of bitcoin in and out of M-Pesa. So that is an

example of you have an incumbent that creates a dominant position and creates a walled garden that doesn't allow innovation to happen in that country.

So I do think it's a fantastic opportunity and I do think that over time it's going to be the bitcoins and the BitPesas that are creating that solution, not the telecom companies.

MR. WESSEL: And does someone want to speculate a little on the non-financial services uses of (inaudible) ledger?

MR. PETERSON: Yes. So if I were to think about the three main things that exist on earth for long periods of time, they're people, they are products that are built, and companies that are created, like AT&T. So all those have through their life have incredible inefficiencies in keeping track of them from birth. So from manufacturing a product. So having worked at Ebay our nirvana was that we had this global product catalog that all you had to do is type in some number and it would explode all the attributes of that product. So the person selling a product on Ebay didn't have to type in and explain it and take a picture of it because the person who built that and created it knew exactly what those specs were, but they're lost. You know, a product is sold, the owner doesn't have those specs. So the example is any product that we don't want to throw in a dumpster, that we want to actually facilitate ownership many times. That's one. Whenever we're born in a hospital we should have a tag that allows us to enable smart programming. We can vote a certain age, we can do all these things, so the attributes that a citizen should have. So keeping track of people is a great one. And then also in the financial industry, and that's the one that we're working on today, from the beginning of one of Barry's companies someone has an idea, then they issue stock, and that stock goes through all the way from Alexander Graham Bell to AT&T, imagine all the time we spent just keeping track of those share of those stock. We could do a much better job with the technology that exists today. So I think it's not just financial services at all. I think it is everything that is in products that can be record kept better and facilitate change of ownership in a digital way.

So that would be my summary on that.

MR. WESSEL: Michael, last word?

MR. BARR: I just want to go back to the point the woman in the front made about democracy. I think there is potentially a role for using this kind of technology and open ledgers to improve transparency

in government and in the political system. And again, it's not something that we would necessarily do on our own in the system without a strong push, but I think the kind of technology is open to that use as well.

MR. WESSEL: Okay. I want to thank everybody for coming, and particularly thank the panelists here and those who participated this morning. (Applause)

Thank you. Because this is not yet a virtual world, if there is paper or coffee cups at your seat, pick them up and we'll recycle them into bitcoins at the end of the program.

* * * * *

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I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

Carleton J. Anderson, III

(Signature and Seal on File)

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