CFTC Technology Advisory Committee (TAC)

Friday, October 5, 2018

Commodity Futures Trading Commission (CFTC)
Division of Enforcement
Three Lafayette Centre
Conference Center
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Washington, D.C. 20581

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P R O C E E D I N G S

(10:02 a.m.)

Opening Remarks

MR. GORFINE: Good morning. Good morning. I'd like to ask everybody to please take your seats so we can get started.

Okay. Well, good morning. As the TAC Designated Federal Officer and Acting Chair of this committee, it is my pleasure to call this meeting to order.

We are very much looking forward to today's discussions, which build on our meeting earlier this year and the Commission's subsequent decision to follow the TAC's recommendation by creating four new subcommittees in order to pursue particular work streams.

Before we get started, there are a few logistical items that I have been asked to mention to the committee members and invited speakers. Please ensure that your microphone is on when you speak and that you are speaking clearly into the mic, as I am hopefully doing now, so that the webcast and teleconference

audiences can hear you.

If you would like to be recognized during the discussions, please change the position of your place card so that it sits vertically on the table, or you can raise your hand. For TAC members participating by phone, please keep your phone on mute until you are ready to speak, and identify yourself beforehand.

Finally, please refrain from using electronic devices during the meeting. We have a full agenda before us today, and we would like to ensure full participation by all members of the TAC.

I would now like to turn to Commissioner Quintenz, the TAC's sponsor, and then Chairman Giancarlo, Commissioner Behnam, Commissioner Stump, and Commissioner Berkovitz for their opening remarks.

COMMISSIONER QUINTENZ: Thank you, Dan.

Good morning, everybody. Welcome to our second TAC meeting of 2018, the second meeting since the reconstitution of the TAC.

Before we begin, I just wanted to thank all of the committee members for being here this morning and giving us your time and participating. We have such a

robust and esteemed group. But the flipside of that, I know, is that there are a lot of demands on your time. And we're very pleased that you've made this work and this committee a priority. We are lucky, as a commission, to be advised by you, so thank you for your -- your efforts here.

At the conclusion of February's TAC meeting, as Dan just said, the committee voted to form four subcommittees around crypto assets, DLT, cybersecurity, and the automated algorithmic trading environment. Those subcommittees have been formed, have been populated, and have been meeting, and I'd like to extend a very warm welcome to all of the members of the subcommittees that have volunteered to join that are not on the full TAC that are here today, and the ones that have been contributing and are listening, and the ones that are still in process and working through some of that paperwork. We really appreciate it.

Thanks again to Dan for all of your hard work with the TAC and over the last two days and over the last number of months in putting together this event as well as the event yesterday that I'm sure the Chairman may

talk about briefly.

I'd also like to thank Jorge Herrada and John Coughlin for their great work in supporting our subcommittees.

We have an ambitious agenda today. We're going to hear presentations from three of our subcommittees on their progress to date and some of their plans for the future. We also have the pleasure of hearing from experts regarding the potential uses of RegTech to facilitate compliance.

The first step, we're going to hear from the Virtual Currencies Subcommittee that's going to present on the evolving cryptocurrency landscape, including questions surrounding the appropriate regulatory framework for various crypto assets and trading platforms. Issues revolving around cryptocurrency, volatility, custody, cybersecurity, taxonomy, trading practices are all ripe for further discussion. The presentations should spur further discussion about how the CFTC, other regulators, spot platforms, and market participants can all contribute to enhancing this market's credibility and safety.

After that, we will hear from the Automated and Modern Trading Markets Subcommittee that's going to discuss its planned work over the next year to assess the true risks of the modern trading environment. At the last TAC meeting, I highlighted my hope that the TAC could assist the Commission in understanding whether exchanges and the market participants are following best practices with respect to automated and algorithmic trading. To the extent market participants are not currently incentivized to follow best practices, or to the extent best practices are failing to adequately address certain risks posed by automated trading, the TAC can advise on whether regulation is the best tool in alleviating those risks.

We are fortunate that the International Organization of Securities Commissions, IOSCO, recently published eight recommendations that we have here to assist trading venues and regulatory authorities in implementing practices to manage extreme volatility and preserve orderly trading. The CFTC was involved with this and supported this document; I'm very pleased about that.

With that, with those overarching principles in mind, Bryan Durkin, from the CME Group, is going to present how the CME has implemented trading and volatility controls that complement and, in some cases, I think exceed the recommendations put forth by IOSCO. I hope that presentation facilitates a broader discussion on whether U.S. exchanges' trading controls meet the principles outlined by IOSCO as whether -- as well as what risks exist beyond those controls impacts, if any.

The committee is then going to hear from a panel about the feasibility of regulators issuing machine-readable and executable regulatory rulebooks to facilitate market participants' RegTech compliance solutions. Although the financial markets are now largely digitized, the regulatory landscape has remained largely inaccessible from a digital perspective for a number of reasons: antiquated data formats, like PDFs, or the common practice of embedding regulatory requirements and relief in no-action letters, guidance, or preamble language rather than rule text. I look forward to hearing from the

presenters about whether regulators have the tools to make their regulatory frameworks more digitally accessible.

Finally, the TAC will hear a presentation from the DLT and Market Infrastructure Subcommittee regarding DLT's potential for trade reporting. DLT's potential to transform how firms handle execution, processing, reporting, and recordkeeping of derivative transactions is already being developed and tested. However, like most opportunities, using DLT for regulatory purposes also presents challenges. I look forward to hearing about those and other large questions raised by using DLT for trade reporting and the current status of the landscape.

Taking a quick second to look ahead, I think we would hope to schedule our next full TAC meeting in January of 2019. We take a risk there since the last two January scheduled meetings were canceled because of snow. I think the third time is a charm. But at that time, we would hope that each subcommittee will present either additional analysis or some concrete recommendations regarding its particular subject matter

area for the full TAC's consideration.

And with that, I would like to recognize Chairman Giancarlo and then my fellow Commissioners to make their opening remarks.

CHAIRMAN GIANCARLO: Thank you, Commissioner Quintenz. And, as you know, whatever day you set that January hearing for will be the day of the snowstorm, so --

(Laughter.)

CHAIRMAN GIANCARLO: Good morning, everybody. Thank you all for being with us this morning. As you know, it's FinTech week at the CFTC, and today is our third day of very high-level discussions of the FinTech revolution that's taking place in our markets.

Let me again express on behalf of the Commission our compliments to the Office of Consumer Education and Outreach and the Office of General Counsel, including LabCFTC, for a great inaugural FinTech Forward conference. Let me say how remarkable is the changeover in this room from yesterday. Pretty amazing. I stopped by last night around 6:30, and there was a dozen or so people in here making sure that

everything was perfectly set up for today. So let me thank our Office of the Executive Director and all the people that worked, our consultants and contractors, to make sure that everything is right as it should be.

And let me also thank our fine officers and security personnel for ably handling such a large influx of people in and out of our building over the last two days, three days today.

I'm really pleased to be here this morning for this meeting of the Technology Advisory Committee. The last time the TAC committee met in front of a full Commission was April 30, 2013, five and a half years ago. In fact, that was the last time any advisory committee took place before a full CFTC Commission. So it's very satisfying to have our new and full Commission present here this morning.

You know, there's a logic to having a five-member Commission, and it's right that all those commissionerships be filled. So I want to express my gratitude on behalf of the CFTC to the Senate Ag Committee, to Senator Roberts, Senator Stabenow, for their efforts in the current Commission to confirm all

five members of the Commission.

One of the capabilities of a full Commission is to sponsor and activate all of the CFTC's advisory committees, and I thank Commissioner Stump for agreeing to sponsor the Global Markets Advisory Committee. In that role, Dawn will be representing the CFTC at the October IOSCO meeting in Madrid. It's been a long time since the last meeting of GMAC, but it's now in good hands and off to a good start.

And I also want to thank Commissioner Berkovitz for taking on sponsorship of the Energy and Environmental Markets Committee. Dan is busy finalizing the EEMAC membership for an upcoming meeting, and we look forward to that.

I'll be taking on sponsorship of the Agriculture Advisory Committee and will be reaching out soon to its members. The Ag Advisory Committee met last year in Kansas City under Commissioner Behnam's interim sponsorship.

Thank you, Commissioner Behnam, for making sure that Ag issues remain front and center for the CFTC. And thank you also for standing up the Market Risk

Advisory Committee so thoroughly.

The Commission, as you know, just unanimously approved the MRAC's formation of a subcommittee to address emerging issues related to the movement away from LIBOR to SOFR. And I know the MRAC's work in this area will complement and further the work of the Alternative Reference Rate Committee. That MRAC subcommittee has my support for such a coordinated effort and for the fine work that is sure to come from it.

Turning to today's meeting of the Technology Advisory Committee, I want to thank Commissioner Quintenz, Daniel Gorfine, and all the distinguished TAC members around the table for preparing such a great program today.

I won't walk through the agenda, you have it in front of you, but it's a crucially important set of issues to discuss. The format is designed to be informative and allow for cross-currents of thought. No doubt the discussion will build upon what we've considered over the past two days.

This is our challenge today. We are racing into

the unknown faster and faster, exponentially quicker than at any time in the past. It's a world that's restricted only by our understanding, our imagination, our learning, and our judgment. We have to see where we're going and prepare for the complex requirements of the future. That is why this TAC meeting, and, indeed, all advisory committee meetings, are so essential for the work of the CFTC, whether in matters of the technological revolution in our markets and around the globe, whether in our core Ag and energy futures markets, or whether in identifying unassessed market risk.

These advisory meetings are crucial for the work of this agency. We receive the benefit of the knowledge of experts in the field from your perspectives here today. Our interactions together improve and refine our policy responses to the quickening pace of change in markets, the increased complexities, and the concerns of market participants and everyday American citizens.

So this meeting is timely. We perceive what is on the horizon, and we must be prepared and be responsive.

And as we confront the challenges ahead, we will rely on the wisdom of advisory committee meetings like this one.

And I look forward to hearing today's discussions, and I will especially enjoy doing so alongside my four fellow Commissioners.

Thank you all very much.

COMMISSIONER BEHNAM: First off, I'd like to echo Chairman Giancarlo's comments about our two new Commissioners. It's great to have Commissioners Stump and Berkovitz here, both friends and individuals I've known for a number of years, and we're truly lucky to have them here, and looking forward to the agenda for the balance of the year in 2019. I would also like to thank you for your comments about the Ag Advisory Committee and the MRAC committee. I know we're all very focused on our advisory committees, and a lot of good work is always produced historically and in the years to come.

Regarding today's advisory committee, a quick thanks to Dan Gorfine for all his work. He's been extremely busy for the last couple days with FinTech

Forward, which was an excellent meeting, and I'm sure you're looking forward to a quiet weekend at home with your kids.

MR. GORFINE: It won't be quiet.

COMMISSIONER BEHNAM: Right. And then, of course, Commissioner Quintenz for holding this meeting. The TAC has proven to be an excellent committee discussing really important issues that the Commission cares about and looking forward to today's discussion.

Thanks.

COMMISSIONER STUMP: So this is my first official meeting as a Commissioner. And those of you who know me well might find it a bit of an understatement if I said I was excited to be here. So I decided to tell you more specifically what I'm excited about today, and it's continuing the work that many here at the agency have done to advance solutions for a dynamic, ever-evolving marketplace.

We, as Commissioners are only here for a short time, and even though I just arrived, I am committed to building upon the strong foundation this agency has inherited in the way of tackling technological

challenges and solutions such that our successors can continue to build upon our contribution.

The TAC was originally established in 1999. And so yesterday I found one of the first agendas from the year 2000. The first topic on this agenda was "Oversight of Electronic Order Routing and Execution Systems." So today this topic is very basic to the function of our system, but many folks working in the trades today don't remember open outcry pits or manual order routing methods.

I actually remember my first Futures 101 class at Texas Tech University, and I can assure you electronic trading was not in the textbook. This either -- you could draw two conclusions from this: either I'm really old or the markets have evolved considerably in the recent past. I think we can all agree that the latter conclusion is the correct one.

My point in bringing this up is that somewhat recently the Commission has solved very challenging regulatory applications with regard to emerging technologies that may not have nicely fit into the familiar market structure of the day. And I'm very

much looking forward to the challenge of addressing emerging regulatory questions that result from today's evolving technology applications in hopes that future Commissions can someday contemplate how we contributed to the proper oversight of market utilization of these advancements.

I would like to thank Commissioner Quintenz and Dan Gorfine for their leadership of the Technology Advisory Committee and all of my fellow Commissioners, who have welcomed us here and have been so great to work with over the past one month. I've been here one month today.

And to all the members of the TAC and all the participants, thank you for being here. And I look forward to the presentations.

COMMISSIONER BERKOVITZ: Thank you. It's a great privilege to be back at the Commission, particularly with this Commission. And I thank the Chairman, I thank my fellow Commissioners for the warm welcome that I've had in also the approximately one month that I -- that I've been here. I've worked with I think each of you in one capacity, we've all been in different

positions on tables like these, these before, over -- over many years on many issues, and it's an honor and privilege to be at this same table here today and before this advisory committee that Commissioner Quintenz is chairing.

I would note that I was last here, last at the CFTC, five and a half years ago, and looking at the agenda today, virtually nothing on the agenda today would have been on the agenda five and a half years ago. And that's one of the great exciting things about being back and where this agency is at today, as exemplified by the activities throughout the week really being at the cutting edge of technology and how the Federal Government and how regulators should be responsive to and address the appropriate role in the face of such technologies. And I find that particularly fascinating and an honor to be a part of, and very much looking forward to learning from all the panelists today.

So thank you, Mr. Chairman, thank you Commissioner Quintenz, thank you Dan Gorfine, for all your work this week.

MR. GORFINE: Great. I'd like to thank the Chairman and all of our Commissioners for their opening remarks.

TAC Meeting: Goals, Agenda, and Scope

MR. GORFINE: And now I want to build on what we heard from Commissioner Quintenz and discuss the scope, plan, and approach for today's meeting.

So as you have already heard, following our TAC meeting earlier this year, the Commission acted on the TAC's recommendations by creating four subcommittees: Virtual Currencies, Automated Trading in Markets, DLT in Market Infrastructure, and Cybersecurity. Today you will hear presentations from members of three of our subcommittees regarding the initial framing and approach that each is taking to execute on the workstreams discussed in our earlier TAC meeting this year.

At the end of these presentations, we might consider whether the current framing and approach to the subcommittee work is in line with the expectations of the TAC members and whether there are additional elements the subcommittees should consider as they go

forward with their work. We will also hear, as you heard from Commissioner Quintenz, from a panel today on the topic of RegTech and facilitating machine-readable and machine-executable rulebooks. These presentations will highlight a promising area of innovation that will require the ongoing attention of innovators, market participants, and regulators. As part of that discussion, you will hear from a member of our LabCFTC team, Brian Trackman, on this topic.

Before we get started, though, with our first panel, I would also like to take a moment to recognize the work of my colleagues in making this meeting today possible. Many have contributed, as you've heard, including our technology teams, our logistics teams, that I think are really sick of seeing me first thing in the morning this week.

Also special thanks to Jorge Herrada, who's our LabCFTC technology lead and the ADFO of our Virtual Currency and DLT Subcommittees, as well as John Coughlin, who is the ADFO over our Automated Trading Subcommittee. Both have been instrumental over the prior months in organizing our subcommittees and their

current workflow. I would also like to thank Michelle Ghim and my other colleagues in the Office of General Counsel.

Panel I: Virtual Currencies Subcommittee Presentation & Digital Asset Security Discussion

MR. GORFINE: So with that, let's jump to our first panel discussion, which will include presentations from members of our virtual Currency Subcommittee as well as a summary presentation on issues related to safeguarding digital assets. So as I go through who's going to be on the panel, if you want to please take your seat, as panelists.

You will hear from our panelists, Richard Gorelick, Gary DeWaal, and Andre McGregor, who is a new member of our recently constituted Cybersecurity Subcommittee. Our TAC members will also have the opportunity to engage with -- in discussion with our two remaining panelists, Alex Stein and Brad Levy.

So once everyone is situated, Mr. Gorelick, we will begin with you.

MR. DeWAAL: I don't want you to be disappointed. You're going to be beginning with me.

MR. GORFINE: Oh. Sorry to switch. Mr. DeWaal.

MR. DeWAAL: I just have to start before I give my formal introduction, Dawn, maybe I'm going to be showing my age, but when I entered the business in the early 1980s, the discussion was how computerization was going to save everybody lots of money. So that's more a fundamental problem, and I think that really should be an issue before the Technology Advisory Committee, but a different day.

So I'm delighted to be the kickoff presenter for the Virtual Committee -- the Virtual Currency Subcommittee. Our emphasis is really the spot market and some issues related to that. And, you know, we don't have answers, but we'll certainly let you know what our thinking is up till now.

We are basically going to try to deal with two issues, which is what the subcommittee has wrestled with over the last couple of weeks, which are really, How can we look at the derivatives markets and leverage the characteristics, the standards, the best practices, that can be gleaned from this largely institutional derivatives market to enhance the integrity and degree

of trust in the underlying spot markets? We think that there's a lot to be learned here, and the issue is, How can our lessons learned here over our years of experience be leveraged?

The next topic we want to discuss is, there's been lots of debate as to, you know, crypto assets are a security, and we're going to be discussing the implications of this debate, but we're going to be looking at it from a different side, which is, What are the characteristics of crypto assets that really would subject them to not only the Commodity Exchange Act in connection with enforcement authority, but render them appropriate for regulated derivatives markets? To date, there are a number of derivatives contracts based on Bitcoin, but that's it. And the question is, What guidance can we help give the Commission to feel more comfortable in approving other crypto assets for derivatives contracts?

And with that, I will turn the presentation over to Richard, who will kick us off with substance.

MR. GORELICK: Thank you, Gary. And thank you very much to the Commission for sponsoring this meeting

today and for having me present.

So I want to talk -- let's see if we can get this working here -- talk a little bit about the virtual currency spot markets. The question that we've been asked about, "What are the practices from the more institutional regulated markets that we should be thinking about in connection with this spot markets?" Sort of, you know, begs a number of questions, and we're going to try and tackle each of those in order here.

The first thing, though, I want to start with is, Why should we care about any of this stuff? And I think it's too easy to just sort of jump into the details without that big picture. And we talked about this a bit on the committee as well. And so our view is that virtual currencies or digital assets or cryptocurrencies or any of a number of terms that mean almost the same thing, they offer great promise to economies and to societies, you know, particularly those who revolve around enhancing efficiency, privacy, and trust, and they provide opportunities to boost economic growth, to create jobs, to benefit businesses,

and to benefit consumers.

In general, we expect that these technological developments will create new types of economic value and will enable new types of decentralized competition to gatekeepers of the Internet and to other sort of centralized features of the economy. And we think that these developments are almost inevitable at this point.

So there's a lot of good opportunity here, and it's going to happen. So our view on the committee was that we really need to be thinking about, How do we boost the integrity and the quality of the markets for these new digital assets?

So I'm going to talk a little bit about, What are the virtual currency spot markets? What do we mean when we talk about that? What are some of the good features about those markets? What are some of the concerns about those markets? And then, to really bring it home and answer some of the questions that we were asked, What are some of the solutions for some of the concerns that have been raised?

Okay. So the spot markets are comprised of really three different categories of types of marketplaces.

One is what we're calling centralized trading platforms. They're often called exchanges even though they're not regulated in the same way that traditional asset-class exchanges are regulated. There's over 200 of these trading platforms, and they're located all over the world. In fact, the most liquid exchanges at this point tend to be located outside of the U.S. The different technologies are used, so there's not a lot of standardization of the technologies on all of these platforms, very different technological models, and very different business models as well.

Often these exchanges act as both a matching platform in sort of the traditional role of an exchange, they act as a broker in some cases, as a custodian, as a clearinghouse, and in some instances, as liquidity providers on those platforms. And so the business models can be quite a bit different than we're used to in the regulated futures markets, for example.

There are also different regulatory environments for each of these markets, depending on where they're based in the world, what their business model is, and really how they've each decided to approach regulation.

The second category of marketplaces, spot marketplaces, in the crypto space are what are called decentralized exchanges, and these are really information platforms where buyers and sellers can meet, can find each other. And then the trades between those buyers and sellers are often settled directly between them using a smart contract, for example. So it's really a way for people to meet to conduct bilateral trades. There are numerous initiatives in this area, but none of them have significant traction yet. And the peer-to-peer nature of these transactions open up additional risk and regulatory questions. I think Gary had a couple of thoughts on some of those issues that he wanted to talk about.

