UNITED STATES OF AMERICA

COMMODITY FUTURES TRADING COMMISSION

TECHNOLOGY ADVISORY COMMITTEE MEETING

Washington, D.C.

Tuesday, February 23, 2016

PARTICIPANTS:

Opening Statements:

CHAIRMAN TIMOTHY G. MASSAD

COMMISSIONER SHARON Y. BOWEN

COMMISSIONER J. CHRISTOPHER GIANCARLO

Panel I: CFTC Proposed Rule, Regulation Automated Trading:

SEBASTIAN PUJOL SCHOTT
CFTC, Division of Market Oversight

MARK SCHLEGEL
CFTC, Division of Market Oversight

MARILEE DAHLMAN
CFTC, Division of Market Oversight

Panel II: Swap Data Standardization and Harmonization

DAN BUCSA
CFTC, Division of Market Oversight

SRINIVAS BANGARBALE
CFTC, Office of Data and Technology

RICHARD MO
CFTC, Division of Market Oversight

JONATHAN THURSBY
President, Global Repository Services of CME

DEREK KLEINBAUER
Product Manager for Bloomberg Swap Data Repository

MARISOL COLLAZO
CEO of DTCC

PARTICIPANTS (CONT'D):

BRUCE TUPPER:
Manager, ICE's Global Repository Business

Panel III: Blockchain and the Potential Application of Distributed Ledger Technology to the Derivatives Markets

BRAD LEVY
Managing Director and CEO, MarkitSERV

SANDRA RO
Executive Director, CME Group

ROBERT SAMS
CEO, Clearmatics

JAMES SLAZAS
CFO, ConsenSys

Closing Remarks:

CHAIRMAN TIMOTHY G. MASSAD

COMMISSIONER SHARON Y. BOWEN

COMMISSIONER J. CHRISTOPHER GIANCARLO

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P R O C E E D I N G S

(9:45 a.m.)

MR. GRIFFIN: If everyone could please take their seats.

CHAIRMAN MASSAD: Could you please take your seats? We're going to start.

MR. GRIFFIN: Everyone, if you'd take your seats, we're going to get started.

COMMISSIONER BOWEN: Sit down, everybody.

REPORTER: Because of the way the room is wired, you're not going to hear yourself.

MR. GRIFFIN: Okay.

REPORTER: Okay, we've got eight different zones.

MR. GRIFFIN: Okay.

REPORTER: This is one. He won't hear it.

MR. GRIFFIN: All right, all right, fine. There you go.

Good morning. My name is Ward Griffin, and as the Designated Federal Officer of the

Technology Advisory Committee and acting chair for this meeting, it is my privilege to call the meeting of the Committee to order. Thank you for your efforts as we worked to reschedule this meeting following last month's blizzard here in the D.C. area.

We have a packed agenda today, and to begin I'd like to offer an opportunity for Chairman Massad and Commissioners Bowen and Giancarlo to make their opening remarks.

Mr. Chairman.

CHAIRMAN MASSAD: Well, good morning, and thank you all for taking the time to be here, particularly those of you who have flown in. We really appreciate it. We're glad there wasn't a snowstorm. I understand there were some weather challenges for some of you, so we're glad you're here. I want to welcome all of you to this meeting of the CFTC's Technology Advisory Committee.

You know, for more than 15 years, the Commission has relied on the TAC for guidance on a

wide range of technology issues, and since I took office I've made it a priority to focus on technological changes taking place in our marketplace, and the TAC has provided an excellent forum to exchange ideas, discuss issues of importance, and engage with market participants. And I know Commissioners Bowen and Giancarlo share my desire to make sure we are looking at technological issues.

And of course we had a little bit of a hiatus in the meetings of this Committee. Commissioner Wetjen was the commissioner that was kind of responsible for this, so when he left we were scrambling and we had more committees than we had commissioners. But we were glad that we were able to reconvene today, and we'll try to move forward with a regular schedule.

I think today's meeting is particularly important, because we're going to address a few issues that are at the top of the Commission's agenda. I want to also thank the CFTC staff, who have worked tirelessly to plan this meeting --

particularly Ward Griffin, for all the work that's gone into that.

The first thing is we're going to discuss the Commission's proposed rule to address the increased use of automated trading in our markets. And as all of you know, automated trading has dramatically expanded in recent years. It's brought many benefits to market participants, such as more efficient execution, lower spreads, and greater transparency, but its extensive use also raises important policy and supervisory issues.

We have proposed a rule, as you all know, that builds upon the steps that we and the exchanges have already taken. It focused on principles-based industry best practices to mitigate operational risks and minimize the potential for disruptions or other problems. And it includes requirements for pre-trade risk controls and other types of measures, but it does not describe the parameters or limits of such controls. So, we're going to look at a few issues

on that. Obviously, we can't look at all issues that are covered by the rule, but we will have a good discussion today of some of those issues, and of course the comment period remains open for your input generally.