MR. DeWAAL: Yeah. I think that when folks think about the regulatory issues related to the crypto asset space, the emphasis is obviously on the coins, and we'll get to that later on, that's one of the important topics we want to discuss. But I think it's also important to recognize that there are big issues. So far, the headlines have been dominated by folks who are allegedly committing fraud, and that obviously is a big

issue, and a proper issue, by not only the SEC, the CFTC, and the States, as well as other regulators, including the Department of Justice to be interested in it, but, in fact, lots of folks are trying to figure out how to do it right. Lots of folks are trying to figure out legitimate players who want to trade, who want to access the markets, who want to provide access to the markets. They are struggling with how to do it right.

And I'd just like to get just a few thoughts on this because this is very, very important in thinking about the environment and the issues we're dealing with. We know -- we know that there are different players in the markets. We know, for example, that this Commission is involved in two ways. We know that if a crypto asset is defined as a commodity, then the CFTC has enforcement authority using its Dodd-Frank broad-based manipulation and other bases to bring enforcement actions. We know that the CFTC has jurisdiction if someone trades or wants to offer a derivative based on a virtual currency. We know that participants may have to register as FCMs. We know

that offerors may have to, or exchanges may have to, qualify as DCMs or SEFs. We know that they may need clearing organizations associated with those -- with those products.

That's actually sort of the easy one. The CFTC is actually sort of the easy regulator so far. The issue is, is when you're talking about the pure spot market, separate and apart from the enforcement authority of the CFTC, it really is very difficult today for legitimate players to navigate the universe. The States -- generally people understand that if somehow you're involved in not investing for your own account, and you're involved in the business of somehow transacting in virtual currencies, you may be touched, and likely are touched, by FinCEN. Okay? And again, they're relatively easy. It’s you know, you have to play AML, that's a good thing. People understand that.

Then you go below that. The States have regimes that touch this space in many different ways. Last night, for the fun of it, I looked at one of the big players, and I'll save their name, I'm not the New York Department -- I'm not the New York AG, so I can't just

name names, and a very legitimate player was licensed in what I call the NMLS State.

So first of all, if you're trying to do things legitimately at the State level, about 35 to 40 States have a common -- what I call a common college application process, known as NMLS. It's just a simple form. The other States sort of have their own form. So just looking at the NMLS States, which is about 35 to 40, this entity was touched by 32 of them, 32 States they were involved in.

In most of the jurisdictions, they had the money transmitted, which is what most people it comes to mind as to what you need to do somehow, and we're going to get into that in a second. But in one State, required payments of instrument license, even though that State also has a money transmittal license, and in other States, they required an electronic money transfers license and sale of checks license, not a money transmittal license. So even among the States, there is not commonality as to what license is available.

Now, it gets more confusing. If you talk to the States and if you look at the definition of what

constitutes money transmission, it really is not very clear, and that's very important because a couple of things are clear from looking at the different statutes around the United States, which is there is, typically in the money transmission world, not an institutional exemption for transactions.

So if you're in, the fact that you're dealing only with institutions doesn't necessarily get you out. So that's issue number one. But second of all, the States have different concepts of what constitute money transmission. Basically money transmission is I take money from A, I take some kind of fiat currency from A, and I pass it on to B, and I'm the -- I'm the person in the middle.

Well, a number of States have taken a view that, you know, substitute the word "virtual" currency for "fiat" currency. So that actually is very interesting because a lot of folks, when they think about money transmission application in the cryptocurrency space, they're concentrating on the cryptocurrency side, and, you know, maybe about 30, 35 States have addressed that issue, but most of the States deal with the fiat

currency side, too, and in many circumstances these transactions involve both the transmission of fiat currency as well as the transmission of cryptocurrency, and you could get caught on both ledgers. So it's a very, very complicated circumstance. That's just at the State level.

We continue. We know that if something is considered to be a security, obviously, the SEC is involved. There's potentially registration issues unless there's an exemption. We know that people offering to the public might have to be involved -- register as a broker-dealer. We know that exchanges have to be involved if they're -- if they're offering or somehow exempt, maybe as an ATS, which, by the way, is an exemption, but you still have to register as a broker-dealer to get to an ATS situation. We know that the States have their own blue sky regime, so they have securities regulation.

And then -- and we'll discuss this a little bit later on -- what happens if something is considered not to be a virtual currency or something is considered not to be a security? Other laws may be involved.

Wyoming, for example, now has a law for something that it may not fall in either crack, and when you get outside the United States, it gets even more confusing. It gets even more confusing.

But that's just to present the problem of legitimate actors trying to play in this space. They have to navigate the Scylla and Charybdis of complicated, you know, regulations just to figure out what to do, and it's not really 100% -- as someone advising clients in this space, the precision of advice is not great, and that's not because we're not trying, it's because that's just the nature of how these laws exist.

MR. STEIN: So I would just add to help motivate clarity or adding clarity to this space, the -- today's investor doesn't have access, whether you're retail or institutional, to the large established institutions that we're used to doing business with. So despite that long list of U.S.-based regulators that one needs to navigate, the reality is those who are participating in this space today in many cases are going overseas to the truly "Wild West." So it really behooves us to

help try to rationalize and provide clear direction for these markets so that American institutions and retail investors who participate in these markets have the benefit of knowing that they're participating in a well-regulated controlled market. But today most of the action, as Gary said, is taking place overseas, whether you're an American or not.

MR. DeWAAL: By the way, to be technically correct, it's not the "Wild West" where most of these exchanges are located, technically it's the "Wild East."

(Laughter.)

MR. GORELICK: Okay. Thank you, guys. So talking a little bit more about sort of the overview of the spot markets, in addition to the decentralized exchanges and the centralized exchanges, there is also a significant over-the-counter market, and this is where you have trading desks that negotiate and settle trades bilaterally with counterparties. That is -- this is the market that my firm is very significant in. Our subsidiary trading desk, Cumberland, is very involved in this over-the-counter market, and that's

also a significant part of the spot market.

So moving ahead, there are some good things about the market structure that we should be careful to preserve and not to lose. It's sort of the first "do no harm" mode. There's a lot of innovation and creativity that's going on in the market right now. Difficult problems are being solved both through innovative technologies and business structures and business models. We want to make sure that we are welcoming some of that innovation. There's been rapid adoption of these technologies and of people wanting to trade on these platforms. The number of new users signing up has been really impressive over the last couple years. There's obviously a big demand to participate in these markets.

And the user base is different than what we're used to seeing in other markets. There's a lot of younger folks participating in this market who may or may not have participated historically in the futures market or in stock markets. And so there is a lot of interest that this is developing in the markets, and that's also something we should be respectful of.

And there's also a lot -- you know, when I said there were over 200 spot markets around the world, there's a lot of competition in this space, and that type of competition and diversity is really an advantage of the current structure.

So what are the concerns? One of the big concerns about these markets, as they exist today, is the lack of transparency. There is much less disclosure about the trading venues in this space than you typically see in more regulated venues. So it's often hard to know about ownership and control and governance on these platforms, about the operating rules of these platforms, about potential conflicts of interest, about safety and soundness and security. A lot of those issues are generally unanswered on these platforms.

There are venue risks. In particular, we've heard a lot about these exchanges being subject to hacking over the years and theft. There is also counterparty risk that's sort of novel in this space since the exchanges, particularly the centralized exchanges, tend to also be custodians as well.

There are concerns about the behaviors on these

platforms. There's been a lot of reporting in recent months about wash trades and spoofing and different types of market manipulation that are going on in these platforms. And there is concern about inadequate surveillance on these platforms, and that's something that needs to be addressed.

I mentioned briefly the concern about conflicts of interest. I think there's still not a very good definition of roles in this space like we see in other markets, and we're going to have to work through some of these issues to come up with a good alignment of interest around different roles and responsibilities within the marketplace.

And then there are just questions about supervision. Gary touched on a lot of this, about who exactly is responsible for regulating these markets that operate in different places around the world with customers and counterparties from different places around the world. How does this fit into the current legal framework?

And so this is sort of the concerns that I think give rise to the question of, What can we look to, to

improve the integrity in these markets?

MR. STEIN: So it's important to add that while all of these concerns are absolutely real, there are exciting and material advancements that are taking place, whether it be the subset of players who are talking about creating SROs, whether it be the application of technology. I have to say anyone who's opened an account on some of these exchanges has to be impressed by the quality and the speed of the AML/KYC. We're seeing applications of technology to help secure wallets and prevent the hacking.

So these concerns are all very real, but there are solutions. They aren't insurmountable. We need to work to promote that technology and promote that type of cooperation so that we have the environment that prevents these issues.

MR. GORELICK: To Alex's point, yeah, what are the solutions? What can we look to in the traditional financial markets and elsewhere to help improve the situation? And one is smart regulation. I want to start off by saying that that's part of the solution, and an important part of the solution, but there are

tricky definitional and jurisdictional issues that need to be taken into account as we go through the process of figuring out what the right regulatory models are.

The CFTC, as Gary mentioned, has authority for fraud and manipulation in the spot market for commodities in the U.S. That's an important part of the market, but it is relatively narrow. And so we need to be thoughtful about, How does a single regulator best influence the situation when there are so many regulators who are going to touch upon these markets from all over the world?

One of my -- one of the points that we raised on the subcommittee was that there is an -- there is an opportunity for industry-organized efforts to help fill some of these gaps. They could be self-regulatory organizations or similar structures that help to define and enforce best practices and standards and accountability across the industry. And I know there are a number of efforts underway to start thinking about and building these types of organizations.

There are lots of precedents in the traditional financial markets that we can look to for innovative

governance structures that apply with markets that touch multiple jurisdictions.

On the technology side, I think there's a big advantage here to use some of the technology of crypto in order to solve some of these problems: you know, the advantages inherent in blockchain and identity tokens in particular, smart contracts to enforce rules and agreements. There's a lot of potential solutions in the technology that we should not overlook, and when there are technological solutions, my view is that they'll often be more certain and predictable and beneficial than relying on sort of outside third parties to come in and, you know, call the balls and strikes, if you will.

And then, you know, some technology exists in traditional financial markets that we should look to as well. There are surveillance systems that are increasingly mature that help surveil markets, electronic markets, in other parts of the world. There are OMS and EMS systems, order management and execution management systems, risk management systems, and different compliance technologies that I think we

really need to be looking at and figuring out which ones are applicable and beneficial to the new developing virtual currency markets.

And, finally, I think there's a role for market practices to evolve in this space. When we look at the traditional financial markets, we see that there are very well defined roles and requirements for different types of market participants, and we should look at those to see which are suitable and which are beneficial and which problems they have been geared and helpful in solving historically, and thinking about how they apply in these markets.

There are important practices that have developed over the years in terms of clearing and settlement that obviously can be very different in the virtual currency world, but there is some important learning that we can get from those processes.

And then custody is an important issue. We've got over the years, in traditional financial markets, there have been very different custody models than what we're seeing evolving so far in the virtual currency market. And there's a real important role for qualified third-

party custodians and the like, people who are accountable, who can look at an account and say, yes, these assets exist and they are owned by and controlled by a particular person or investor or company. We need to be able to develop the practices around that in the virtual currency space.

Now, I want to be -- I want to caution the group that it would be a mistake to try and replicate the traditional financial markets here, that I believe that with looking at the technology that is developing and where it's likely to go in the upcoming years, that there are opportunities to be better, to build a market with higher levels of integrity and more certainty, but we need to be able to sort of pull both from the learning of the traditional financial markets and the opportunities from the new technologies, and I think we can really improve upon what we're used to seeing.

I think I'll close by saying that the stakes are high. It's important to get this right. We need to make sure that -- you know, the world is going to move on one way or another no matter what we do here in the U.S. on the regulatory front. We want responsible

market participants to be able to invest and build these important technologies and markets here in the U.S., and that's going to take a lot of thought and effort both from traditional financial markets and from the sort of the digital natives in this world. I think there's a lot of opportunity here when we combine the best of both.

Thank you.

MR. DeWAAL: And so what I now want to do is help start the conversation and give you ideas on how to classify these crypto assets because, as confusing as it is at the State level even when you can classify which regime you're in, it's very difficult and becoming increasingly difficult to classify which asset you're speaking about, and are you changing the regulatory regime that you're in? The last time we met, we discussed the fact that there were three effective types of crypto assets, what the common press refers to as, you know, virtual currencies. We know those are commodities because of two recent cases decided on behalf and for the CFTC.

We -- you know, cryptocurrencies, virtual

currencies, are typically medium of exchanges, you know, unit of value, store of accounts. Those are the traditional concepts of a fiat currency. They are applied generally to virtual currencies. Whether they're 100 percent accurate, that's -- that's a debate that's going to have to be had.

We know that there are security tokens that have the quality of securities that are out there. Folks keep talking about the 1946 *W.J. Howey* decision. Investment contracts, people are investing collectively in an enterprise where there's an expectation of profits either exclusively or mostly through the efforts of others, depending on which cases you look at. And we know that those things are considered to be securities and likely subject, as I said before, to the SEC's oversight.

And then there's this other category, utility tokens, consumption tokens. They're much more like the admission ticket to Coney Island, where you get to ride the Ferris wheel and the go-carts, but maybe there is a secondary market in them. You know, what are they? Does that make them securities? These are -- these are

challenges because they drive which regulations the participants in those markets are subject to, what regulations the offerors of the initial coins are subject to.

Since we last met, William Hinman, Director of Corporation Finance of the SEC mentioned something that we discussed last time, but he acknowledged it a bit more formally, although it was not the official view of the SEC, that -- that you can have coins that morph. You could have a coin like Ether, which like was a security token at the point of initial offering because it was done by a sponsor and had the hallmarks that satisfied *Howey*, but today, given the fact that it's a mined coin, given the fact it's much more decentralized, in his view, was likely not a security.

So it may seem academic as to knowing what brings a coin into what category, but it has very profound regulatory consequences. And as we mentioned before, folks are dealing with it differently. We know that Malta, we know that Gibraltar, we know that Switzerland are looking for and recognizing that there is this third category of coin, and it is subject to some kind

of different regulation. We know that the State of Wyoming has created a recognition of this third state of coin.

So the universe of regulatory schemes is quite evolving and becoming more and more different and more and more confusing. So we do believe that it's important to help determine, How can something fit into categories? How can we help decide where something belongs? And that's where we want to add some value. We know it's a difficult conversation because it involves a lot of regulators, but we think the conversation has to begin and come to some kind of conclusion.

From this agency's perspective, there will be applications, there will be self-certifications, for folks to trade derivatives based on coins other than Bitcoin, and you will struggle and try to come up with your own standards in how to decide whether you have the authority to do that. We want to -- we want to help you.

So we think that, looking at some of the literature out there, looking at some of the guidance

in the foreign jurisdictions, looking at some of the thought process that went in Wyoming, looking at some of the literature, looking at William Hinman's commentary. We think there are generally really three broad categories of things that folks have to think about, which is, How was the coin issued? Okay? Was -- was there a -- was it -- was it meant to be an investment vehicle, or was it meant to be something else? It's sort of a binary question, at least at the beginning. How did the sponsors promote it? What was the initial enterprise or the initial sponsor's retention of control of financial interests in the tokens? Did the initial raise bring in more funds than we needed for the actual project? These are very, very important issues.

Second, the purpose of use in reality. Is the token used for investment vehicle? Is it used for consumption? Again, how is it marketed? And typically, objectively, how is it used? And then governance, is, what is -- how is consensus done within the -- within the relevant blockchain that the token is associated? How are forks determined on? How are

different elements of the blockchain decided? Are these done by sponsors? Are they done by a limited universe of miners or the equivalent of miners, of consensus holders, or is it truly decentralized? These are all issues.

Now, once you determine the issues, the issue then becomes, Is it better to keep the criteria subjective, or should quantitative measures be devised? Should we be thinking in numbers? Are there ways to try to quantify this so it's more formalistic? And even among the subcommittee, there is debate about that. But these are things that we think we want to continue to discuss and help this Commission and help guide the Commission in coming up with viable criteria.

MR. STEIN: So I would add to that that because this is an industry and a technology that's evolving so quickly, even in the past few years when crypto has had a lot of focus, we've seen a dramatic growth. I mean, when Bitcoin was the coin, it had a single use, and then Ether came out with this concept of smart contracts. Then all of these new mining mechanisms -- proof of stake, delegated proof of stake -- have some

out. The challenge of what are these, how are they used, and how to regulate them evolves and will continue to evolve. So I think there is consensus on the group here that whatever we do going forward, it should be more principles-based because it will be very hard to stay ahead.

One rule of thumb is that humans tend to linearize the world around them. They look at what happened yesterday, today, and you think you can draw a line to tomorrow. Crypto assets and blockchain technology are technologies that are available open source to 7-plus billion people in this world. Applications are being thought up across the entire globe.

In particular, if you look at Gary's point, "How are these blockchains or these coins being used?" one of the critiques that comes up often is, well, today really the only use is as a store of value. This is a technology that is likely to change on an exponential path, and, therefore, if we take what we saw yesterday and rely upon that to tell us how we need to regulate this tomorrow, we are likely to totally miss the puck, and it's quite a challenge, but the opportunity is

really great. This -- these are enabling technologies, they are enabling financial assets that won't just affect the U.S. economy, but the global economy.

So we have a very worthwhile but substantial challenge in keeping to the principles that keep our markets safe and not overspecify.

MR. GORFINE: Thank you very much. And so one of the issues that you all have raised is around, How do you safeguard these assets? And then one of the risks being, you know, security and the risk of hacking. So I'd like to turn over to Mr. McGregor, who presented this week at our FinTech conference, but will share some remarks on safeguarding digital assets.

MR. McGREGOR: All right. Thank you very much. I'll just wait for the PowerPoint presentation to come up.

I'm not sure who was in attendance on Wednesday and Thursday for the conference, but what I found very interesting was one of the panels around scams and frauds, and specifically there's a statement that was made that it's a lot of the same old fraud, fraudsters, but with a new product, and that some similarities

dovetails directly in cybersecurity because while there is a new, you know, industry, there is a new technology, a lot of the concerns that we still have are old cybersecurity problems.

(Technical difficulty with slides.)

MR. McGREGOR: That just -- I don't think the --

MR. HERRADA: I'll help you out. I don't think it's working.

MR. HERRADA: The technology is --

(Laughter.)

MR. McGREGOR: All right. Okay. Technology, works out well.

So with cybersecurity, just to -- you know, I say that it's a lot of the old tactics, and really when I -- when I look at it, I'm looking at it from the vantage point of doing security both at Brown University, at Goldman, Cardinal Health, at the FBI for many years, with China, Russia, Iran, North Korea, cyber criminals, and then in Silicon Valley. So, you know, I got to look at a large swath of different incidents, disrupted a fair amount of various cyber hacks, and, you know, today, looking at security, one

of the things I've noticed is it's still very much the same.

And so I would be remiss if I didn't bring up some of the crypto hacks that were in the news. And it's notable that more than 980,000 Bitcoins have been stolen from exchanges, which would be about $15 billion at current exchange rates. And what's most interesting about this is really the fact that as the FOMO, the fear of missing out, you know, came about, you saw more and more hacks, and specifically I'm only showing the hacks that were north of $10 million. There are many, many more that happened in this space.

And really, you know, when you start to break it down to try to figure out what actually happened, you know, it's a lot of very simplistic attacks: you know, employees failing to protect private keys; you know, hackers sending a malicious file to exchange employees and being opened on a machine that has access to exchange wallets; deposits being on a single wallet and allowing for extreme exposure; exchange owners, you know, realizing that it might be an inside job. You know, at a certain point, there is collusion and third-

party risks that are associated with this. And then, of course, hackers realizing that it's a small exchange, and so there is probably less likely to have the robust security as a much larger exchange.

You know, it was interesting, and I think the Commissioner mentioned yesterday about emails exposure for attacks, and really, you know, it is as simple as that. So, you know, when we're trying to have an open Internet and a way to communicate with people, that same openness allows for the adversary to come in, and right now 90 percent of intrusions still happen via email. It doesn't need to be a sophisticated attack, it just needs to be a sophisticated attacker using unsophisticated attack methods to gain entry into a system, establish a foothold, laterally move around to find the high-value target assets, and then complete its mission usually through escalated privileges.

So the majority of my time will be spent talking about custody. I'll caveat and say that each one of these slides I could spend an hour talking about, but really, you know, hammering home some of the more important items. Why custody regulations are

important.

So, you know, dovetailing from the earlier presentation, there is a lot of consumers that are in the market. They want to be in this space, and they're trusting their -- they're trusting their wallets, they're trusting their money, with companies that, you know, might not have the security acumen, the maturity, and the space, or really the number of people needed to protect that money.

If -- if, you know, we look at some of the more, you know, cryptophiles, such as myself, we have hardware wallets. We're concerned at some point in time that we'll lose it. We're concerned that someone will take it from us. You know, we've moved away from the security of the FDIC and have now gone back very much to the "Wild West," not just the "Wild East," in how we actually are protecting this.

And then we're so archaic that we're looking at scraps of paper, printouts. You know, there is actually the idea of using Polaroid cameras to take a picture of your private key and saving it somewhere so that, you know, someone can't, quote/unquote, hack into

your system because it's not online. All of this security is what really causes people to take a pause, especially institutional investors.

And then when you do look at the exchanges and when you look at the fact that they have about ten percent of their currencies sitting on a hot wallet and then the other 90 percent is in a cold storage solution, they are rotating those around bank accounts and safe deposit boxes very similar to how diamonds are moved into a diamond district. You, you know, might be on a plane with someone having, you know, $20, $30 million of diamonds in their pocket, and you just don't know it. That is exactly what's happening in a lot of these exchanges, especially overseas.

Looking at some of the limitations, you know, there is truth in the fact that with 53 States and Territories and their money transmission laws and the various Federal agencies, it makes it very complicated to be able to actually operate in this space. And so a lot of people are moving overseas.

You know, there is a lot of credit given to places like Bermuda and Jersey and Malta because everyone in

the government can actually walk across the street, be in the same building, and create a regulation together. It has allowed for some more maturity in the space. Obviously, there are, you know, tax incentives that are being used.

And then when you look at the United States, you know, there are just simple questions, you know. Will we be using new guidance versus existing guidance as it relates to third-party custodial accounts? You know, where are the standards as it relates specifically to cryptocurrency?

And then insurance is the biggest deal. At a certain point, institutions, endowments, funds, pensions, would love to get into the space, but without, you know, logical insurance, it's hard for them to really sort of take that risk. And when we look at insurance, the insurance industry itself has broken it down into three spaces.

You have a hot wallet, which is constantly connected to the Internet. You know, they're not insuring that. It's just not something that they're comfortable with, so it's either done by captives or

self-insurance.

Warm wallets, which are briefly connected to the Internet to be able to publish a transaction to the blockchain. That's under sort of the traditional financial institution crime policies of theft and similar.

And then there is cold storage, which is the actual, physical, tangible holding of an object based very much off of maritime law from the 1600s, and that, for them, is, you know, a vault, something that's etched on paper or metal and something that, you know, if you were to compare all the ways that insurance is outlined, it's the car in the garage that never moves and really would only be destroyed if there was a fire or some sort of catastrophic act; whereas, the warm wallet is the car on the road that has the ability to have a variety of different accidents that would pay out.

And as a result, the risk in the insurance towers are commensurate with that, so there is a $50 million policy that's about the most you can get on an insurance tower for a warm wallet, $500 million for

that cold -- that cold vaulted wallet, and really the insurance industry itself is comfortable putting about two billion dollars into the insurance market because there is just not enough of a loss history. And this is based off of dozens and dozens of conversations I've had personally with underwriters educating them on this space to try to move this forward.

And then, of course, we just move into all of the traditional insurance risks that are there, everything from technical hacking and vulnerabilities as well as, you know, social engineering that would relate to that -- that email fraud, third-party collusion counterparty risks, you know, avoiding at any point in time some insider could just take a billion dollars of cryptocurrency and then run away with it, as well as a customer could just defraud the insurance company in support of that same effort as well as just losing a key and then, you know, someone comes back and says, "Hey, I want my $50 million worth of coin."

And then moving into sort of the crypto-specific insurance risks, everything does relate around the private key. How is it generated? How is the entropy

or randomness of that, so that no one can have a copy of it? And then is it destroyed? How is it destroyed? We have obviously supply chain issues with hardware. You know, the current news aside, there are issues within the crypto space where even the hardware wallets have been intercepted in the supply chain and have been hacked at a certain point.

The decision of whether or not to have a pure custodian or actually sharing that custodial effort with another entity. So while multisignature is a great idea and it does allow for the diffusion of third-party risk, now I'm also concerned if I take part of that key, that if I lose it, I lose all of my money.

Then, of course, we want to actually have some controls in place. So how fast can transactions happen? The velocity of the number of transactions that you can do, as well as making sure that addresses are white-listed so you're not just -- you know, there is malware out there that you can actually think that you're sending it to the wallet that, you know, is visually there on the screen when in fact it's a completely different wallet that you're sending the

money to. And, of course, there is Pen test code validation, and then the backup keys, you know, where appropriate.

What this all leads to is the fact that we do need a standard, you know. And there is a standard out there. It's not widely adopted, but it's important to just take a couple minutes to really sort of go through the fact that, you know, there are some best practices that need to be employed. There are best practices that could avoid a lot of the exchanges that are being hacked from being -- being hacked, or if they are, it doesn't result in a catastrophic failure.

So the CryptoCurrency Security Standard is one. You could actually see that there's a variety of different processes in place that -- that go into extreme detail as to what people should be doing, but really, you know, the primary areas that are interesting is, you know, key creation. You know, how is it created? How is the methodology validated? Is there a system that allows for it to be created properly? Looking at wallet creation, you know, whether or not you use a unique wallet or address for

every transaction. Multisignature, of course, which we talked about earlier. How that multisignature is broken up, whether it's a two of three, three of five, five of nine. And then, of course, how keys are distributed.

You know, in many ways, you have the Federal Reserve Bank idea of having, you know, a bunch of cages underneath the ground that you could just move gold from one cage to the other. And having been down there and moved some of the gold bars, it's been -- it works, but that only works in a vacuum for the most part because we, you know, had a lot of security in place. For all of these digital keys, they really need to not be in a single location. And then, you know, as we keep going, and I won't sort of go into each one of these, there's ideas around key storage, key usage, specifically with KYC/AML in mind and identity verification on top of, you know, when we say multifactor authentication being something you know, something you have, like a token, something you are, like your biometrics, where you are, specific location, employing all of those multifactors, not just a single

one or two of three or three of four.

And then really processes in place, written, codified, to be able to say, you know, Who has access? What is their role? How do I revoke it? What happens if a key is actually comprised? What are the steps in place to be able to audit all of that so that we really sort of stand by a "trust but verify" model for security? and then using that and dovetailing it into a policy that is really centered around establishing a security program, dedicated security staff, and external security audits that really report up, not to any technologist, but to general counsel or anyone else that's in a higher authority that cannot really avoid some of the risks that are there.

And so at the end, some of the institutional barriers, you know, it was mentioned earlier that institutions really need to have insured, qualified custodians. Right now, insurance premiums are quite high. So for cold storage, it's 0.75 percent AUM; for warm storage, it's anywhere from 1.25 percent to three percent; and actually some companies are charging five percent to have warm storage. You also have the fact

that there is the self-custody that's happening with exchanges and funds, and they also don't know exactly what they should be doing.

I spend a good amount of my time consulting with some of the largest wealth managers, and, you know, top five banks in the world, and they're still trying to figure it out of how we should actually do digital asset custody. We talked about no wide -- widely recognized industry standards.

And then, of course, with everything that we're talking about with the various companies that are out there that are doing custody today, it's slow liquidity. It takes 48 hours to be able to get my money. If I do make an appointment and I schedule it, they can do it within a 2-hour period, which makes it very difficult to be able to be part of the market.

And so at the end of the day, we want more standards. The government is great. I will say at a time I was assigned to DHS at the NCCIC, and NIST came out with its cybersecurity framework, and it was a relief to the industry because everyone was looking for just something, anything, to say this is what we should

be doing for cybersecurity, you know, and that worked. And so it could be something that's from the government, it could be a consortium like the CCSS, or could be an SRO.

You know, obviously we want to have bank-level physical cyber and crypto security. I do believe that even though it's supposed to be a decentralized, deregulated coin, we need a regulated market to be able to actually operate safely. And then, of course, KYC/AML and antibribery corruption process to ensure the safety, and better education overall.

So thank you for the time.

MR. GORFINE: Great. Thank you to all of our panelists.

And so I would like to actually open the floor now to our members for reactions to what you've heard from the panelists. Any additional observations that you may have, as well as whether there are -- the work that the subcommittee is currently doing is in line with your expectations, or are there additional considerations the subcommittee should explore going forward with their work?

MS. VEDBRAT: I actually have a question. I wanted to, you know, just get some sense on, How easy is it or difficult to create a new cryptocurrency?

And then one of the panelists mentioned that the user base is different, it's a younger user base, and do we feel like, you know, the cryptocurrencies that are out there today, are we providing, you know, sufficient information and security to this new user base?

MR. STEIN: So that's actually a great question that comes up very often. And the issue is that one can create a cryptocurrency in a matter of minutes. In fact, there are tools to autogenerate a new cryptocurrency, but that's not really the important point. The important point is adoption. I could create the Alex Stein coin today, but unless people wanted to take it and use it for something, it would be irrelevant.

So looking at how coins are being used, whether they're backed by future functionality, whether they are exchangeable on an exchange, those are the important criteria that are actually quite hard. So if

you look at the, at this point, thousands of coins that are nominally listed on sites like CoinMarketCap, once you get past the first tens, there really is nothing there.

So I wouldn't be concerned about the ease with which one can create a coin, it's, How are these coins being used and how are they regulated and how are they secured?

MR. LEVY: And if I could just offer, the duality of this conversation in terms of virtual currencies being used as cash to acquire others or an asset that increases in value, you know, the new generation desires very fast acquisition of anything. It would be clear that virtual currencies generally are very light and could be used easily to acquire other goods and services. That is very Gen Z and Millennial friendly.

So I think in terms of this conversation, drawing a distinction between virtual currencies used as cash effectively to do things in institutional markets like settle trades or in buying Starbucks, you know, that's important to understand because those are two very different purposes, and, you know, one in terms of

being used as cash to acquire other goods, that's -- you know, there's some risk there, but it's probably much lighter in terms of the downside of that versus getting into it as a store of value or an asset. That could have a lot of volatility, and people may not know what that risk is going in, in terms of making an investment versus just using a virtual currency -- i.e., crypto -- to exchange for other goods and services.

MR. GORELICK: Supurna, also in terms of your question about what the user base looks like, I think, you know, in addition to sort of, you know, hand-wavy age type categorizations, I think what's interesting about this market is it's starting largely as a retail market, albeit a very tech-savvy, early adopter retail market, and it's moving out from there and becoming increasingly attractive to institutions. You know, we've seen over the last year and a half that prop trading firms and family offices and hedge funds are increasingly interested in getting involved in this space, and we would expect that trend to continue over the next couple years.

So it's both -- you know, it started out as retails going institutional. A lot of the traditional markets started out as institutional and became increasingly retail, and that creates interesting questions about market structure and regulation as well.

MR. McGREGOR: Just one thing to add. I -- when I look at it from the security perspective, there's a generational gap, and it's not what you expect. So there's a generational gap in the sense that young people are very interested in this space, and they want to be involved, but they're not -- they don't have the maturity to know that bad people are out there that are trying to scam them.

And so they're -- and then on the other end, you have, you know, older individuals that have that experience and -- but are pausing because they know that bad -- you know, that bad people are there that are going to do things.

And so, you know, unfortunately, I deal with about a hack a week from -- it's unfortunate that, you know, it's high-net-worth individuals, it's companies, it's,

you know, all different types of individuals, whether Ph.D.'s or a student, and the thing that you sort of realize is that we're just moving at such a speed that with the fear of missing out, unfortunately, people sort of have to make that decision, and they do, and sometimes it ends up being wrong.

MR. DeWAAL: Yeah. I think it's an excellent question, too. I mean, I think sometimes we all forget that it hasn't even been ten years since the 51st Bitcoins were mined, that anniversary coming about in January.

I think one of the great challenges right now -- and you may recall at the last TAC I gave sort of the history of commodity options and the regulation of commodity options in the 1970s -- right now, we're in a world where the tokens are really disassociated from the chains in many ways, and the tokens are being used by, you know, too many fraudsters or purported fraudsters, and the law is being driven by the desire to eradicate the fraudsters, not that differently than the law was being used in the 1970s, the best it could be, to eliminate the fraudsters in the commodity

options space.

And the problem with that is that that will impede not only institutional traders of -- or institutional offerors of tokens down the line, but it will impede potential the blockchain development. That's the danger. That's -- that's the real danger here, you know, because the law becomes very binary when there's fraudsters involved. You know, it's good or bad, and obviously you want to eradicate the bad, and the problem is you get very binary legal decisions, which seem great in the environment of trying to, you know, uproot the fraudsters, but may not be, you know, workable for everybody who wants to do it legitimately.

MR. GORFINE: Okay. I'm going to go down the line. We'll go Mr. Tabb, Mr. McHenry, and then Mr. Lothian.

MR. TABB: Certainly, the idea of custody is really kind of critical in this whole market. Have you guys thought or done anything in terms of rehypothecation, securities lending, repo, finance, all that other stuff? And, you know, is that good or bad as this goes into the -- as we start moving into more

institutionalization of this market?

MR. GORELICK: I'm going to answer sort of in a general way. I think that all of the processes and devices and tools that have been useful in traditional finance will be at least explored in the virtual currency market. And I think there may be some advantages, there may be some disadvantages, there may be some concerns, there may be cultural mismatches. But just the way that the economy works is that if people want to lend their coins, they're going to figure out a way to do it, and I think we need to be aware of that whole process. You know, they're extremely portable. They are, you know, easy to move. So I do expect that a lot of those features will start to develop in this market, and it will be important for the community and the regulators to make sure that it's done in a thoughtful and safe way.

MR. DeWAAL: And I'll point out this is one of the areas where whether you take a view of what these activities or not -- I mean, certainly, as a counsel, we're seeing folks wanting to do lots of different things with tokens, and this is where the law really

becomes challenging because we're talking about -- you know, most people just think of the plain vanilla transactions and how they fit in, but we start getting to there as a rehypothecation, you get into the areas of lending.

The New York BitLicense is a good example. That law is triggered, if you engage in a virtual currency business activity, which is very broad to begin with, involving New York or a New York resident, every transaction that you just talked about -- rehypothecation, lending -- if it involves New York or a New Yorker -- it's just so broad, it gets captured into that, and folks are scared to do business in or involving New York State because they're afraid of getting caught in the BitLicense requirement, which is very, very time-consuming to obtain. There are less than a dozen folks who can operate legally in New York today in this space. And that's part of the problem right now with the regulations and the laws out there being so vague.

MR. LEVY: And just some --I'm sorry, just without regard to any of the regulations that exist or the

complexity of that, which matters, just the idea of segregation of assets and accounts, which is obviously critical to safeguarding and certainly sits within the stock loan and repo markets, et cetera, and the futures markets, if you can safely protect an asset and really identify it as someone's, the idea of holding it in a broad account -- and these are for the purists in the crypto space -- it's very easy to get your head around that if you just believe that every coin can be hashed and owned by an individual, and it could sit sort of anywhere and always be known as owned by a particular entity. If people are uncomfortable with that, then you'll need many accounts segregated, so any one institution can't commingle those.

So it really does turn everything on its head depending on the coin, the model, and the ability to identify an owner of that coin or an account with assets in it. So it really -- it does force you to rethink all of that potentially.

MR. TABB: Well, that gets -- that gets to the heart of this, is that you may have two owners of one coin because it's -- you know, you've got the

registered owner, the guy who bought it, then he lent it, then somebody else bought it, you know, bought something. So that opens up a whole can of --

MR. DeWAAL: Fractional art.

MR. TABB: Yeah.

MR. STEIN: So a related issue that we didn't touch on today, but we should in the future, is the impact and role of smart contracts. You know, smart contracts were originally developed with the tagline "Code is Law." Well, I'm a computer scientist myself, and I would never rely on "Code is Law," certainly not my own. Understanding the jurisdiction, understanding the recourse, understanding arbitration provisions underlying these smart contracts are all interesting areas of research. That would be instrumental in hypothecation scenarios to ensure you don't have two owners simultaneously.

MR. GORFINE: Okay. Let's go to Mr. McHenry.

MR. McHENRY: Thank you. So does the scope of regulation that's currently under consideration extend beyond just trading to include aspects like mining? Because I know there's a lot of potential manipulation

there.

MR. DeWAAL: The answer is yes and no. Jurisdictions that have generated – that have regulations that actually address mining typically carve them out from the application, for example, money transmission requirements or even being -- getting a BitLicense. But the problem is, is once you -- once you're done mining, and then you start getting involved in -- you know, getting rid of the mined coins, then you're potentially touching other laws, depending on the business you're conducting.

I mean, the problem -- the issue is -- and, again, it's not -- it's not that different than the problems of the early 1970s when commodity options became a very, very popular vehicle for fraudsters in the United States. You know there was no doubt that there were legitimate users.

Today, nobody thinks about commodity options as primarily a fraud-based product. Okay. But in the early 1970s, before the adoption of the amendments to the Commodity Exchange Act that created the CFTC, there was great -- there was great confusion as to who had

jurisdiction over commodity options. Was it the States? Was it the SEC? It likely wasn't the Commodity Exchange Authority. But, you know, the problem was is that, you know, the concentration was getting rid of fraudsters. There was even that ban that I referenced last year from the end of the '70s to the early '80s in commodity options.

Until people can get their hands around this, okay, let's -- now we figured out we have an environment, and the exchanges will start trading this product. Right now, there are so many elements touched by every types of transactions. That's why making things -- doing things the right way is so difficult.

MR. LOTHIAN: So I'd like to take a little bit of a big-picture look at this because when the -- when the CBOE and the CME offered Bitcoin futures, I got a lot of calls. I got calls from FCMs, risk managers, general counsels, saying, "Hey, what do you think of these things?" -- you know -- "Should we offer these things?" whatever. And I had to really dig deep because I had some preconceived notions, and I had to work my way through those and take a different look at

this.

And so I want to take a different -- a different look. So Bitcoin futures, the Genesis Block, Satoshi Nakamoto, he supposedly, he or the group of people supposedly, mined the original million Bitcoin or thereabouts. Okay? It's worth six billion dollars today. It hasn't been touched. Okay?

Now, why don't you touch a six billion dollar asset? Okay? Now, you know, the reason that's most given is if somebody touched it and, you know, took some -- took some profits, a little portfolio reallocation, whatever you want to call it, that it would undermine the confidence in the product, and the product would go down. But you know what? If it goes down 90 percent and I get out with 600 million dollars, I am still 600 million dollars ahead of the game. Right?

But that's not the point. The point is, Why -- why don't you? And the reason is because you're making so much money elsewhere. Okay? And that points to a group of people having made the decision as opposed to one that it would be beating down on.

And so I asked myself, okay, who -- who -- who can make money from this product? And these are -- and this is early days. You know, I'm talking about the genesis of this, right? And I came up with the answer of money launderers. Okay? It's the third largest business or industry in the world. And if you think about it, who might be behind that? That could be Russia, oligarchs. We recently had the story of the Russian security forces that were hacking into the U.N. Okay? And they -- one of the ways that they were supporting themselves was actually mining Bitcoin or mining cryptocurrency. Okay?

And so that's my -- that's my theory, without any proof. Okay? And it's just a -- it's just a cautionary question. It's a "What if that's the case?" because it makes -- when I tell people this theory, they go, "You know what? It makes a lot more sense than it's a Japanese guy who created this technology and never touched the six billion dollars or 20 billion dollars when it was at its high." Okay? And so what -- you know, what are -- what is the risk of the origins of this?

Now, I -- I get the tremendous opportunities in the cryptocurrency. You guys do great work. I agree with much of what I heard. I'm even pursuing a token strategy myself, so I'm not -- I'm not anti. So to Gary's point, commodity options can be good. Okay? But what if there is a more nefarious beginning for this?

But the biggest question is, Who's looking into this? Because nobody that I've heard is looking into this, you know, other than, you know, *Newsweek* tried to do it a few years ago and got some -- some -- somebody that's not Satoshi Nakamoto, and there's other people that have come out and said it. But who's -- who -- you know, is this an issue for the concern underlying the confidence? If it turns out that it is created by money launderers, what does that do to the confidence of all this wealth and all this money and all this technology and investment? Okay?

And, quite frankly, if you think about it, if I gave you a million dollars to launder in cash -- right? -- and you take it maybe to your local mobster that you know and your repeat customers, so it gives you 70

cents on the dollar, if you think about the billions of dollars that are being invested in cryptocurrencies, that 30 percent margin represents easy to invest in making better technology for -- for laundering money.

And if -- and if the -- you know, if you look at the money laundering through Danske Bank that was going on and some other places, the huge amounts of money, guess what. The regulators are never going to keep up with -- with what's going on. The regulations are never going to keep up with what's going on. There's just too much money in it, and they're -- you know, and they're way ahead of us.