Second, we will discuss our efforts to improve the quality of swap data reporting. This has been a key feature of the reforms enacted by Dodd-Frank, and we have come a long way since 2008 when we basically had no insight into the over-the-counter swaps market. We do have much better information today.

But building out the system to collect and analyze all this data is a very significant project. We're taking a number of actions to enhance the quality of the data, and today we will focus on one aspect of our actions, which is our efforts to ensure greater consistency in the data. Currently, there's a lot of variation in how different participants report the same fields to swap data repositories and then in turn how the SDRs themselves transmit the information to the

CFTC. We have made a dedicated effort to focus on that issue and to identify a number of priority areas where we think standardization or clarification is needed, and the staff has recently solicited public input on 80 specific questions addressing 120 data elements. And so from the discussion we'll have today and the other feedback we get on this, the staff is hoping to develop proposals that specify the form, manner, and allowable values that each data element can have.

And finally today we will discuss blockchain technology and its potential application to the derivatives market. I know many of you are thinking about this and looking at it. We are quite interested in hearing your thoughts about this, and I hope we can have a discussion today that gets into some of the specifics -- and avoids maybe some of the hype -- but really looking at the potential for blockchain or distributed ledger technology in this industry. In what specific areas could there be applications

that might bring benefits or improvements? And what are the disadvantages and advantages of those? What are the limitations of those?

So, again, thank you all for coming and lending your voice and experience. It means a lot to us. And with that I will turn to Commissioner Bowen.

COMMISSIONER BOWEN: Thank you, and good morning. It's a pleasure to be here today for a meeting of the reconstituted Technology Advisory Committee. I want to thank the staff and the Committee for the time you've devoted for today's topics. The Committee clearly has its work cut out for it today, so I'll be brief.

As I've said before, changing technology is causing a sea change in how our markets operate. That's particularly true of the three issues the Committee will be discussing today.

I've already spoken several times about the remarkable changes caused by the rise of algorithmic trading and the positive impact that I believe our proposed regulation automated trading

will have on market stability. However, this regulation is, to me, only a first cut. I want to hear from you if you believe our new rule is failing to address aspects of algorithmic trading that pose system risk or pose undue risks to ordinary investors. I'm absolutely willing to take additional steps to craft additional appropriate regulations on this nascent technology. In that regard, I look forward to the Committee's thoughts on our proposal, including whether we have overreached or even under-reached.

The second topic before us today, swap data standardization and harmonization, may be less heralded than algo trading, but I believe it is no less important.

Our new rules regulating the swap markets have substantially increased systemic stability and reduced the risk of major market events. But our rules cannot work without accurate data. And to have workable data requires robust, widely-accepted data standards. Our staff has made great strides in the last few years

towards standardizing the most important aspects of data but more work remains. Until all of our key data is standardized and easily usable for analytics and surveillance, we cannot say that the Dodd-Frank regime is complete.

Finally, what can I say about the blockchain that has not already been said? I'm fairly confident that the vast majority of the press covering today's event have spent significant time discussing or reporting some aspect of this new innovation, from crypto-currencies' value swings, to legions of bitcoin miners, from blockchain cyber security developments, to the technology's myriad early adapters. This technology, which is even more nascent than algo trading, carries with it tremendous potential for electronic trading and electronic commerce more broadly.

Yet, before we can use this technology, we need to understand it. No one from industry to regulators or consumers is served if we run head-long toward adopting a new technology that we

all do not understand. I therefore hope that today's discussion on the blockchain's ledger technology, its public data file of all the transactions, can be safely distributed to the derivatives markets.

Now, to date myself, I graduated from law school before Apple introduced the Mac. So, I've been a securities and corporate lawyer in the pre-digital world, and while I'm quite familiar with online e-commerce and mobile payment systems, more recently I've been following current news about the blockchain and crypto currencies generally.

Well, like many people in public, I'm still learning. So, I not only look forward to today's discussion, but I also want to urge everyone to try and make sure that we don't skip over some baseline facts as we delve into these issues. But those of you who are experts who perhaps spend hours in the bitcoin sub-forum in Reddit or elsewhere on the Internet, innovate with care and be mindful of the rest of us.

Thank you.

COMMISSIONER GIANCARLO: Thank you. The electronification of trading over the past 30 to 40 years -- actually since before Commissioner Bowen, the Chairman, and I all graduated from law school -- and the advent of exponential digital technologies have transformed financial businesses, markets, and entire industries with dramatic implications for capital formation and risk transfer. We see this change most presently in the area of automated trading that now constitutes over 70 percent of regulated futures markets.