So that's the question I want to ask, and just to ask yourself that question, and --

MR. STEIN: So one of the biggest misunderstandings about Bitcoin is that people say it's anonymous. Not only is it not anonymous, to my understanding, going all the way back to Silk Road in 2014, law enforcement has been incredibly successful in using the pseudo-anonymity of the Bitcoin blockchain to identify and apprehend people who are doing money laundering or illegal activities.

Now, there are coins that have come about that have real anonymity. They don't have anywhere near the velocity or the market value that Bitcoin has. But Bitcoin itself, you can see every wallet, you can see every transaction.

So where is the Achilles' heel in Bitcoin? The Achilles' heel is not transactions that are done on the blockchain because they can be tracked; it's this unregulated world of exchanges where the exchange may or may not be employing AML/KYC. And if I can deposit Bitcoin into some exchange outside of the United States and find a counterparty, we may be able to transact -- that's not on the chain.

To Andre's point, I'm now taking full counterparty risk. I'm not on the blockchain, but I could do that as anonymously as this third-party organization allows. But all of this speaks to the value of having regulated qualified custodians and exchanges. And as we do with equities and fixed income and commodities, ring-fencing that space so that when I transact in shares of IBM, I don't have to worry about my counterparty because I know the entrance gate was manned. And so there are

solutions, and that drives much of what this panel was thinking about.

MR. LOTHIAN: Yeah, no, I note -- and I was actually kind of appalled by this when I looked into some of the exchanges where if I deposit my Bitcoin at the exchange and then go trade, my trades are actually not written to the blockchain, they're written to some other kind of system. So I'm really not trading Bitcoin, I'm trading a derivative of Bitcoin, which you might call a futures contract or some type of derivative or swap.

MR. STEIN: Except it's probably on an Excel spreadsheet.

MR. LOTHIAN: Yeah.

MR. DeWAAL: I mean -- I mean, and, also, John, in fairness, FinCEN and OFAC are pretty out there trying to tell people that just because you're trading this new exciting asset doesn't mean that you're not subject to AML and KYC concerns, and they're making it pretty clear that there are applications that have to apply. I mean, as I said, FinCEN has been pretty aggressive both -- there have been criminal actions out there for

folks who didn't get the money service business license, and they felt they should have, and they've been prosecuted, and I'm sure there will be more. And, you know, OFAC, make sure that you cannot do business with people who are transacting on a blockchain if they're a prohibited person. The fact that they're creative and, you know, they vowed to start listing addresses of, you know, that you shouldn't be dealing with.

So I think the crime enforcement people are pretty good. I had the pleasure of listening the other day to the senior guy in the State of Alabama who was the guy who actually helped the Iraqi government prosecute Saddam Hussein and Chemical Ali, and he's now in this crypto space and prosecuting reported bad guys, and he was explaining the processes they use to actually research and take advantage of the blockchain technology to learn who the bad guys are. And his problem isn't -- I mean, I'm sure there are guys out there he can't find, but his problem is there are too many guys he can find, they just don't have the resources to prosecute.

MR. McGREGOR: So just to --

MR. GORFINE: Sorry, Andre, I'm going to -- I'm going to cut you for a second here because we're going to try to stick to our timeline as best we can. So I'm actually going to go to Ms. Peve for a question, and then a question or comment from the Chairman and Commissioner Berkovitz to round out this panel discussion.

MS. PEVE: Thank you. So just real quick, stable coins. So they seem to have all of the characteristics and mechanics of a futures contract in that you're locking in a value today and protecting against volatility in the future. Have you guys looked at or discussed the emergence of stable coins and what the best practices or guiding principles should be around them?

MR. STEIN: So individually, I'm sure we all have. As a panel, we have not yet discussed it.

CHAIRMAN GIANCARLO: Just a little perspective here. The last time I did the math, the total value of all cryptocurrencies is a couple a hundred billion less than one large-cap tech stock, certainly dwarfed by

mortgage bond IRS FX energy markets.

Richard, you said, I think when you closed your presentation, that the stakes are high for a policy response in the area of cryptocurrency. So the floor is yours. Why are the stakes high if the magnitude of this is as small as it is?

MR. GORELICK: That's a great point. I think we do need to keep an eye on what is the overall size of this market and how does it compare to other asset classes that we should be concerned about?

I think my view is that this is an area that is relatively small today, but it has a tremendous amount of energy and enthusiasm behind it, and growth ahead of it. And with that in mind, now is sort of the time to get it right because we want that growth to occur by responsible market participants hopefully in regulated jurisdictions where there's appropriate safety and soundness, you know, guards. And now is the time to be doing that. It's not after this has grown to the point where it's significant from a systemic standpoint or compared to other asset classes.

COMMISSIONER BERKOVITZ: I just want to comment

that, Gary, your comments on trying to do smart regulation and the subcommittee's comments regarding that particularly resonated because over the past few years, I've been engaged in some of the same exercises that I think you are in terms of advising clients who may be interested in this space on the regulatory landscape. And I was frankly with a team of lawyers, and we have securities lawyers, we have commodities lawyers, we have AML lawyers, and just the barriers of the legal costs in terms of prospective clients having to arrange an array of lawyers to advise on how to get in this space, I'm also aware your vast experience over several decades, and I'm sure in advising clients of what's a forward, what's a future even.

We -- in many areas, we've sort of developed a common law of the Commodity Exchange Act, facts and circumstances tests, case-by-case basis. That may not be the best way to proceed for an industry trying to off the ground, as you've noted, and some legal certainty, but how we cut through that is a challenge that I look forward to the committee's recommendations how we can avoid the next 30 years of facts and

circumstances cases trying to address these.

MR. GORFINE: Okay. Maybe we'll take one more question or comment from Paul, and then wrap up the panel.

MR. CHOU: Thanks. I'll be fairly quick here. So, you know, I mean, some of the discussion that you guys had were the challenges of categorizing certain cryptocurrencies, whether they're definitely commodity, whether they have elements of security or not.

So my -- you know, from your review of the kind of cryptocurrencies that are out there right now, do you ever believe that it might be a realistic possibility that some cryptocurrencies will eventually have to be jointly regulated by the CFTC and the SEC similar to how single stock futures work, for example?

MR. DeWAAL: That's a -- that's really a good legal question. And, you know, as you know, I write a lot in this area, and I've thought about doing something in this area. And the answer is there is not really a mechanism for joint regulation yet because there's a mechanism in the world of security futures, but that was created by law, and that sort of gave a

mechanism.

Without some kind of compromise, you know, by law, either -- it's binary -- either it's a commodity that is defined under the Commodity Exchange Act, and then there is no preemption because it is a security, or it's not. So absent an amendment to the Commodity Exchange Act, the simple issue whether a particular token is regulated by the SEC or the CFTC I believe is binary. Others may disagree.

You know, there was -- again, going back, you know, decades ago, when this agency was begun, there were a lot of jurisdictional turf battles with the SEC over particular products. I mean, there were court battles. It was -- it was an interesting process to watch. Hopefully, to the Chairman's point, and to Richard's point, those things can be avoided by thoughtful, you know, planning in advance because, you know, that doesn't help anybody. But to me right now it would really be binary in this space, not joint.

MR. GORELICK: Well, to Gary's point about this being a binary determination, I think that's -- that's accurate from the way I understand the law to be today.

But one real interesting thing that came out of the SEC Hinman's speech a few months ago was that something can start off as a security, and at some point, when it's sufficiently decentralized, become a commodity. Presumably, it might be able to go back if it subsequently became less decentralized over time. And this idea that something can transform in nature and switch between regulatory regimes is really interesting, and it will pose some interesting questions for, you know, exactly what point does that jurisdiction switch, and how do we know whether or not it's occurred?

MR. LEVY: Just one point. I would argue -- I don't think "trinary" is a word, but maybe trilateral.

(Laughter.)

MR. LEVY: I think the banking system and the banking regulators will also have to play a role in this. We have a system today that doesn't really work that way. When we think about global competition where the regulatory side is maybe a bit cleaner and there are single regulators or broader regulators, especially when you look to the east, I do think that we're going

to have to seriously look at it and figure out, how do you get banking securities and commodities together when it makes sense? And I know that's not possible potentially in the practical world, but that is probably a version of the right answer in the long run.

MR. DeWAAL: Yeah. I'm sorry. On the point I mentioned before, I mean, already we're seeing, you know, the New York State Department of Financial Services has filed a lawsuit against the Office of the Comptroller of the Currency over its supposed FinTech -- the FinTech charter, and some other States are on the queue to do that. I mean, that's what we want to avoid. We want to avoid those kind of governmental battles that don't benefit anybody by thoughtful planning in advance.

MR. GORFINE: All right. Well, I'd like to thank our panelists for their comprehensive presentations, and our members for asking good questions and I think raising some new elements that the subcommittee might consider incorporating into their work going forward. So as we think about kind of next steps for the subcommittee, maybe formalizing some of the work that's

been done and the outline that essentially presents today, some of this may help to inform that work. So thank you very much to our panel.

Panel II: Automated and Modern Trading Markets Subcommittee Presentation

MR. GORFINE: I would now like to turn to our next panel, in which we will hear from our Automated and Modern Trading Markets Subcommittee member, Mr. Bryan Durkin.

So, Bryan, if you can -- assume the panel spot there.

MS. KERSHAW: Perhaps your party has a muted line. If he is online, he can press star-zero so I know which line to open.

(Pause.)

MS. KERSHAW: No one is signaling me so far.

MR. DURKIN: Well, thank you, Commissioners for this opportunity to present to you today on behalf of the Subcommittee for Automated and Modern Trading Markets.

First of all, congratulations, Commissioner Stump and Commissioner Berkovitz. It's wonderful to be in

front of a full complement of Commissioners. And Commissioner Stump, when you mentioned the genesis of this very important committee -- and Commissioner Quintenz, thank you for making sure you're carrying on the importance of this committee -- some of us I think were part of that original genesis.

And when you spoke about order routing mechanisms and having controls in place, I think it underscores the deep importance and commitment, not only of the CFTC to having forums like this, but hopefully my comments today will underscore the importance that this committee has had in informing the topic that we're going to talk about today.

So, first of all, electronic trading has emerged as the principal trade execution method for futures markets, resulting in important, well recognized public benefits of increasing liquidity, promoting price discovery, narrowing the bid ask spreads in markets, and lowering risk management costs.

Now, in light of this fact, over the last several years, this very committee and its subcommittees have examined numerous topics associated with the increase

in algorithmic trading and the dynamic changes that have occurred within our industry evolving from the increased usage of technology. Now, these efforts have unquestionably led to important and very noted principles, base guidance, involving a range of subjects directly related to the advancements in technology and to the progression in an increasingly automated marketplace.

Now, among other things, this guidance has informed industry and this Commission on risk management, pre- and post-trade protocols, systems safeguards, access to co-location facilities, messaging policies, and proposed Reg AT.

Now, today we're going to discuss a bit about volatility controls and the IOSCO report that Commissioner Quintenz referenced.

Now, this IOSCO consultation that was issued earlier this year is significant not only in its recommendations, but also more so in its continued advocacy for a principles-based approach to the application and to the oversight of controls and any regulations that are governing those.

Now, we should be proud to say that the U.S. markets are well ahead of the IOSCO report, and we believe, as a subcommittee, our work here under the Technology Advisory Committee, has largely contributed to our position as standard-bearers and as leaders in the advancement of risk and volatility controls.

Now, it goes without saying that everybody around this table, protection, market integrity, has the greatest import to every single one of us here today. We all share in the responsibility to deploy multiple and varying layers of controls across individual market participants, trading entities, FCMs, and exchanges. It's a collective effort. More than a significant amount of work has been put in by this industry over these years on this very front, and collectively we have built the standards for excellence in this industry in safeguarding these markets.

As I've noted, the work by this very advisory committee and the ongoing dialogue with the Commission around automated trading have created a forum, an excellent forum, a productive forum, for very productive, highly collaborative discussions between

our regulators and all layers of this industry, as indicated by this panel here today. And this has resulted in real demonstrative work products, such as the FIA best practices and industry guidelines for risk protocols and controls.

To take us back a bit, in 2010, the FIA formed a working group to evaluate existing practices and to provide recommendations for managing the risk of direct access market trading. This was formed under the Market Access Working Group. Now, this working group established a set of principles for this industry to rely on as matters of best practices, detailing risk management controls that should be in place across the marketplace, this being at the trading firm level, at the clearing member level, and at the exchange levels.

Now, these recommendations broadly addressed execution risk tools, such as pricing banding and dynamic limits. It addressed intraday position limits, post-trade checks, or drop copy functionality, co-location policies, conformance and certification testing, and guidelines for establishing strict error trade policies.

Very logically, the recommendations are delineated by trading and by clearing firms and by the exchanges according to the policy that's being addressed, according to the application of any tools, and the most efficient and the most logical way for these to be promoted. The goal has always been to promote enhanced transparency, minimizing uncertainty and systemic risk, and protecting and preserving these markets.

Now, soon thereafter, the FIA Working Group report was released. The FIA Principal Traders Group issued a comprehensive recommendation piece of work that addressed risk controls for trading firms, further expanding upon the FIA's market access risk management recommendations.

Now, this combined document set forth what the industry, after much deliberation, deemed essential, operating risk controls across markets to address market access, electronic trading, pre-trade risk management, trading interruptions, volatility, post-execution, and maintenance of overall business continuity. And in 2010, that collective guidance and the examination of the current practices was way ahead

of its time. In fact, the first FIA Working Group report was issued just prior to the May Flash Crash, and already the trading venues, such as our own at CME Group, already had numerous of these controls in place.

The working group acknowledged market structures and regulatory regimes differ across markets. They differ across the globe, and some markets will find themselves in different evolutionary stages. Therefore, a principles-based approach was most fitting in 2010, and it remains most fitting today.

Now, to that end, it is important that we, as leaders within this industry, constantly review and that we constantly assess where we are at collectively in our practices to protect these markets against market disruptions and to ensure that our markets remain fair, that they remain transparent, that they remain efficient.

This committee had extensive dialogue on the level and the application of appropriate market protections, the risks, and volatility controls during its Reg AT deliberations. It was made most evident then, and there are many of us still here around this table, that

a prescriptive approach would be detrimental and could have the unintended effect of unraveling much of the tremendously good work that has been accomplished over these years by this very industry, working side by side with this Commission, such as evidenced by the FIA best practices.

In 2010 and in 2015, the FIA conducted a survey of global exchanges' traded derivatives venues regarding the types and the position of controls that are offered. The FIA has performed a similar survey again this year, and I understand they hope to publish the survey results later on this year, but I'm fortunate enough to be able to share some of those findings which are relevant to today's discussion with you. And I very much thank the FIA for sharing this information with us in advance of their report's official publishing. And I thank them for their excellent work.

Now, with regard to this year's survey, the FIA found the following: out of 17 responses from major derivatives exchanges globally, 11 have implemented dynamic price bands, and 13 have implemented trading halts during extreme volatility. Every exchange in the

Americas that responded to this survey has implemented both price banding and trading halts without express regulatory requirements to do so. All European exchanges regulated under MiFID II that have responded to this survey have also implemented both price banding and trading halts under the requirements detailed in RTS 7, and more than half of the Asian exchanges that responded to the survey have now implemented price banding and trading halts, again without regulatory requirements.

Without question, our U.S. markets were well ahead in 2010, but the EU and the Asian markets have generally caught up by 2018. These findings prove out that global derivatives markets have implemented and have unquestionably improved upon market integrity controls without explicit regulatory requirements to do so. Why is this so? It's in our best interest to have the very best protections in place. Much of what we implement by way of risk controls is based upon our own view of the markets that we operate and represent, and also in response to our participants' demand.

It is important that regulators strike the right

balance in administering their oversight with allowing the markets to evolve accordingly with advancements in technology and market structures.

Now, moving on to the IOSCO consultation report that was just issued this past March entitled, "Mechanisms Used by Trading Venues to Manage Extreme Volatility and Preserve Orderly Trading." And I quote IOSCO, "The importance of establishment of volatility control mechanisms is recognized by trading venues and by regulatory authorities globally. And IOSCO believes that these mechanisms support the goal of ensuring that markets are fair, efficient, and transparent."

With the prevalence of automated trading in markets, IOSCO has determined to focus its work on, quote, automatic volatility interruptions and mechanisms and controls deployed by trading venues, or not, to halt trading or reject orders to minimize market disruptions. The aim of this report is to present a pathway, I believe, to establishing guidance or regulations to ensure volatility control mechanisms are appropriately implemented across markets globally with oversight by its jurisdictions' regulators.

Now, IOSCO issued eight recommendations, the first being that trading venues should have appropriate volatility control mechanisms. Now, as evidenced by recent events, extreme volatility can have a negative impact on market stability, on its integrity, its efficiency, and ultimately investor confidence. The report is focused on mitigating impacts of, quote, extreme volatility. The report very clearly recognizes that normal volatility is a healthy, and it's a regular component of market operations.

Their second recommendation is that trading venues ensure that volatility control mechanisms are appropriately calibrated. IOSCO recognized the importance in promoting a flexible approach to how venues might establish and calibrate volatility controls. Differences, and I quote, in approaches to managing excessive volatility reflect differences in market structure and flexibility needed by regulatory authorities and trading venues, thus, emphasizing a "one size fits all" model is not ideal. And I'll speak more to this point in a bit.

Their third recommendation is that trading venues

should regularly monitor volatility control mechanisms. In their report, IOSCO recommends that trading venues conduct regular reviews of their mechanisms, ensure that mechanisms are adapted to market changes and changing dynamics, and adjust mechanisms where it's warranted.

Their fourth recommendation is regulatory authorities should determine what information they require to effectively monitor volatility control mechanism frameworks.

The fifth recommendation, trading venues should provide regulatory authorities information regarding the triggering of volatility control mechanisms to regulatory authorities. The exchange markets work closely with our CFTC, and we share information routinely, and we're proud to do so. We have a very strong collaborative relationship in that regard.

And certainly upon a formal request by the Commission, as suggested by the IOSCO report, an SRO could be compelled to provide data to the CFTC at any time.

Their recommendation number six is that trading

venues should communicate information to market participants and to the public about volatility control mechanisms.

Their seventh recommendation is that trading venues should make available market participants -- to market participants, and, if appropriate, to the public, information regarding the triggering of a volatility control mechanism.

And, finally, the IOSCO recommends that where the same or related instruments are traded on multiple trading venues, there should be communication between the relevant trading venues.

Now, going back a moment into the IOSCO report, that trading venues should have appropriate volatility control mechanisms and ensure that those mechanisms are appropriately calibrated, I'd like to walk through some of the CME risk and volatility controls by way of example.

This is not comprehensive, but it gives you an outline of the framework that has been informed by this very Commission and by this very committee, noting some controls that have been in place for a number of years

by our institution, but also noting that this is an evolutionary program, and it's an adaptable program, and you'll see some that have been more recently introduced by our organization.

The goal here is to illustrate the need for markets to develop proprietary functionality that can be customized to the respective markets and the respective dynamics, as appropriate.

Inline credit controls, for example. CME Group now offers pre-trade risk management capabilities through its inline credit controls. ICC, as we refer to it, allows clearing member firms and Globex executing firms to set daily position limits for CME Globex at a per-product level and at the account level. Velocity Logic, which is an outgrowth of our stop logic capabilities, implemented in 2013. Velocity Logic is a patented and proprietary functionality within our Globex trading engine that has been designed to detect significant price moves of futures contracts occurring within a predetermined time period. And when those parameters are met, there are momentary pauses that are introduced into the system to allow the marketplace to

find its equilibrium and regroup.

Price limits and circuit breakers. Numerous CME Group products, including equity indices and energy products, have rules establishing daily price limits and/or circuit breakers in order to promote market confidence and to mitigate risks to the market infrastructure by allow market participants time to assimilate information and to mobilize liquidity during periods of sharp and potentially destabilizing price swings. Of note, circuit breakers are calibrated at defined levels and completely halt for defined periods of time for balance of the day's trading session when those parameters have been met. And price limits allow trading to continue, but only within defined limits.

Protection points for market and stop orders. As these controls are to control against price swings in illiquid markets, these price protection points prevent market and stop orders from being filled at significantly aberrant prices because of the absence of sufficient liquidity in a particular marketplace.

Pricing banding. Price banding is designed to prevent the entry of orders at clearly erroneous

prices. It's calibrated by a product basis thereby mitigating the potential for market disruption. And we have many other risk controls and protocols in place, but this gives you a sampling of how this marketplace has evolved and these risk management protocols, not unlike other institutions, have been implemented.