Automated trading presents new challenges to the continuing viability of traditional market regulation, and how 21st century markets adjust to this evolution from human to automated trading is critically important. Last November, the Commission voted to propose Regulation AT. I questioned then whether the merits of the proposal outweigh its additional costs and burdens, and I raised special concern

about requiring registrants to hold proprietary source code in data repositories available for inspection by the CFTC or the U.S. Department of Justice at any time and for any reason without a subpoena.

Yet, a broader concern is that, in essence, Reg. AT is a registration scheme. The relatively simple process of registering AT users does not begin to address the hard public policy considerations that arise from the digital revolution in modern markets:

What do essential legal concepts like mens rea, scienter, and "failure to supervise" mean in transactions initiated by artificial intelligence rather than by direct human action?

How do we adapt regulatory frameworks designed to catch "bad guys" to catch tomorrow's "bad algos?"

And how do we recondition 20th century trading markets and their essential institutions to benefit from 21st century automated trading while maximizing marketplace safety, soundness,

efficiency, resiliency, and liquidity?

These difficult policy issues can only be considered with deep technological expertise, industry-wide dialog, and thoughtful analysis. And that is our purpose today.

I also look forward to our second panel on swap data standardization and harmonization. At the heart of the 2008 financial crisis was the inability of regulators to assess and quantify the counterparty credit risk of large banks and swap dealers. The legislative solution was the establishment of swap data repositories and enhanced market data analysis. Yet, 7 and a half years after the financial crisis we still do not have accurate visibility into global swaps counterparty exposure. Of all the many mandates to emerge from the financial crisis, swaps market transparency was perhaps the most pressing. The failure to accomplish it is certainly the most disappointing.

Prior TAC meetings have well documented the challenge facing the Commission in optimizing

swaps market data. They range from field standardization and data validation to analysis automation and cross-border data aggregation and sharing.

A key challenge of swaps market analysis is the lack of global standardization. Market participants vary widely in how they report the same data field to SDRs that, in turn, differ in how they report to the CFTC. I fear that the CFTC and its overseas regulatory counterparts, acting by themselves, will continue to struggle to achieve the important objective of full visibility into swaps counterparty exposures.

Swaps market analysis is essentially a big data problem -- the kind of problem that is tackled every day in America's technology corridors from Brooklyn to Silicon Valley. What is needed in Washington is a concerted and cooperative effort by regulators, market participants, commercial technology vendors, and academia that draws on the emerging fields of big data analysis, network science, and financial

cartography. It's long past time to broaden this important implementation.

I welcome the TAC's input on this and other swaps data reporting challenges.

Finally, blockchain. In a recent podcast I spoke about the potential benefits to financial market infrastructure from the application of distributed open ledger technology, and at risk of increasing the hype, this is indeed a development that has enormous implications for financial markets in payments, banking, security settlement, title recording, cyber security, and the process of collateral management and settlement. It may make possible new "smart" securities and derivatives that could revolutionize operational and transactional efficiency. It may help reduce some of the enormous costs of the increased financial system infrastructure required by new laws and regulations, including Dodd-Frank.

We regulators must cultivate and embrace new technologies, such as the blockchain, that

hold important promise for our financial markets and their greater service to our country.

So, I'm pleased that the TAC will be discussing these and other issues, and I look forward to a very productive meeting today. Thank you all for coming and bringing your expertise and thoughts.

MR. GRIFFIN: Thank you. Before we turn to our first panel, it would be helpful if we go around the table and ask each of our TAC members to introduce themselves and the organizations that they represent.

Paul, would you like to start us off?

MR. CHOU: Thank you, Ward. My name is Paul Chou. I'm the CEO and Chairman of Ledger X, and Ledger X is a current applicant for registration as both a SEF and DCO, and we are entirely focused on bitcoin derivatives and so very much looking forward to the conversation today for perhaps obvious reasons.

Thank you.

MS. COLLAZO: Hi, I'm Marisol Collazo.

I'm a managing director at DTCC. I'm the CEO for our U.S. swap data repository, and I look forward to the discussion on data standardization.

MR. DURKIN: Good morning. I'm Bryan Durkin, Chief Commercial Officer for CME group and delighted to be invited back as a member of this Committee.

Thank you.

MR. GORELICK: Good morning. My name is Richard Gorelick. I'm the CEO of RGM Advisors, a proprietary trading firm in Austin, Texas.

MR. HEHMEYER: Good morning. I'm Chris Hehmeyer. I was chairman of the National Futures Association for the last four years. I run a prop. trading firm in Chicago, and I was in the FCM business for 25 years.