Although the IOSCO report and recommendations focused on recommendations deployed by market operators to mitigate potential impacts of extreme volatility, we, at the CME Group, obviously do not look at volatility controls singularly, but as part of a more robust offering of risk and a more robust offering of volatility mitigation tools. It's critical that markets continue to build upon existing controls and to protect the markets and address dynamic changes in our industry. It's incumbent upon all of us.

As the markets evolve, we must continue to evolve with it, and we have, and we do. To that end, a principles-based approach to regulatory administration and oversight of risk management capabilities used across this industry is essential in allowing our markets and allowing our market participants the

flexibility to keep pace with change, to keep pace with market and technology developments.

This has been absolutely most evident in the area of automated trading. Given the rapid and given the highly complex trading innovations that we are seeing, a regulatory standard must be flexible to adapt quickly and to adapt efficiently to changes in trading behavior and trading capacity. I think we have found prescriptive rules cannot keep pace with nor can it anticipate every technological innovation and may actually allow new methods to slip through regulatory cracks by doing so. Hence, a principles-based structure we believe avoids these types of pitfalls.

I'm proud to say that the Technology Advisory Committee has led much of the dialogue, has informed the great work, the principles, the guidelines, the risk protocols that have been outlined. It's been, from our ongoing discussions, many years of work by this Commission that has led us to this path.

It's encouraging to see recognition by IOSCO -- IOSCO, by the way, which is a global standard setter -- of the import of the value in relying on a principles-

based regime. And I'm confident that this industry, that the Commission, that the Technology Advisory Committee, will continue to build on the good work we've already accomplished thus far. I believe that this Commission and this committee will remain critically attuned to the developments that might require regulatory insight, guidance, and possibly oversight. I'm deeply proud to be a part of that evolution.

MR. GORFINE: Thank you very much, Mr. Durkin.

So with that, I again want to open the floor to any observations or questions that the TAC members may have, but also keep an eye towards, you know, some of the next steps for the subcommittee, including whether it's around the IOSCO recommendations and how they currently map to existing requirements or previously proposed requirements, or if there are new items that the subcommittee should be considering.

I'll begin with you, Mr. Tabb.

MR. TABB: Thanks.

Hi, Bryan. It seems like the IOSCO rules seem to be aligned with where we're headed. You know, where

would you say this committee and the regulators should focus on, you know, as we move forward? Do you see gaps? Do you see things that, you know, we should be thinking about as we move into the future? And what future steps, you know, should we help -- be able to help with, with the committee?

MR. DURKIN: Well, thank you, Larry. We do feel that the IOSCO report is very aligned with the work that we have done as part of the TAC and that the CFTC has led. They were very emphatic about a principles-based approach, which is something that I think everyone around this table has advocated for a number of years. The -- what they outlined in terms of volatility control mechanisms, many of us have already adapted those types of mechanisms in our -- on our second or third generation.

And that gets to my final point. I don't believe that this is an area that you're ever done. We have continued to introduce some more granular capabilities. I alluded to the inline credit controls. That was the most recent generation of risk controls that we introduced in the past year. So this is something that

as the markets continue to evolve, become more sophisticated, we have to continue to make sure that we have the protocols in place to address that.

I think you'll also find that with some of the capabilities that are in place, they bear a relook in some respects because of the sophistication and complexities associated with automated trading that maybe some of these areas could bear some refinement or calibration.

MR. GORFINE: Okay. I'll come over to Mr. Chattaway.

MR. CHATTAWAY: This is a little bit less of a question and more of just a general comment. One of the lessons learned from the Swiss de-peg in 2015 was where quantitative calibrations can go wrong, particularly in the provision of margin or leverage. And, you know, I think it's important for market participants and exchange operators to keep in mind the sort of nuances of various markets and, where appropriate, apply, you know, qualitative safeguards on markets where, you know, there may be government intervention or nuances that could result in extreme

volatility in a very sort of unpredictable manner.

MR. GORFINE: Thank you.

Mr. Hehmeyer.

MR. HEHMEYER: Thank you. Bryan knows that if I have a criticism of the CME, I usually speak up pretty quickly, and I have to agree with him that -- completely, that this principle-based approach has worked pretty well, knock on wood. And so as Bryan said, it evolves, it's an "earn your wings every day" type of endeavor.

But when I was at NFA, when we were talking about possibly going into different types of regulation and doing it differently, it became very complex on how to do that. And I would, for my two cents' worth, from the prop trading community, any of those tools that you all continue to -- you all, the exchanges -- continue to develop are very helpful for the -- for the trading companies, for the FCMs, for the entire community. These tools are very helpful in the firms trying to manage their risks. So I would definitely urge the exchanges to do that.

But it's -- the principle-based approach has

worked pretty well, and it gets extremely difficult to try to fix a problem that really isn't there. So I just would really encourage everybody, what Bryan said makes a lot of sense, they've done a great job at that for my two cents' worth from that community, given what we heard from the previous panel, the challenges with these digital assets and how that is so thirsty for regulation and attention.

My two cents. Thank you.

MR. GORFINE: So let me just pause for a moment because I heard the line beep twice, and I don't know if that's an indication that one of our members is trying to participate by phone. So if so, this is your opportunity to jump in.

(No audible response.)

MR. GORFINE: Okay. So then we'll move along.

So, Ms. VedBrat, please.

MS. VEDBRAT: So, you know, I'm participating in the subcommittee with Bryan, and, you know, one of the things we wanted to actually ask the broader TAC is if there is benefit in, you know, all of us looking for, you know, areas in the market that might have actually

been impacted by automated trading in a way that we might need to revisit.

And just, you know, to give you, you know, a little bit insight into where I'm going from here, you know, there are advancements in technology, there has been advancements in automated trading, there have been, you know, evolution in business models. You know, it's like Commissioner Stump had indicated, like from open outcry to exchange traded to algorithmic trading for many, you know, of the futures contracts that we -- that we invest in today.

And, you know, one example that comes to mind is, you know, we have some -- we have self-matching prevention engines that many of the exchanges, you know, offer. And what's happening is that, you know, many end users, they actually use algos to trade these contracts, and there was the self-matching prevention engines were designed in order to prevent, you know, prearranged trades in the same contract, same month, from happening for, you know, the same beneficial owner.

And what we're experiencing today is that you

could be using algos for different beneficial owners that are actually provided by different -- you know, by different banks, and those trades are getting rejected, which, you know, essentially is complicating the methodology for trading, and it is actually inserting unnecessary or redundant rejections, and at times, it may be for time-sensitive trades that we're trying to execute.

So, you know, this is just an example of how like, you know, there may be, you know, a rule or regulation that was written, you know, for prevention of certain activity, but because of the advancements along the way, they -- you know, they may not actually be providing the same type of -- or there may not be the need for the same type of regulation, and should we be addressing it? So what I would like to ask the TAC is, If you see these type of examples, please let the subcommittee know so we can, you know, further investigate them.

MR. GORFINE: Okay. Thank you.

I'll turn to Mr. Randich and any reactions to Ms. VedBrat's comments as well.

MR. RANDICH: Thanks. Yeah, looking at the parallels to the equity markets, you know, obviously, as the equity venues and exchanges went algorithmic and electronic 15 to 20 years ago, most, if not all, of these volatility controls were put in place with varying degrees of success; yet, we still ended up in 2010 with the Flash Crash. So now the SEC and others are focusing more on the root cause of the volatility, which are technology issues, and recently implemented the Reg SCI system compliance and integrity as well, you know, not only looking at the venue's system integrity, but also in other cases, the participants'.

And so that -- that element or dimension of this is in the content here. And I was just wondering if there is a focus on actually looking at the underlying technology that often is the root cause of why we get volatility.

MR. DURKIN: I would say yes, it is within our agreement to do so, but I could also get into a debate about the Flash Crash since I lived it very deeply at the time, and there actually were mechanisms that on the futures side we had in place, the stop logic

capability to be very specific, that did intercede and did have an effective impact in reversing the situation on the futures side.

So, you know, I would say it's a combination of factors. It is having those capabilities built into the system and also, you know, looking ahead in terms of understanding the technical components that are interfacing with these markets and making sure that the appropriate protocols are in place from beginning to end.

And I think in my comments I indicated that this is not a one-segment responsibility. So this committee has been very affirmative in saying -- and this Commission -- that, you know, it is all the players of the system that have a responsibility in terms of the risk management and risk protocols in place at the trading level, the clearing firm level, at the exchange level, at the participant level.

MR. GORFINE: Okay. I'll go to Mr. Levy and then Mr. Tabb.

MR. LEVY: This is maybe a bit of a stretch, but just picking up on some points. Bryan, you mentioned

never done on looking out and, you know, this is an evolution. Chris, at Goldman, talked about quantitative calibration gone wrong. Obviously, the markets have benefited from automated market-making, co-location, fiber and microwaves over time, and those are things 10, 20, 30 years ago that weren't as prevalent. And then from FINRA, Steven, the underlying tech is the cause or not.

I'm assuming that this hasn't come up in conversations, but in the next ten years, quantum computing will come online in a meaningful way, and what we -- you know, just as Tesla redefined what torque means in a production car, you know, that may redefine what the markets look like from an automation perspective and a trading perspective as it relates to electronic.

I assume the group hasn't talked about the impact of quantum computing on CME market-making and kill switches, et cetera. That may be a question or rhetorical, but that may be something to contemplate as you look to 2025 and beyond where quantum computing will be a reality and completely bend all of the

technology laws that we know exist today.

MR. TABB: Given the conversation between, you know, Bryan and Steve, how -- how have we done in terms of being able to, you know, deal with the jurisdictional issues between equities and futures given that a lot of your businesses, you know, e-minis are really very tied to the underlying cash markets. Are we getting better at that and harmonizing these stops and the cross-market, cross-jurisdictional issues?

MR. DURKIN: I'll just state that the capabilities that we have developed are, you know, very clearly accessible, they're publicized. We, you know, engage in public dialogues such as this one today to hopefully help each other learn and to be stronger in terms of learning from each other, the capabilities that are out there, and hopefully refining the tools that exist on our respective marketplaces.

MR. GORFINE: Commissioner Behnam.

COMMISSIONER BEHNAM: Bryan, thanks for the presentation. Appreciating the efficacy and the usefulness of a principles-based approach, what do you

think -- and you spoke to this a little bit, but I just want to unpack it a little bit more -- what can we do, I think as regulators, in relationship with the registrants? How can the relationship be better so that under a principles-based approach, we know that you're complying with the principles, as registrants, and then also from your shoes, you have a clear understanding of what the principles are? And I think we do that generally pretty well, but, you know, if we're going to have a principles-based approach, it's I think very important for all of us to understand what the principle -- what the principles are, what the expectations are, and that the registrants are meeting those principles.

MR. DURKIN: I think you coined it, Commissioner, yourself by saying ensuring that people understand the guidance or the principles, delineating those principles, making it incumbent upon the people that those principles apply to, to apply them appropriately, and to hold us all accountable in the context of carrying out those guidelines or principles. And there's a wonderful track record from this Commission

where that's been applied over the years, and it works.

MR. GORFINE: Mr. Gorelick?

MR. GORELICK: Thank you. Thank you, Bryan, for your presentation. Again, I always enjoy hearing all of the detail of the -- you know, how the industry has really raced ahead of some of these challenges and is continuing to work to keep up with sort of the latest thinking in the area.

I think one area that's particularly interesting in light of Steve's question as well is linkages between different markets when they have failures of some kind that take them offline through a circuit breaker or extreme volatility of some kind. I thought it was good that the IOSCO suggestions talk about communication between the exchanges. I think that's essential, and communication with the regulators also very important.

I think it's also important to think through hard-coded linkages between the exchanges because I think that's when we can start getting into challenges about fragility of a system. I think when you look at the equity markets in particular, there are hard-coded

linkages between those many markets in Reg NMS in particular that do raise concerns about fragility. I think we're fortunate in the futures market that it's more of a communication layer rather than a hard-coded linkage that we rely upon to prevent the spread of any technology problems that occur in one venue.

MR. GORFINE: Please.

MR. HEHMEYER: I agree with Richard completely, and to sort of emphasize my point, from our shop, when we deal with the CME, the tools are robust. They're granular. They are -- the technology is incredibly dependable. It's been thoroughly tested.

When we trade on one of these crypto exchanges, it's like you call -- you call and the phone rings and rings, and you don't know where your money is, it's off to some wallet, you've got no idea. And so this is -- and I don't want to jinx them because they do a great job every day, but -- and if there's a -- right exactly. But it's -- it's -- the technology and the tools are robust and developed, and that principle-based approach has worked well. And so when we go over into the crypto land, there's no principles, there's

sort of no nothing out there.

So I just -- I'll leave you with that. Thank you.

MR. GORFINE: Okay. So my next question is more of a process or output tied to next steps question. And, you know, maybe for Mr. Durkin or Ms. VedBrat or the full members, what might the next step look like for this subcommittee? Is it some type of a report kind of based on the outline that Mr. Durkin presented today around the IOSCO principles and some of the additional areas that have been flagged by members during discussion? Does it help to kind of summarize what the current state of play is for automated trading markets today? Any -- any thoughts or reactions there that can help kind of to guide the work of the subcommittee I think would be appreciated.

MR. DURKIN: Just from this discussion, I walked away with a few to-do's that I think could keep our subcommittee busy in terms of reporting on some of the mechanisms that have been outlined today, taking a relook at them, making sure that they're providing the functionality and impact that has served us well in the past. Is it serving us well today? Are there some

adjustments that maybe need to be considered? There are a few of those components that have been brought to my attention that I think we could take up with the committee. And I think also just to more directly tie what's been achieved to date through your good work as part of the Commission and linking that up with the IOSCO report might be beneficial.

MR. GORFINE: And I know that was a risky question to ask right before our lunch break, but Mr. Gorelick and then Mr. Chattaway.

MR. GORELICK: Sure. I think it was helpful to see the survey results from the FIA in terms of which other exchanges are broadly complying with these -- these best practices. It might be helpful to the subcommittee and the committee and the Commission to have similar reports from other exchanges and SEFs, DCMs and SEFs, about the extent to which exactly the details of their implementations and maybe some of the challenges and questions that they're running into.

MR. CHATTAWAY: Yeah. My comment is along a similar vein in that I think some more specificity would be -- would be warranted here. So, you know, we

talk about the principles. Let's list out what the principles are. Are they different from the IOSCO principles? Are they the same ones? Let's be a little more specific.

And then with respect to, Which venues do these principles apply to? like let's list them out. Which market participants do these principles apply to? Let's list them out. And that level of sort of specificity will I think help guide -- guide this subcommittee.

MR. GORFINE: Ms. VedBrat?

MS. VEDBRAT: You know, the Flash Crash was brought up again, and I don't know if it's beneficial to perhaps give a very short update of what caused the Flash Crash, and also like, you know, what changes have been made because, you know, while it was related to technology, and I go back to what I had said earlier, that there are advancements in technology over the years, and then there are enhancements that have to be made in order to, you know, keep evolving those markets. So we could actually provide an update on that.

And, you know, if you'd like, more recently the work that was done in order for us to be able to trade swaps, we could potentially provide, you know, some update on, you know, things that we should be looking at, given, you know, it's been multiple years since, you know, that evolution has taken place. So that gives a little bit -- you know, some concrete things to demonstrate.

MR. GORFINE: Thank you.

Okay. Well, with that, I'd like to thank our panelist, Mr. Durkin.

And then we are remarkably on time. So we will break for lunch and return back at 1:30 for our RegTech and Robo-Rulebook discussion, which will draw everybody back to their seats. So thank you.

(Lunch.)

Panel III: RegTech and Robo-Rulebooks

MR. GORFINE: I would like to call the TAC meeting back to order and begin our next session with a discussion of RegTech and how it is opening up the possibility of machine-readable and machine-executable rulebooks. At its core, RegTech appears to offer the

potential of more effective and efficient compliance by market participants as well as oversight by regulators. Today, we will hear about a broad range of efforts, including overseas, and then consider how these efforts may impact the CFTC and our markets.

Presenters today include Jo Ann Barefoot, Pierre Lamy, Brijesh Solanki, and Brian Trackman, from our very own LabCFTC, where we have been actively exploring developments within and applications of RegTech.

So with that, I'd like to kick it off with Ms. Barefoot.

MS. BAREFOOT: Thank you, Daniel.

It's a delight to be here today. I was able to watch the morning sessions and thought they were absolutely fascinating. And I'm happy to be able to come here and widen the lens a little bit on some of these issues, to put them in the context of what's happening with RegTech.

I work in the RegTech field all the time. I wanted to start by sharing a quote with you: "The biggest challenge facing virtually every regulator is: How do we take a 20th century analog rulebook and apply

it in a 21st century digital world?" That was said by the Chairman, Mr. Giancarlo, at my podcast interview with him last year, and I've been quoting it ever since. I think it's the pithiest statement of what this challenge is about from any agency head that I've had the opportunity to see.

So we're going to try to convey some of what's going on globally in RegTech -- more of it is outside the United States than in -- and, again, kind of convey some of the energy that's in this space.

So I'm going to start by telling you a story that occurred last year, December 1st, in London, at the Financial Conduct Authority where a little noticed event occurred that I think we might look back on as the equivalent for the regulatory world of Alexander Graham Bell making the first telephone call or Edison lighting a light bulb. The FCA ran an experiment on whether it was possible to issue a regulation in the form of code rather than words. They called it model-driven machine-executable regulation, and they organized what they call a TechSprint, which is a hackathon. They'll tell you we're regulators, so we

don't like the word "hack," so they call it a "sprint."

And they have done a series of these. They bring a group together, financial companies, I'm pretty sure Credit Suisse was at it, the tech people, some academics, and regulatory experts, and try to pick a problem. It's an innovation in regulatory process itself, which is really interesting to me. At each of these sprints, they'll try to pick a regulatory problem to try to solve, and then they'll work together across these diverse teams and try to actually write code to begin to solve it.

The one that happened last November and ended on December 1st lasted for two weeks, and culminated on the Friday afternoon. There was a lot of fear that it was going to fail. People were tired. But in the end, they pressed a computer keyboard, and they succeeded in executing an experimental regulatory change in ten seconds. They had taken one line of regulatory guidance, which was about requirements for retail lending reporting, and they had sat down what they call their tech group and their text group of regulatory experts. And they had worked on translating the syntax

of the words of the regulatory guidance into the syntax of the computer code, and ran it against a pool of dummy data, and were able to get first a correct report, and then they tweaked the regulatory requirement, ran it again, and got a correct adjusted report back.

It -- for the people who were there, it felt like a breakthrough. I'm going to show you a little video at the end of my talk. The room erupted in cheers over it. And, you know, I think it's ushering in a new era.

I'm a former bank regulator. We all know regulation changes slowly and with great difficulty, but there is a breakthrough occurring today, and it has to do with shifting the whole ecosystem from an analog to a digital design, as you said, Mr. Chairman. All our financial products pretty much were designed on paper originally, and over the years we have automated them and had ways of speeding them up and gaining some efficiency.

But the thing that's happening today is that we're moving them toward -- we're moving finance, and then behind that, financial regulation, from an analog to a

digital design. And when you digitize things, you make them faster and cheaper and better and don't -- you're not just -- it's like the difference between -- it's like Uber. You can start with a -- you can say Uber solved problems like being able to find a taxi, but we didn't know it was a problem that you have had to pay for the taxi ride at the end of the ride until the whole process got redesigned.

So this is underway worldwide. There are -- I believe the FCA is the leading agency in the world, but many countries are really aggressively undertaking RegTech at the government level, and also thousands of companies are cropping up to reform compliance. The RegTech for regulators is sometimes called SupTech, for Supervisory Tech, a word I disapprove of. I see people smiling. It sounds like "chicken noodle soup." But the two are converging using the same technologies.

So globally, the leading use cases that are emerging include the -- converting the rulebook to being machine-readable is a top case. Both regulators and private sector companies are working on this. And the idea is to put an electronic tag on the sections of

regulations and rules and be able to say -- enable a machine to be able to understand who and what is covered by it, and then to implement changes. The machine-executable scenario that I described at the beginning is also the subject of a great deal of work. It's a more ambitious vision, but people are working on it.

There's a great deal of work underway on market monitoring through RegTech using artificial intelligence to detect patterns of conduct that could indicate misbehavior or noncompliance or regulatory risk. Some regulators in the world are working on putting chatbots on telephones, on the cell phone, so that people can complain directly to the regulator if they are detecting -- if they think they might be the subject of a scam or something like that.

There's a huge amount of work underway in anti-money laundering. It's really a leading use case. The United Nations says that there is about $2 trillion a year laundered in the United States -- in the world globally, and that we're catching less than one percent of it with the current approach. And we are spending

tens of billions of dollars to do that. It's not lack of resources; it's old technology that's really holding us back.

So digital identity is another area where RegTech is being used. There's a proliferation of kinds of use cases trying to bring this digital thinking into it. And I might say that one of the driving forces behind a lot of it is the global push to financial inclusion through the mobile phone that has really caused NGOs, like the Gates Foundation and the Omidyar Network or the World Bank to prioritize RegTech as one of the most important goals for building a healthy financial system for people because regulators throughout the world can't keep up with the changes that are underway.

So I want to quickly walk through the key concepts that I think we should have in mind on RegTech. The first is I think that we should be aiming for actual transformation of the regulatory space. Again, I'm a former bank regulator. I work with regulators all over the world. I know how difficult this is. But there's an opportunity here to deeply redesign how we do regulation and actually make it work better, cheaper,

and faster at the same time.

Secondly, we have the technology already to do most of this. The problem we have is with institutional readiness and capacity. It's hard for both the agencies and the industry to make these kinds of adjustments. And it's going to be necessary to do that, to move to a digitally native design.

Third, we are going to have to learn to move faster. That doesn't come naturally to regulators either. People worry about getting it wrong, but if you think about the difference between the linear pace of change and regulation and the exponential pace of change in technology, the delta between the two is growing fast, and there is so much risk in it that -- and it's going to widen unless somehow we can enable the regulatory process to speed up. To do that, we're going to need new models, new architecture. We have an entrenched complicated system in both the regulatory apparatus and the industry, and we're not going to change most of that, so we have to enable it to connect up differently, work differently together, and move more quickly.

Another secret to success in this, including acceleration, is we need a lot more collaboration. We need a lot more ability to talk freely and work together. The FCA's TechSprint is a great model of that.

I like to say I'm in a good meeting these days if I have to declare an acronym-free zone because you know you've got people in the room who are coming from different worlds. If you get people who can write code and people who can't, put them in the same room, then they have no idea what each other is talking about.

Another key is regulators have to have the capacity for experimentation. LabCFTC and also the Science Prize Challenge are such amazing innovations. The CFTC, in my opinion, is the leading agency in the United States in really embracing an agenda of innovation. And part of the key to this is there has to be a place for regulators to work hands-on with both FinTech and RegTech and try things out rather than just learn by regulating them.

Another is we need to be working to interoperability, and the regulators have a huge role

to play in beginning to set standards that can enable everybody to get onto the same frameworks and connect up.

The other key is to move toward open source design in regulation, to be moving from our sort of rigid, centralized processes and beginning to move the whole regulatory space onto a platform where we can have continuous innovation, not have dominance by a rigid single vendor or single firm, but, rather, enable people to have people who are starting to talk about having a GitHub for regulation, a place where we can gather the best innovation together.

And last, I think it's a way to think about how to get from here to there, is to begin to introduce some of these changes in an alternative regulatory track on the side, plant it on the side of the current system, don't try to reform the whole system at once. But think big, but start small with some alternatives, especially in new areas, and learn from that experience and let it grow.

So I want to just show you this very short video, if we can queue the video. This is from the Financial

Conduct Authority.

(Showing video.)

Text on video screen: The autumn 2017 TechSprint examined the potential to deliver model-driven, machine-executable regulatory reporting

MR. OLIVER BURROWS (Chief Data Officer & Head of Data & Statistics Division, Bank of England): This is about communication between regulators and firms. The challenge here was, Can you make this a straight-through process? Can you make it machine-readable, model-driven, machine-executable? What we've got here now is a rule that's being ingested and made machine-readable. You change the rule, it flows all the way through. And we saw it happen. It took seconds, 10, 12 seconds. To me it works really really well.

Text on video screen: Participants worked to map an FCA regulatory requirement directly to a financial institution's data

(cheering)

Text on video screen: Laying the groundwork to automate regulatory reporting, which could reduce the need for costly interpretation within banks

MR. CHRISTOPHER WOOLARD (Executive Director of Strategy and Competition, FCA): This is not the first TechSprint we've done of this kind. But it certainly is the longest, it certainly is the most complex. Huge amounts of the costs is sunk into the current process of regulatory compliance. There are real costs in terms of time, management effort, distractions, that go around these systems at the moment. And actually, if they can be channeled elsewhere, they can be channeled to the issues that create public value, that really go to the heart of why we regulate in the first place. Then that's a huge prize on the table.

MR. IAN SMART (Partner, Grant Thornton): It's actually worked beyond our wildest imagination, to be truthful.

(Video ends)

MS. BAREFOOT: So I'll leave you with that, beyond their wildest imaginations. And I'll ask you the question, When was the last time you ever saw bankers and regulators cheering together? Something different is happening, so it's exciting.

MR. GORFINE: Okay. Thank you, Jo Ann.

We're actually going to go to Pierre, who should be on the line.

So, Pierre, if you can --

MR. LAMY: Yes, I am on the line. Thank you.

MR. GORFINE: Excellent. Thank you. Go ahead.

MR. LAMY: Okay. Good afternoon. Thank you to the CFTC Technology Advisory Committee for giving me the opportunity to share our experience at REGnosys as it relates to machine-executable regulation. As Jo Ann just said, this is an important field to make regulation easy to adopt and to comply with.

Before going further into my presentation, can you please confirm that you have the cover page of my supporting slides on the screen?

MR. GORFINE: Yes, we have your first slide up, Pierre.

MR. LAMY: Perfect. Thank you.

So let me start with a brief background about REGnosys. REGnosys is a FinTech company which was created two years ago with a vision to radically transform the financial industry's approach to regulatory compliance by providing a digital repository

of data, workflow, market practices, and regulatory provision that is accessible to all market participants. The digital repository is called "Rosetta." We expect Rosetta to result in a more transparent and efficient marketplace while also facilitate the development of a rich ecosystem of new technology solution providers. We will get back to Rosetta later on in this presentation.

Let me shift for now to what has been our experience with regulators here in London as it relates to machine-executable regulation. REGnosys was given the opportunity by the FCA to get involved in the two-week TechSprint that Jo Ann just -- was just referring to early on. This TechSprint made use of natural language processing technology, which ends at turning human language into executable code.

One of the key takeaways from this TechSprint has been that for such efforts to succeed, the source document needs to be expressed in unambiguous terms and syntax so that it can be converted into a sequence of subject-object predicates that can be executed by machines. So the subject and objects need themselves

to be unambiguous. Let me just give you an example. As Jo Ann mentioned the (inaudible) data that we basically seized upon applied to retail clients. It progressively emerged through this two-week TechSprint that the banks involved in it had quite different interpretation of what a retail client is. As a result, both of the exercises consisted -- as consistent into qualifying at an actionable level what the retail client is for the purpose of this role.

Natural language processing is certainly a very interesting technology. Its usage in the regulatory space, however, requires that rules be written with specific syntax and be actionable. In that respect, I do not see this technology as applicable to principle-based regulation. We then believe that the recent opportunity to complement such parties with solutions that are compatible with the regulatory framework that currently exists. Rosetta can provide such answer.

Today's topic, being machine-executable regulation, I would like to present Rosetta as the machine-executable workflow. If you could please turn to the second page of my supporting presentation, at

the core of Rosetta is the syntax that provides the ability to express data presentation, data validation, data mapping, and workflow logic in an intuitive and legible manner for non-technologists. This syntax is then automatically translated into executable code.

Rosetta is currently used by ISDA and market participants to develop the Common Domain Model, which is a digital representation of the derivatives products and workflows. The expectation is that this ISDA Common Domain Model will bring efficiency and transparency to the marketplace and will facilitate interoperability across platforms, such as blockchain providers.

The first version of the ISDA Common Domain Model was released in May of this year. Its initial scope include the features that is particularly relevant for this discussion, as it corresponds to an initial state into providing machine-executable ISDA definitions.

If you could please turn to page three of this presentation, the approach that we have taken as part of Rosetta is to position the ISDA definition text alongside the machine-executable expression of it.

This provides an explicit and auditable relationship between the original text and its Rosetta syntax expression. Whereas the ISDA Common Domain Model focus has so far been on derivatives, data, and workflows, we have undertaken work in terms of technologies to confirm that this approach can also be applied to regulatory positions.

I would like to explain this work through two examples. If you could please turn to page four of the presentation, the ESMA MiFIR rule that went into compliance earlier this year specified that all instruments need to be reported with a buyer-seller indicator. It also specifies how the various types of swaps, which are transacted through a payer-receiver indicator, should be reported with such a buyer-seller indicator. The specification was published via spreadsheet, the translation into code by the respective market participants.

Using the same approach as illustrated before in the case of the ISDA Day Count Fraction, you can see here that we have extended the data representation for swaps, which is part of the ISDA Common Domain Model to

provide a mapping into this ESMA reporting specifications for the buyer-seller indicator. This is, I believe, a good illustration of the close synergy potential that exists between Rosetta as a machine-executable workflow and the quest for machine-executable regulation.

If you could please turn to page five of the presentation, the second example that I would like to share with the TAC members relates to the CFTC Part 43 rule, which specifies that the price of which swaps are transacted need to be reported through two distinct fields called "price notation" and "additional price notation."

As part of the rule implementation, market participants did agree on the common market practice to specify all of the instruments should be reported, depending upon the type of swap and whether the transaction was a fixed or flow thread, spread, an initial fee, et cetera. This market practice was then published by ISDA as a spreadsheet to be transacted into code by the respective market participants.

The second example is interesting in the terms

that this provision for the Part 43 rule cannot be translated into executable code as such. In this respect, this is quite similar to the retail client example that I was referring to earlier as part of the discussion. In this case, Rosetta provides the flexibility to reference both the Part 43 rule and the ISDA market practice and express those into a legible syntax that can then be turned into machine-executable code.

To conclude, I would like to suggest that there would be value for both market participants and regulators to further explore how we could leverage Rosetta to make regulation easier to adopt and to comply with. The technical infrastructure already exists. Its usage is currently being tested by a number of actors in the marketplace. The timing seems right to further its applicability in the regulatory space through joint involvement of regulator and market participants.

Thank you.

MR. GORFINE: Thank you, Pierre.

I'll turn next to Brijesh, please.

MR. SOLANKI: Thank you. So we are part of the FCA pilot, and we are still working with them.

(Microphone problem.)

MR. SOLANKI: Better now? Yep?

So I agree with the comments and the approach recommended by both speakers before me, so I won't repeat some of that, but just to step back and to explain the approach and the objectives we had when we started some of this work internally within Credit Suisse as well as with FCA, our observations are that the regulatory environment is complex and continues to become complex, and the cost of implementation and the time to market continues to increase.

With an organization like Credit Suisse, we also deal with a very large group of regulators here in the U.S. as well as abroad, and in many cases, what we are seeing is that we have same or similar regulations with different interpretations, and Basel III being a perfect example where we have different interpretations across regulations, which we have to comply to.

What we started doing is looking at machine-executable and machine-readable regulations sometime

last year in order to understand the potential of technologies. So we are playing with AI, machine learning, NLP, and a few other technologies. We have started participating in a couple of sprints, as mentioned, with FCA. We are also working here in the U.S. with a university to execute some research projects to understand how some of this technology can be extended, and we could push the boundaries.

Now, just from our point of view, the way we are approaching this, just conceptually, we think of it as three big broad buckets of activities. So there are inputs, and I'll explain some of it; there is the processing part of how to read, how to understand; and there are the outputs.

When it comes to inputs, I think one of the primary and the most important aspect, which was mentioned, is having a common language, common terminology, which we do not have. And when we look at the global perspective, we definitely have an issue with not having a common language we can speak.

The rulebooks historically have been plain English text, and then we need to understand how we could

leverage, if any, of that to build machine-executable regulations. We definitely need common terminology and a mechanism to have common interpretation of some of the rules, which is an issue and which consistently takes a lot of time to bed down.

And we, I think, need collaboration amongst regulators globally to work together to find common approaches on some of the regulatory requirements. So that we think those are our observations as to the things we need to be successful with these technologies. Yeah?

In terms of the processing, the second big bucket of activities, the way we are approaching this is, building algorithms is hard, but the technology and understanding of these algorithms is evolving, and at some point, we will be at a place where these algorithms will be relatively easier to build and execute.

I think the real challenge is around understanding how to structure the process steps involved as well as how to organize the execution of these rules.

And, finally, when it comes to these processes,

understanding the data quality expectations on the regulatory side as well as on our side internally is quite important. What we have also observed is different regulators seem to have different perceptions and expectations on data quality, which I think needs some level of harmonization.

And, lastly, the last bucket around the outputs. So we are looking at the outputs in terms of what do we actually produce and what do we actually submit to the regulators and how that can be part of situation. How do we use some of this to generate internal MI, so analytics, so we can understand and leverage the data internally and not just for regulatory purposes?

So conceptually, that is how we are approaching. And then all the buckets, we have some sort of activity ongoing right now. And I can -- I'll talk to a couple of examples of those activities.

Key dependencies, common language across the industry is a very big dependency, and we need a mechanism in which I think it is better to run with as a joint collaboration between the industry as well as the regulators to define that common language, so we

can all work towards that.

We need consistency in terms of expectations across regulators globally. We need a relatively flexible data model to be able to do this because it's all about data, and if we don't have flexibility and a consistent common data model, it's a challenge. We need consistency in data quality and timing expectations, and we need consistency in terms of the frequency of how frequently we've done certain things when we execute them.

So just to talk about one of the examples and one of the projects we are running here in the U.S. with a university, in order to understand how to approach this, we are playing with some of the technologies and the sprints we -- we -- that was discussed with FCA, but we are also trying to approach this from the other side.

What we're doing is we took some of the Basel III documents and we said, well, can we build models and LP algorithms, so on and so forth, that could read these documents and translate them into machine-executable regulations? What we have learned is converting plain

English text into executable regulations is quite hard, and the technology needs quite a bit of evolution, and there is a lot of learning involved in it. But the things we have managed to do is we are able to read plain English text, find out the meanings of the words in the right contexts of those paragraphs, so we're not just reading words and doing the comparison to understand what is the meaning of a word, we are trying to read the words in the context of the paragraphs so we can understand what does that word mean in a paragraph in the right context. And we are also trying to now build decision algorithms once we learn that to build relationships.

So one of the things we're trying to do is build relationships between historic documents and current documents by reading to understand how regulations have evolved. So if you look at something like Basel III or Basel, over the last ten years, it has consistently evolved. So what we want to do is go from Basel I to Basel III or maybe now Basel IV and start building those relationships to understand how these regulations are evolving, and that allows us to do impact analysis.

So when new regulations come, the amount of time and energy it takes to understand, what does it mean? What is the interpretation? What does it mean to us? and how to go implement -- how to go about implementing this, we are trying to see if we can carve that cycle down by having this historic lineage and traceability on regulations.

We are definitely not there, and I think we need to do a lot more work. We are absolutely not there. But it is an exciting space. Obviously, there are many challenges, but we definitely see a lot of opportunities in playing with these technologies. So we are coming at this from both sides, look at the executable side of things, but also try to see how some of the existing stuff can be converted. It is a good learning experience for us as organization because it's helping us understand how to think through the future.

A couple of other things I would mention is any -- any development in this space will have to factor in the historic portability as to how we ensure that the future technology-based solutions are going to be portable with what we already have up and running

because changing all that is going to be a massive cost and quite complex. And we also think that this is a great opportunity in terms of public-private partnership and working together with the regulators under their guidance and under their leadership.

Thank you.

MR. GORFINE: Thank you very much.

And last but not least, Mr. Brian Trackman, from LabCFTC.

MR. TRACKMAN: Thank you, Daniel.

Mr. Chairman, Commissioners, members of TAC, it's my pleasure and privilege to present to you today. I want to thank my LabCFTC colleagues for also helping to prepare this presentation. Many of the themes that we just heard about -- complexity in our marketplace, digital transformation of the financial markets, opportunities in RegTech for collaboration, particularly between ourselves and other regulators and members of the market, market participants -- are definitely things that we here at the CFTC have been thinking about. And as a member of LabCFTC, I'm part of the group that really has the mission to take the

lead in engaging in this area and looking for opportunities to facilitate market-enhancing innovation.

So I will note I am the attorney lead, not the tech lead, so hopefully they'll -- all right, there we go.

So, you know, overall, we have a broad objective. A lot of what we do is around engagement. We meet innovators both here and, of course, we do office hours across the country, but also we are looking for opportunities to proactively facilitate that, that new -- those new steps, and I think this is the basic idea to spur innovative thinking and activity around applications of new technology.

So last spring, we initiated a request for input on potential prize competitions that we here at the CFTC would sponsor. We solicited and received feedback on both substantive topic areas and how we might administer such a competition. We had a 90-day comment period, which is now concluded, and my goal today is both to, you know, summarize what we have done and provide you with some of the key takeaways that we have

going forward.

Just by way of background, the science prize competition provides authority to all Federal agencies, including ours, to set up and structure essentially a competition that would have a defined topic area and would then solicit potential solutions. In terms of administration, we have broad flexibility. The SPCA includes certain limited requirements, but gives broad discretion to the agency head to structure it in a way that makes sense both for the subject matter and for the specific industry. There's a very useful website, I'll just pause to note, challenge.gov. If anyone is interested, they can take a look there to see -- they can take a look to see competitions that have been done already. But as far as I know, we would be the first financial regulator to do such a competition.

So in the RFI, we proposed a number of ideas. We meant these really to grease the wheels in terms of what commenters might provide feedback on. We didn't mean these to be an exclusive list by any means, but the five are listed here. We did receive meaningful feedback on all five, and you will note that the

Robo-Rulebook, which is essentially a layman's term for machine-executable, machine-readable code, was one of the proposals that -- that we put forward.

I will get this right before the end of the presentation I promise, I promise.

We had a goal to stimulate thinking around RegTech in doing our RFI, and in that respect, it was, from our perspective, a very big success. We got strong feedback, as I noted, particularly around the machine-readable and machine-executable regulation. The topic areas we proposed are overlapping. And so automated regulatory reporting, leveraging new sources of market data for such things as better market surveillance, standards development, really form an orbit that could help us select a competition topic going forward.

We got some comment, too, on administrative elements. There was some divergence of thinking with respect to the best way to structure a competition. I think Jo Ann mentioned that in the UK, the structure has been these shorter framework competitions. Others suggested that perhaps a longer program might work better to generate solutions that are more meaningful.

There was some question about IP rights.

Again, there's a lot of flexibility here. And I should also note that in terms of the prizes, there's a lot of flexibility. The SPCA provides for both non-cash awards as well as cash awards. So we have a lot of flexibility in how we go about doing this.

So in terms of key takeaways, certainly, the Robo-Rulebook concept has global interest. As was already mentioned, other jurisdictions are exploring this. A number of entities are also involved working on potential ways in which we can make regulation more accessible to machines, which has the great potential of reducing costs.

A few other takeaways, which I think are relevant in thinking here, when it comes to automated regulatory reporting, which has been a challenge, there seems to be a lot of potential there. A competition, some commenters suggested, might be a -- that might be a useful focus.

The other broad feedback we got was that if we do a competition, we should focus on practical steps, which I personally thought was quite useful to hear.

Keep it specific, keep it practical.

And then the other piece that's rather broad and cuts across different specific topics is the importance of standards. I think we heard mention of that, too, in the earlier presentations, the need for a strong base layer to really support further innovation, and that might be an area, some commenters suggested, where a Commission-sponsored competition could be helpful.

So going forward, our evaluation rubric, this I took right from our RFI. An ideal competition would both highlight how new technology can benefit the CFTC as well as the derivatives markets we oversee, and also lead to actionable next steps, which could include further use case development, additional research or investment, proofs of concept, and implementation.

So that's kind of what we've done so far. And where we are right now is that we are continuing to evaluate the comments we received. They are available publicly right from our website if you hit the links over to public comments. And we are intending to maintain a public dialogue on which topic we should choose. So if folks have ideas or further thoughts, we

would be welcome -- very welcoming of those.

Directionally, I think we're hoping to move forward with the competition sometime early next year.

Thank you.

MR. GORFINE: Great. Thank you, Brian, and thanks to all of our panelists.

So I'd like to open the floor to our members to ask questions or make some observations.

Mr. Randich, we can begin with you.

MR. RANDICH: Okay. Thanks. I think, you know, having worked as a consultant, an exchange bank broker-dealer, now regulator, I think this idea would be great because one of the biggest issues that you hear from firms, the participants, is the fact that they've got to deal with dozens, if not hundreds, of regulators and the interfaces with all of them, and the language is all different. But then the reality of it, from an implementation and execution standpoint is that, you know, because of the politics, the history, and the jurisdiction overlaps and competition, and then you've got, you know, the States and the Federal and you've got foreign and local, historically the regulators

don't really want to work together. So how are you going to get to -- and without getting them to work together, this isn't really going to break through.

So have you seen or heard or gotten any sense for movement in this regard?

MS. BAREFOOT: So I think you put your finger on the problem. And I have a lot of sympathy for the regulators, challenges with it. There is a lot of movement toward more collaboration. Even the U.S. regulators now all have innovation groups. And, Daniel, I know you're all in regular conversation with each other, connections are starting to form. And globally the FCA spearheaded the creation of GFIN, the Global Financial Innovation Network, which was originally conceived of to be a global sandbox and will still include a sandbox, but will be broader than that. One U.S. agency has signed up for that, CFPB, the FBCFP, whichever name they're using today, and there are 12 countries in it, and they're going to do just, as was said, to try to pick something very small and practical and doable and build the relationships and build from there.

The FCA did a bigger TechSprint in May. Daniel and I were both there. We had six U.S. agencies -- FINRA participated in it as well. Six U.S. agencies went to London to observe or participate in that event, and regulators came from all over the world just to watch it. And now there's going to be a bigger one in Abu Dhabi next year with a bunch of countries doing multicountry AML problem solving. So there are seeds of change.

MR. GORFINE: Brian, did you have a --

MR. TRACKMAN: Sorry, I was --

MR. GORFINE: Sorry, Jo Ann.

MR. TRACKMAN: I was just going -- I was just going to say that in our case, we would welcome specific ideas on how better to coordinate, but it's not -- also, it's important to point out I think that from our perspective it's not necessarily the case that we need to wait for coordination before proceeding. There could be some value, we think, in proceeding and then being a model for others. And we've noticed that from the perspective of LabCFTC. So --

CHAIRMAN GIANCARLO: If I could jump in on that

one, at least this agency is highly committed to coordinating with our fellow regulatory agencies, not just here in Washington but around the globe. The last two days, we had, in addition to ourselves, 18 regulatory agencies here at the CFTC plus SROs, including FINRA, working with our FinTech Forward 2-day conference. So we've made great strides. And, in fact, yesterday we signed a cooperation agreement with the Australian regulator right here, and that's our third one. We already have one in place with the FCA and with the MAS out of Singapore. So we've made a -- put a real emphasis on coordination, I think. And for all of the reasons that have been expressed here, coordination is vitally important.

MR. GORFINE: Okay, great. I'll go to Mr. Tabb, Mr. McHenry, and then Mr. Levy.

MR. TABB: Hi. This sounds -- you know, being on, you know, historically been and, you know, bank and bank tech areas a long time ago, this opens up a tremendous amount of efficiency. I guess the two questions I have are, first, you know, if you start thinking about framing the regulations in, you know,

kind of more structured language, does that, you know -- are the Commission -- you know, you guys -- it would seem to me mostly the folks writing rules are lawyers, not technology folks. Does that -- you know, how does that start, you know, getting into the fact?

And then the other side, on the implementation side, the banks have different technologies and infrastructures, and how to convert that and put it into your own technology, that would seem to be -- you know, it's certainly probably easier than having to do everything by hand by coding, but it would seem to me every implementation of that would be pretty significantly different, depending upon your systems and your database infrastructures.

MR. GORFINE: Larry, actually, I'll jump in for a second on your question, and, you know, it's a very good point, and that's part of the effort of LabCFTC, is obviously around introducing more technologists to the agency. But one area where there is really low-hanging fruit, and even resonates with folks like us that are lawyers, is that we publish no-action letters, for example, in PDF format, which are not readily

consumable by these types of platforms. So there are areas where it seems like there is low-hanging fruit that we're beginning to explore. But I will defer to the experts there.

Yeah, Brijesh, please.

MR. SOLANKI: So I think it's a great point, what you raise. I think the first thing which would help the most is to establish that common language and a common data model because I think that is where it's going to start. And I think the regulators have an opportunity to take a lead in establishing a common language and data model because once we have that, it, I think, makes the communication easy, machine to machine. Yeah?

In my personal view, I think at some point in the future, we will have the plain English text documents with regulations, and there will be an accompanying document which will be the machine-readable format because I think the need for plain English will not go away, but we will have machine-readable formats that come with that. Yeah? So I think that's the first part. Obviously, we're very far from there, and I

think the first step is getting the common language, common terminology, and some level of agreement on some of the interpretation-related issues we face globally. Yeah?

To answer your second question, I think it's a very good question, as to if we achieve that, how does that fit into the existing infrastructure in the industry? Yeah?

I think the infrastructure will have to change to some extent. I don't think it needs a full rebuild or full redo. It is the interfacing because the way we think of it is if we have the common data model, common language, internally we have to map our systems to that, and once we receive the external regulations in a machine-readable format, we just need a mechanism to then execute those internally.

So, again, easier said than done, but at least -- at least there are design patterns we can look to that might help us.

MS. BAREFOOT: I would just add that part of the secret to making this doable in the real world is going to be to phase it in, and as we have both the paper

document or the Word document in the machine-readable form there, I think an -- it wouldn't work for everything, but to start to give the industry the option, you can report the way you always have. You know, you may not like it, but you know how to do it. Or you can come into this new RegTech track, and it will be more efficient, and you can -- you'll -- we'll see you more fully, so you have to be -- think about that tradeoff, but not force the change on the whole system any more than we have to.

MR. GORFINE: So we have to be mindful of time, but I'll move to these final three questions or comments.

MR. LAMY: Can I -- this is Pierre. Can I just add something in response to the point that Larry made?

MR. GORFINE: Please. Go ahead, Pierre.

MR. LAMY: Yes, thank you. Yes. I -- I completely agree with the two points made by Larry Tabb in the sense that we should not develop a solution that is based on the assumption that we will revise the rules into a way that is more friendly to machine execution because it would just -- I do not see that

happening, and putting that precedence would delay everything, which is exactly what we have -- the formation of what we have been doing with Rosetta, which is assuming that we take the rules as they exist, and then what we do beside them is to develop an implementation that is very legible as part of the syntax that we have developed that provide the ability to express an interpretation of those rules into something which is directly machine-executable.

I also completely agree with the fact that we have a very diverse environment within the banks, and I do not see any time soon when the banks would say, okay, let's completely change all data models and the way we do things to addressing something else because that will not happen.

So what we have also built within Rosetta is an explicit mapping between the canonical model, which is this normalized model that we're developing with ISDA and other market participants with all the -- and explicit mapping with all the relationships that exist within the bank. So a bank can, without trying to be told the internal data representation, plug itself into

Rosetta. So this is exactly the product we have.

Thank you.

MR. GORFINE: Thank you.

Okay, Mr. McHenry.

MR. McHENRY: Yeah, I'll just say from an NFA perspective that for a while now we've been storing all of our rules and all of our interpretive notices in a database, so -- and that's been very beneficial internally in terms of facilitating searches and things like that, and also displaying the rules on our website. So I would think that if we could come up with a common language and common structure, that that would have a lot of potential.

MR. GORFINE: Okay. Mr. Levy and then Mr. Stein.

MR. LEVY: Yes. Jo Ann, you mentioned open source. Have there been any particular initiatives or platforms, venues, open source foundations that that conversation has been had? Because there is an existing FinTech Open Source Foundation that might be a worthy conversation.

MS. BAREFOOT: That would be a worthy conversation. It's very early -- very early dialogue,

that ones that I'm in, which -- but there are a lot of them all over the place. But if you've got suggestions on where to start, I think that a lot of people believe that's one of the foundational pillars.

MR. LEVY: Okay. Well, there's a foundation called FINOS, FinTech Open Source Foundation, that many of the banks and the vendors that are in the derivatives space and beyond, I happen to be chairman. I don't get paid, so it's not a paid advertisement, but it might be an interesting discussion to have, and it's been much -- it's been broadened out greatly this year, and this could be an interesting home for it, or at least a conversation.

MS. BAREFOOT: That's great. My colleagues might have connected with them, but I'll make sure.

MR. GORFINE: Okay. Mr. Stein.

MR. STEIN: Thank you. That was very good. When you consider the code as regulation, have you thought about whether that becomes more or less susceptible to end runs, systematic end runs? And how do you address that?

MR. SOLANKI: It's a good question. I think the

trick is in the execution cycle, so -- and we have thought about it, not enough, but we have some thoughts on it. If we have the common language, and if we have the execution part of those rules, there can be validation mechanisms to ensure that the rules have been executed correctly. And we have not spent time experimenting with that, but we have some thought process around it.

But I think the risk is real, and it could happen. We also feel that understanding the output across the industry from a regulatory point of view will help us prevent these issues. So to give an example, if multiple participants are submitting the output, often executable regulation, the historic and current variances between participants and within themselves could help understand if things are going wrong, but more to come on it.

MS. BAREFOOT: That problem is why we need to have artificial intelligence in this, to catch the end run.

MR. GORFINE: Okay. All right. Well, thank you all very much. I want to thank our panelists for a great discussion.

Panel IV: Distributed Ledger Technology and Market Infrastructure Subcommittee Presentation

MR. GORFINE: With that, I would now like to turn to the final topic on our agenda, in which members of our DLT and Market Infrastructure Subcommittee will share the framework they've been developing within their subcommittee work stream.

So our panelists are Mr. Erik Barry and Mr. Brad Levy. And I believe this time around, Mr. Levy, we are going to begin with you when you get situated.

MR. LEVY: Okay. Thank you. We'll try to call back some time. I don't want to steal from our important Commission.

So thank you very much for today and for the subcommittee efforts specifically, just a few points on that. Very broad diverse group. I want to particularly call out Yesha Yadav on our subcommittee, who did quite a bit of the lifting on this one and wasn't able to participate today directly, but just calling her out specifically; Erik, my co-presenter and producer of the materials; the staff behind it -- Dan, Jorge, and Bianca -- I want to call out Bianca

specifically, who has done real work with us; and Chairman Giancarlo, for his support of this generally over the years and before being on the Commission; and Commissioner Quintenz for his support of this and us.

A few qualifiers. This is a broad representation of the group's views. It does balance, I would say, the diversity of the group, the breath of this space, DLT, from a technology perspective, and maybe most importantly, the newness of it. The group did ramp through this process for the last few months, so people came on a little bit toward the end, but I do think that today's presentation is a good synopsis of what we -- what we believe today.

If you were confused by the Virtual Currency panel, you will either walk away from this more or less confused, we'll see, but it is -- it is a big topic, a relatively complex topic, but we hope to take it from a high level, go from the Moon to Mars and maybe back into the depths of the oceans as we get into the FCM world.

So, you know, people talk about the Internet, and it's actually come up a number of times today, and if

you think about the technology, Internet 2.0, in the 1990s, it was about mail. We've talked about the downsides of email and the challenges there, the browser, and buying books. So that was really that core first use in the '90s.

Clearly, we are doing a lot more with that today. And the question is, Is that a good thing? We're certainly doing it, but is it safe? And one of the questions is, Can DLT free us from some of the challenges of this open digital world while we lock it down, which is a little bit at odds with each other?

It's also not industry-specific technology. This is a broad technology space that will apply to many different industries, whether it's health care or finance, and all supply chains. You think of finance as a supply chain. This is just one of those conversations, and this conversation could go from the most virtual, banking, to the most physical, oil.

It's a massive game changer for many, as people and industries, where the data and the applications can be distributed and used more safely, and think of those assets moving around much more freely and the smart

contracts or automation being accessed and doing exactly what you think it says on the tin.

Most importantly, there will be unintended consequences, especially in these areas where it's very new and it's technology-led, and those consequences will be good and bad, and we'll have to work through those.

The word "trust" has come up quite a bit today, especially in the virtual currency panel. There is likely to be a blend of how we develop trust with these new technologies. It could either be based on somebody's character as a person or their authority and their right to do something, or they're convincing you, or just the logic and the power of technology and the binary nature of code, it's either zero or one.

There's an element in this conversation that the purists would say that it's only about technology, and if you just trust the technology and remove the people or the systems that have existed, that's the way forward; and there are others that would say we should do none of this. The right answer is most likely in the middle, and today I think is us trying to balance

the trust. Does it create value? Does it blow us up? And does it disintermediate us? So the balancing act of all of those will be an important dynamic in the coming years.

Whoops. Okay, so down a level.

We started with some of the concerns or the issues that we talk about when we talk about new technologies, and I'll just fire through this relatively quickly. And to each of these, in operations and technologies, which I consider one, and the regulatory and legal. Just think of these as blockers. And if you think about what is a potential blocker and is more adoption of the cloud generally, which is starting to really get adoption in our industry, is that a dependency? Is figuring out custody a dependency?

Number two, resiliency. We talk about systems and exchanges. Bryan went through a lot on the CME and how -- how resilient it is. This is new technology. In a highly automated world, how resilient is this technology? How scalable is it? Should we be using it for very fast markets or things that are a bit slower and heavier today? Competitively, will larger firms

dominate the space and adopt this technology or will new firms come in and take them out? And then ultimately the viability. Sometimes the technology we talk about just isn't fit for purpose, but it may become in the future as we evolve.

On the regulatory and legal side, you have --- Can it happen compliantly within a new regulatory framework? Are there rules that allow for this technology to be utilized in scale? How will we deal with the international nature of our markets and these technologies? And we've come -- we've talked a little bit about today the east and the west, from a conspiracy theory all the way through globalization and commerce.

The legal frictions, contract law, something very specific. You can't just say it happens in technology, and that's fine. Think about how long we worked on e-signatures in ISDAs, where for a decade or two we still had to send them around by paper and do AutoSig, and only ten or 15 years ago did we actually get a legal framework where we could put it in the API.

And then the last, riskily. If we're going to put

exchanges in clearinghouses into this business which are very sensitive, and platforms that I look after, like MarkitSERV, how risky is it to take central resilient entities and introduce this new modern technology?

So talking about the bigness, this is big, it's complicated, and there are many applications to drive a value prop. I tried to come up with a construct for thinking about this. And if you look up the left and right, or the X and Y axis, those are value or complexity and tangibility, or lack of complexity. And if you go from the bottom left to the top right, maybe that's where the value is. I talked about the physical world and the financial, more virtual, world applying here. You hear a lot about marine and shipping and transport utilizing these technologies, or the oil industry. You hear about crypto and trading firms like Cumberland setting up to do these.

We'll try to focus in a bit today on the idea of ags and treasuries and metals and swaps and futures, but all are leveraging a lot of these same technologies and converge as we know. There are times where the

IoT, the physical world of sensors and "Where is my oil?" will meet the physical delivery of a futures contract, whether it's grain or sugar or Treasuries security that needs to be delivered on the back of a futures contract.

So at the bottom of this page, we rattle off trade matching and execution, user identity, reconciliation, settlement, custody, risk management, regulatory reporting, and oversight. To unpack any one of these today will be extremely challenging, and we're not intending to do that, but the reality is these technologies will be used in all of these areas in some form, in some time, and it's only a question of, How soon and how big of impact will it be? And at that time, it may not even be that big a deal at all.

So we spent a lot of time as a subcommittee attempting to frame this somehow to come up with a way to look at this and drill down. As a very quanty data scientist in my firm, he says, "Can you double-click on that?" meaning, "Can you drill down easily, and then can you double-click again, and then can you come up?" You know, data scientists, they go right down to the

golden record and then right back up to some statistical analysis. So how do we frame this entire discussion?

So we chose to frame all of this in a technical perspective. We will not talk about regulations today.

Sorry, Gary, we just won't go there.

So this is really a technology-focused discussion. And we thought about it as there are instruments and assets, there's identity and roles in the market, there are processes and functions that people perform, and then there's the authority or regulation generally to perform something.

So in the instruments and assets, think about a futures contract that's created or exists on an exchange, an identity or role as an FCM that plays a role in that market with an identity to perform certain tasks; from a functional role, they help entities enter clearinghouses. And then there's an entire regulatory framework around that that's about the CFTC and what their role is, the FCMs, introducing brokers, et cetera.

One thing we intend to do today is ignore the "D"

in the "DLT," meaning the "distributed" part. Part of the reason is the theory of our subcommittee is a lot of the distributed nature of where the world will be in the next five to ten years will more likely be driven by the move to the cloud than the evolution of DLT specifically, and the evolution of DLT will leverage the move to the cloud. And the quote on the first page, it's easier to move the compute to the data; it's counterintuitive, it's cheaper, than to move the data to the compute. Data has become so big and complex, and the commoditization of technology itself at the hardware level, that what you really want to do is move that compute to where your big data is, and especially from a compliance and a sensitivity perspective.

So what we'll do today is try to drill down on a few different areas. These are definitely words that you've heard, which move beyond the distributed nature and really into the cryptography, which is about the data protection and the information security, again, that we all heard today is really challenging in an email-riddled world. And then the potential for more automation, largely around the concept of smart

contracts, which again is a little bit of an abused, overused term, but it really does mean encoding an action into a process more directly, and never having to look back at whether the action happened or not. Think about a corporate action. So linking the data and the action with authority and/or creating that authority by linking the data and the action.

There are many ways and many variants to apply cryptography automation to create authority, whether it's the blockchain method on Bitcoin or a different version of that in Ether and Ethereum, or the 1,500 cryptos and tokens that exist with different methods there of creating safety, security, and automation. But ultimately, there's two questions. What is it that I'm trying to get to: my cash, my security, et cetera? And did it happen?

So double-clicking one more, maybe to bring this down to something a bit more practical and tangible, these are examples that exist in the real world. We use these examples because it really does demonstrate the breadth and depth of the applications and the earliness and the early stage that we are in, in this

DLT space. There are also initiatives that are familiar to our subcommittee members because we're involved in them.

So we've broken these down into three major buckets, and I think there's been a lot of discussions around this today, including on our last panel discussion about this idea that the new will never come or that the new will wipe out the existing. Neither of those are true, and it's very rare that you've ever seen that happen. In all likelihood, it's combinations of everything we're talking about and some incremental evolution over a longer period of time, but it will happen.

So just a couple of examples that maybe pull back a little bit to what we talked about in the Virtual Currency group this morning and maybe give you a bit of an understanding of how broad this technology space is and how varied the applications can be.

There's an initiative that we're involved in, in IHS Markit called "Stax Payments for Loans." It involves a syndicated loan market, which is a highly sensitive private market that is relatively low to

settle, and cash is a relatively painful process in that market, whether it's making an interest payment or paying the agent back -- agent bank to represent your interest to the lender or the borrower, or the borrower drawing more down from its lenders. Cash is heavy, it's inconvenient, it's low yielding, and it's generally disconnected from the event that drove it, so you spend a lot of time reconciling it.

So can you create a replica, not a token, not a new currency, but a replica, of true money in a trusted private system, connect that to the event that generated that cash event, move away from the need to use the legacy systems of wiring money, and then within a 3-hour window every day, and then spend a lot of time reconciling those movements to make sure that the cash in your portfolio matches what you think it should and that the assets or futures or whatever they are, are also accurate?

The number two initiative on here is central banks using the same type of a concept, which is what inspired us to do it, a project called "Ubin." The monetary authority of Singapore is a central bank, in

2016, create an exact replica of their paper fiat in their systems. The Central Bank of Canada did the same project, "Jasper." And if that central bank says this is fiat money and moves it between central banks, and then banks are allowed to use that, then that is an exact replica of fiat in a lighter system that can maybe modernize the way central banks work globally in a central monetary system. So that's where we're combining current technology with new technologies.

The number two bucket, taking existing technology and replacing it with distributive ledger tech. So credit derivatives right now is going through a relatively large replatforming exercise across the industry. It touches the DTCC, it touches ICE, it touches LCH, and it touches MarkitSERV and other platforms in the market that are involved in the credit derivatives market.

DTC, in particular, is rebuilding the Trade Information Warehouse as the golden record repository for all credit derivative trades and building them on a distributed ledger technology. Now, the reality is that won't change our lives anytime soon, but we will

have a lot more optionality down the road to do more with that data from an analytics perspective looking at risks and flows in the market. And if you paid attention to '08, it might be interesting to have an understanding of what's going on in CDS beyond just a few folks in the market that may have had an indication of that.

No smiling, Mr. Chairman.

It's a real thing, and it could provide a real value and de-risk a lot, or at least giving people a bigger sense of where the risk is before it manifests.

There's been a very large initiative in Australia to fully replatform the entire front, middle, and back there from an exchange and clearing perspective. Digital Assets is running that and is a member on our committee. So that's a full-stack replacement that's underway, and that's a big deal, and it's a closed private trusted system that has the ability to do this. And, again, it may not change much at the get-go, but it will provide a lot of optionality for those markets in the long run.

And then there are just slight tweaks, like the

CBOE creating a futures contract on Bitcoin. Now, that doesn't sound like a big deal because the underlier is just a thing, and it's a futures contract, and people will trade it. But the reality is when you think about risk, when you think about what underpins that underlier, and from our Virtual Currency panel, that's a tweak to a futures contract maybe, but the entire ecosystem that needs to coexist around that new futures product is meaningful when you think about EMS systems and risk systems and collateral management behind that and CCP risk. It's a much bigger deal than just listing a futures contract on an exchange.

So now I'm going to turn to my partner, Erik, who is going to take it down to the persona or the function of an FCM in the market and make it a little bit tangible from that perspective.

MR. BARRY: Yes. Thank you.

So Brad has done an excellent job detailing the conversations. The very diverse thought processes amongst our subcommittee have been engaged in as it relates to the implications of DLT implementation across not just futures and cleared swaps, but

financial services more broadly. So as I and others in the FCM industry have tried to grasp the possibilities that DLT provides, I take it from a perspective of nearly 17 years in the FCM community, starting from doing basic exchange reconciliations, speaking with floor clerks to chase down trade breaks, to running a client service team, to moving to client solutions, and eventually on to running technology strategy across our business.

So as we look at that process and the migration of that, we're trying to navigate this tangled nest of client workflows between our clients, their vendors, and how we bring all that together. So we see the promise of DLT as being a very wonderful opportunity to solve all the issues that the FCMs come across on the clearing side of the business.

So I'm hopeful that many of the concerns that our side of the FCM business have tried solve for independently can be addressed through this technology. And the slide that you see up -- oh, there we go -- the slide that's up there now, things as basic as an initial clearing record of an executed trade.

Currently, identifiers don't carry through from execution through to clearing in a normal manner across the industry. This creates a very divergent workflow in how we deal with -- with our clients, and, again, the vendors that they have. They all have different workflows, they all initiate different identifiers at each step in their process.

So at the FCM level, when you try to take that information, bring it back together, recreate orders, recreate average prices, allocations, that have to get down to the final clearing level, it's very difficult to do. We all do it in different manners, and there's no traceability that's consistent from one FCM to another FCM or how you interact with different clients. So common identifiers addressable by any permissioned party is one of the goals that we seek to achieve coming out of this.

That goes back to Brad's point about permissioning, authority, different roles that different parties would play on this central ledger, and allowing clients to drive a bit more of the decision making about who's the best provider of a

service to them. Do they go choose a vendor that goes across multiple brokers? Do we unlock the stranglehold that an FCM currently plays in providing a lot of these services by opening up that -- that allocation, all that post-trade servicing, to vendors that are approved, perhaps that pull in machine-readable formats around allocation rules? It opens up a whole new possibility as to how this may happen.

So consistent APIs. Reduced messaging. Messages right now go from OMSs to execution platforms to clearinghouses to vendors to the FCM back out to the clearinghouse for allocations going to another broker. All along those paths, messages can fail, breaks can happen, translations can drop off, and it makes the entire process difficult. By moving to that central ledger, the promise of DLT allows you to perform all those functions at a central place and remove the need for reconciliation to cross multiple aspects of that.

So I've highlighted just a few of these -- these items on the slide. If we go to the critical considerations, we realize that many of these benefits, very important considerations to take into account.

Allowing these permission-certified vendors to interact with the ledger increases the choice in competition. Clients and FCMs can select vendors that best meet their various business needs, whether it's for futures or across their entire portfolio. And we look to move to certified standards, perhaps guided, again, by the machine-readable rules, which were on the previous panel.

The key to this is that regulators can gain access to this data on a central ledger, and we completely rewrite how swap data repositories, how large positioned trading reports need to be reported. This will all be available to you in that permissioned role with the authority that's granted to you to read that -- that ledger. So instead of, like Brad said before, instead of the data going out, you're coming to the data, and we're all working off of that same -- that same data.

So what we have seen as we talk about this within the FCM community, certain challenges, and fracturing of the process flows is probably key amongst that. So what we're trying to avoid is having a separate

distributed ledger with different language and different protocols across each of the CCPs or institutions that we need to deal with. So if we can move towards a common language, a common framework, that allows us to connect all that and really bring the efficiency that the industry needs to ease this part of the workflow, we start to realize less of the benefits of that efficiency if we start to fracture how that communication works.

Another concern that's been brought up was around jurisdictional concerns, where you hold data. A distributed ledger, by nature, the ledger can sit on any of those nodes. If -- if there are certain rules and certain countries where an exchange may -- may be local to, are there concerns about how you access that? Is it allowed to leave that country? Or does everything have to happen within that country? Do you have to have a node local to that exchange? So these are just some of the concerns that the community has brought up as well.

MR. LEVY: Thank you. So just to conclude formally with what we have here and then a bit on what

we believe are our next steps as a committee, so hopefully you took away that the reach of this space, from a technology perspective, is potentially quite expansive. It really does hold out the promise of introducing deeply transformative changes to any -- into any process. I personally believe that, and I believe my subcommittee members believe that it's more a matter of where we go, how we go, and when we go.

Cryptography is critical to DLT's success. Smart contracts will facilitate greater automation, but that will only happen when we get comfortable with the ability to protect both the data, the identities, and the processes or applications that are performing tasks. We've talked a lot about today, How much will we trust this technology? Well, we'll trust it if it works, but, more importantly, we'll probably trust it over time.

Also, the existing players that are in the market today as trusted entities, whether they're fully regulated large exchanges that have been around for decades or longer or newer technology, all of these will come together, and these large players that exist

today are likely to play a very large role bringing this technology forward.

That said, the technology of virtual currency, which is really the genesis, I guess, of this whole conversation, even though many of these technologies have been around much longer than Bitcoin, can be adopted in traditional finance, and the regulation and the authority of the financial markets can be applied to this space of distributed ledger tech and the more virtual world.

But the reality is new networks take time, do require incentives to ramp up, and the existing networks may also need some changes, both technologically and beyond to adapt to this new world.

The reality is existing tech -- existing players will evolve incrementally to develop this trust with this new technology. This new technology will mature incrementally to develop more trust, and then the outcome is likely to be both will combine to the benefit of all.

So that's the end of our formal remarks just to give you a bit on what we believe are our next steps,

because we did stay at a relatively high level and then again tried to refine it down to markets that you understand, like swaps or futures, more importantly, a very important roleplayer in the market, the futures commission merchant.

What we plan to do, number one, is refine our focus on the functional areas and drill down into those, whether they are the instruments that they deal with, swaps and derivatives broadly, the entities in the market, like clearinghouses. What does a clearinghouse look like in a more decentralized distributed world, and what do they do, both from a futures perspective, but then also how do they adopt these new technologies to make their markets bigger and safer? And then how will the swap markets in particular evolve, which are fairly heavy?

And, again, I think a lot of what we heard on the RegTech panel was around the automation and the evolution of swaps. We've been through a lot from Dodd-Frank and beyond. We landed, but we can likely do much better from a technology perspective.

We'll go -- number two, we will push deeper into

specific technology areas and the differences and the risks and benefits, whether it's blockchains or cryptography and the nuances of different networks and protocols, different levels of smart contract automation and the blend of legal authority, regulatory authority, and automation more generally through software, and the relationship to the broader technology landscape. You heard natural language processing in a significant way in the last panel. NLP will play a very big role in this space, as cloud will, as we talked about the distributed side.

And then specific industry efforts, number three, that are adopting this technology today. We glanced through a few of them. We will stay close to home in terms of futures and swaps and clearinghouses, et cetera, maybe spending more time in execution in our next sessions than we what we do, from a reporting perspective, back to the community; looking at post-trade life cycle more detailed; and then ultimately looking at risk more deeply, whether it's the technology risk introduced or the technology's ability to manifest risk or understand risk in a more

meaningful way.

Most importantly for this Commission and all of us, these technologies can be used by the regulators to enhance their ability to surveil and do what they need to do as regulators. There is no doubt that these technologies will both aid the markets that these -- that this regulatory body oversees as well as aid the regulator themselves in overseeing these markets. So through those three areas we expect to come back in the future with more drilldowns, double-clicks on these areas, and hopefully over the next months and years, where this technology is less new and more real, we'll be able to talk a bit more deeply and practically and about business models that are evolving behind this DLT space.

MR. GORFINE: Great. Well, thank you very much for the comprehensive presentation. So I want to open the floor, and I'll just, for the sake of time, I'll throw a few questions out there that may help stimulate discussion.

You know, first you mentioned particular areas of application, but where are we seeing any proofs of

concepts that have demonstrated some success? And I guess on the flipside of that, you know, there have been some reports of delays in implementation of certain projects. Do we have a sense for why that is? And I suppose my last question, if I'm rattling them all off, is you mentioned regulatory reporting. You know, what -- what's the role of the regulator, if any, in terms of generating adoption of these types of technologies?

MR. LEVY: So on the -- I'll -- and other committee members, feel free to come in. We all have our -- we all -- we all know things that are going on.

So where is it real? I do think the Australia initiative with ASX is fairly far along in terms of the actual build-out. There many, many initiatives today that are moving well beyond POC. I don't allow my team to use the "POC" anymore in the DLT space. We try to use "pilots," you know, real ideas that we think could be applied. They may not work, but we're trying to build production-grade systems in areas that we know would provide or believe would provide some value. The initiative around the CDS Trade Information Warehouse,

it's quite real.

And I'll just pivot to the delay side of things. If you wipe out everything and build new, it's relatively easy to get there. We are operating on patients without anesthesia. It's challenging to build new, run old, and bring the two together. So many of the initiatives, if we talk about the existing platforms will leverage this, there's just the practical fact that getting the legacy forward is challenging, it's hard to predict.

On top of it, a lot of these applications are network technologies where it's hard to change the technology of a network without impacting all of the nodes or the users of that network. So if you have a one-to-one relationship as a provider like us, where you can change technology and only impact one participant in the market, that's relatively straightforward. If you want to rebuild the CME tomorrow or MarkitSERV or the DTCC or Trade Information Warehouse, that many entities come in and out of, it's very challenging to get that, shut it off on Friday, and Monday morning the new network is lit. Those tend

to take time and hard to predict the timing of when you will, quote/unquote, go live.

MR. GORFINE: Any other members?

Jen Peve, I know you're on this one.

MS. PEVE: Hi. So with regards to the -- I do think that there are a number of initiatives, and, Brad, you mentioned ASX and the Trade Information Warehouse being two really good examples of how the industry is helping to move this technology forward.

With regards to the Trade Information Warehouse, in terms of its reality, development has actually been completed on the project at this stage, and the expectation is that we are going live in the first half of 2019. Structured UAT testing has started, so we've kept a very small group that's starting the test process around the application right now. And we expect to open up user acceptance testing in December. So there's a lot of progress being made there and a lot of good excitement around it.

And the only other add that I have to Brad's comments is that when you're looking at a technology that is new and as nascent as this one, the number of

challenges or things you come across throughout that process of operationalizing the technology, you know, you can't predict a lot of what you have to -- what you have to solve for in those types of situations. So the fact that the industry has come together and collaborated throughout this process, and we have still maintained, you know, a relatively steady progress throughout -- throughout this phase has been pretty tremendous.

MR. GORFINE: Mr. Lothian.

MR. LOTHIAN: So I was connected with some gentlemen from Tezos, which raised about $315 million in their ICO, and they awarded a contract to a couple of guys from the University of Illinois to basically develop a user community in Chicago aligned with the Chicago trading community to kind of rival that of Brooklyn and the New York banking community. And their job specifically is to develop kind of the user manual for how to deploy the Tezos platform and then to come up with some use cases, and they're actually looking at a certain John Lothian & Company as a possible use case for the crypto markets wiki project that we have. So,

you know, so there are some things happening in Chicago.

MR. LEVY: And I could just add on Chicago, with the trading community, while we may not call it an institutional market today, and those in the institutional markets may not be comfortable yet, there are real institutions in this market today with real risk and real technology. When you know Cumberland and these other players that are out there, they are on the cutting edge maybe, but it is real. It is not a proof of concept, it's real dollars going into virtual currency space that is real risk, and it may go to zero or not, but it is tangible and it is well beyond a POC. Now, it is not DLT applied to big institutional systems, like clearinghouses, et cetera, but it is tangible.

MR. GORFINE: Okay, great.

I'll go to Paul and back to Jennifer, and any further thoughts, too, on the scope, the current scope, and approach of the subcommittee if anybody else has further thoughts there.

MR. CHOU: Great. Thanks, Dan. So I have a quick

question. You know, putting aside for now the understandable challenges of trying to work with an existing infrastructure and trying to build something new on top of something that has to be running in the background, if you were able to build something from scratch, for example, and not have to worry about a lot of these integrations and making sure the ship is still running in the background, you know, what are -- can you give us a sense of like some of the broad metrics of what you expect to see in terms of superior performance? You know, what are the things that would be so clearly above what other existing clearinghouses and exchanges do right now if you had a blank slate basically?

MR. LEVY: Yeah, I guess from my perspective, if you had a blank slate, the idea of reconciling anything would be a relic, you just wouldn't need to do it. You would have an immutable database that you would be able to attach assets to smart contracts, or cash to assets to smart contracts. You just wouldn't need to do nearly the same amount of checking that needs to go on if you could truly build it as a clean slate.

That would be -- I mean, we -- if you're in the industry for any more than five minutes, you figure out how many people and how much time is spent not trusting and checking something else or somebody else's work, whether it's your custodian, your fund administration, your clearer, your clearinghouse.

So if you can get to this world of an immutable ledger and a trusted network and attach assets or instruments to an action, you really get to near zero reconciliations, and that's the utopia of what I think the community chases, but similar to magnetic strips on our credit cards or landlines versus cell phones in the U.S., those are just the challenges, and the reality is that -- you know, so I think one of the theories is if you have a market that is not already highly automated and technology riddled, meaning the heavier, more manual markets today, maybe some areas of derivatives or the loans markets, those may be the better places to start because you're not unpicking a legacy of technology as much of a legacy of human behavior and legal provisions.

MR. GORFINE: Jennifer.

MS. PEVE: So quickly. So I think one of the other suggestions from the subcommittee was to really take a hard look at adoption and what it takes to bring some of these newer technologies, blank slate or otherwise, to market. And so when you look at -- when you consider how complex our inner workings are today and the different overlaps, the number of systems that all connect to each other, it's often very difficult to build support and enthusiasm across your client community to get them to move to something brand new when they have existing systems that are resilient, robust, they work, they may not be perfect, but they work. And so I think getting through that adoption challenge is important.

And, Paul, to your point on having a blank slate, there are a number of things that if you could start over, could potentially be rearchitected in a better, more efficient manner, and that's actually irrespective of technology -- right? -- Irrespective of whether it's distributed ledger or something else.

You could see a world with distributed ledger where from the point of execution, a trade is reported

to a ledger that then is picked up by a trade repository immediately, by a clearinghouse immediately, and additional types of services could be run on a near real-time basis on the back of it as a very long-term future example.

MR. GORFINE: One more here from Mr. Stein.

MR. STEIN: So a quick comment. I totally agree with Jennifer. My experience is way too much time is spent focused on proof of concepts and technology, not enough on adoption. As a real business with, you know, real operational costs, we appreciate it so much when the folks working on DLT, or, in fact, any technology, have thought through with the lowest impact and credible way to foster adoption.

MR. GORFINE: And, Commissioner Stump, a question?

COMMISSIONER STUMP: Just a quick question for the panel.

Brad, you mentioned the interesting work that's being done with regard to Trade Information Warehouse. And then I noted that Erik mentioned actually something that I was going to raise as a concern, the standardization. So you're right, it would have been

great in 2008 if the regulators had had access to all of the information that would have helped to think through what was happening in the midst of the crisis. And I think what we've learned since then -- and data and reporting is something I am keenly interested in -- that we struggled a bit to bring in the data in a standard way under current rules.

So I'm just curious, given all the vendors in this space, what will it take to drive standardization in the data reporting space? And I'm not suggesting the regulators need to dictate that, but if it's ever going to be digestible and usable by the regulatory community, it has to come in, in some standard form. So I'm just curious what -- if you have any ideas as to what it would take to ultimately drive that standardization.

MR. LEVY: Yeah, that's big. I would say we have a lot of standards today to define transactions, whether it's an ISDA, and FpML message, a FIX message, an LSTA agreement. So there are -- we have a lot of standards that are actually pretty well adopted. Some markets just lack technology, some lack adoption of

those standards.

FIX took quite some time to get adopted in the post-trade space. Actually, it was much more of an IOI execution protocol initially. FIX for fixed income took a decade. That's where I started my e-commerce days, trying to do FpML for fixed income.

So the standards generally are there. Some of it is down to, Is it in PDF or a machine-readable API? ISDAs getting sent around, that could have been automated sooner if we got through e-sig, you know, as a legal -- a legal contract.

So I do think the standards are there more than people think. The reporting standards on the data side is more, What do you want to know? Because that can then drive what you should be putting in and through. And then the technology is evolving rapidly. I mean, natural language processing and artificial intelligence, the standards are there if you listen.

There's a lot of patterns in the world if you listen enough and you have enough data, and, you know, there's discussions around self-writing software and self-healing software. Those things are not that far

out, and you can definitely see standards that are created just by listening to what everybody is doing because the standard is generally a version of what everybody is already doing, they just haven't written it down in a document and programmed it.

MR. GORFINE: Okay. Well, thank you very much to our panel and our presenters. And I want to thank all of our panelists today. I think we've heard some excellent presentations from our subcommittees as well as our RegTech panel. And so based on this, we look forward to the ongoing work of our subcommittees and the broader efforts of the TAC.

I am now going to turn it back over to Commissioner Quintenz to facilitate closing remarks.

Closing Remarks

COMMISSIONER QUINTENZ: Thank you, Dan. Before I give my closing remarks and thank all of our great presenters and our members, let me turn it over to my fellow Commissioners for any closing thoughts.

Commissioner Behnam?

COMMISSIONER BEHNAM: First off, thanks to the entire committee, the subcommittees, the speakers,

excellent discussion today and look forward to future discussions and ideas and conclusions that obviously, as we've discussed many times on this side of the table, are really helpful to us to think about these issues today, next week, next month, and in the many, many years ahead. And with that, a special thanks to Dan, as DFO, and, of course, Commissioner Quintenz.

COMMISSIONER QUINTENZ: Thanks.

And Commissioner Stump.

COMMISSIONER STUMP: I have very little. It was fascinating. I'm excited to attend the next meeting with -- with many of the things that were laid on the table for future discussions. Really interesting. And thank you all for being here. Thanks to Commissioner Quintenz and Daniel for putting this together. It's been a busy week, and you all -- I hope you have a great weekend. You deserve that.

COMMISSIONER QUINTENZ: Thank you.

And, Commissioner Berkovitz.

COMMISSIONER BERKOVITZ: Thank you, Commissioner Quintenz. I will just echo the remarks of Commissioner Behnam and Commissioner Stump. And it's very, very

informative. And thank you all very much. I look forward to future meetings and speaking and hearing from you again. Thank you.

COMMISSIONER QUINTENZ: Well, let me thank all of you, my fellow Commissioners, for spending the whole day with us, and that's a great tradition that we have here with all of our advisory committees. In that vein, the Chairman wanted me to express his gratitude to all of you for all of your work, all of your hard thinking. He had a prior commitment that, to his credit, ended or began after our time was supposed to end, so he met his obligation but wanted me to personally thank all of you for what he thought and what I thought was a very impressive discussion.

The quality of the work that went into these presentations was superb. I -- as I think my fellow Commissioners just expressed, I am very excited to see where this thinking goes. I'm very excited to see all of you answer the very tough questions that you posed. I think you are the people to do it. I think we're going to rely on you to provide some guidance, some answers, maybe some suggestions as to practices or

standards. That's why we have this advisory committee. And while it takes a lot of thought and work to ask tough questions, it's going to take some more to try to provide some concrete responses.

So I learned a great deal. I have a lot here that I could go through. I don't think I will since these topics have been so thoroughly fleshed out, but I will say that in all future conversations, I'm going to reference this meeting and its webcast to point to for anyone to get a good basis of understanding on these topics, and I think that will hopefully encourage a continual increase in the amount of attention that gets paid to your thinking and the CFTC's work in technology in this area and in furthering our relationship with innovators.

So thank you. Thank you all very much for being here, for participating, for your efforts.

Let me turn it back over to Dan and thank him for his work as well as, again, Jorge Herrada, John Coughlin, and all of the support staff that have turned this event into something very meaningful.

MR. GORFINE: Great. Thank you, Commissioner.

I have two more important lines, and it is, first, thank you for joining us today; and, second, we are now adjourned. Thank you.

(Whereupon, at 3:22 p.m., the meeting was adjourned.)