MR. JOACHIM: Good morning. I'm Steve Joachim. I'm the Executive Vice President for Transparency Services at FINRA with people that bring you TRACE.

MR. LAMY: Good morning. I'm Pierre Lamy, a managing director in the Technology

Division of Goldman Sachs.

MR. LEVY: Hi, Brad Levy, managing director at Markit. I run one of our product division's processing, and I'm the CEO of MarkitSERV and oversee our blockchain initiatives within Markit. And I'm pleased to be added to the TAC at this point. Thank you very much.

MR. LEWIS: Cliff Lewis. I'm here representing Eris Exchange. I see a lot of old friends that I've known for -- we're trying to figure out how many decades. But it's fun to have seen the industry evolve to the point -- when I started there wasn't any need for a technology committee.

Thank you.

MR. TABB: Larry Tabb, founder and CEO of Tabb Group, and we write financial markets research, and I'm happy to be part of the TAC.

MR. GRIFFIN: Thank you and if -- oh, all right. If I could just ask everyone -- I think there are some issues with the sound. If you wouldn't mind just leaning in and speaking up.

Don't be bashful.

We also have a few of our members who were planning on calling in. I want to take the opportunity to invite them to introduce themselves if they're on the line.

MR. TRAHAN: Yes, Ward, this Jeff Trahan. I'm Vice President of Pensions at Deere & Company and formerly the treasurer, where we are a pretty extensive user of derivatives.

MR. GRIFFIN: Thanks, Jeff. Anyone else? Great. Turning now to our first panel, I would like to welcome Sebastian Pujol Schott, Marilee Dahlman, and Mark Schlegel -- all from the Commission's Division of Market Oversight -- to get us started with a discussion of the Commission's proposed rule, Regulation Automated Trading, or Reg AT.

MR. SCHOTT: Thank you, Ward, and thank you to the members of the Commission and the Technology Advisory Committee for taking the time today to share your thoughts on our proposed rules for automated trading. As a reminder, Regulation

AT, or Reg AT, was published in the Federal Register on December 17, 2015. It remains open for public comments through March 16th. The staff has already held a number of informative meetings with interested parties, and we encourage and look forward to comment letters on the proposed rules as well as to meeting with anyone who would like to talk with us.

This morning, I'm going to provide a very brief overview of Reg. AT, of its purpose and design, also with a particular focus on the elements that we will delve into further in today's conversation.

First, as a threshold matter, it's important to note, Reg AT is intended to reduce risks and increase transparency in automated trading. It identifies points where operational risks may be introduced into the trading ecosystem and proposed as a series of related measures for mitigating and managing such risks. In this regard, Reg AT follows recommendations from many industry best practices in adopting a multilayered

approach to risk control and in addressing the role of order originators, FCMs, and exchanges in the life cycle of each automated order. This multilayered approach to risk controls will be one of the topics we discuss this morning.

Second, in proposing risk controls, Reg AT makes an effort to provide flexibility and rely on existing industry best practices wherever possible. For example, the proposed rules provide latitude around the design and calibration of required pre-trade risk controls and around the design and implementation of self-trade prevention tools. In fact, many of the specific pre-trade risk controls posed in Reg AT are existing elements of best practices in industry.

At the same time, the proposed rules attempt to promote the responsible use of such flexibility through, for example, annual reporting from each market participant regarding how it has chosen to implement and calibrate its own risk controls. Both the specific mix of pre-trade risk controls and the proposed rules around

self-trading will be another topic of discussion today.

Finally, I'd like to emphasize that Reg AT is a proposed rule, and it is a proposed rule that asks over 160 questions over almost every element of the proposal. From a staff perspective, readers should hopefully see a consistent approach where each proposal is balanced by one or more questions around whether the Commission has identified the best way to get from point A to point B or even whether the goal is the appropriate goal.

With that in mind, I'd like to highlight a third aspect of Reg AT and the one with which we will begin today's conversation, and that is the importance of key defined terms in establishing the scope of the proposed rules. These include, for example, the proposed definition of the term "algorithmic trading" and the proposed definition of the term "direct electronic access." These terms are fundamental in that they define who's in, who's out, and what activities are covered by

proposed Reg AT.

In closing, let me say that Commission staff is aware of the time and of the effort required to engage substantively with the proposed rules. We look forward to your comment letters, and we are very appreciative of the time that it takes to write a letter, so thank you for all of you who produce them.

Ward, I think if you would like at this point we can bring up some slides to guide the conversation.

MR. GRIFFIN: Good. Thanks, Sebastian. As Sebastian noted, we're going to begin the discussion with an examination of the scope of the underlying rule, in particular, as Sebastian noted, a couple of key terms, and to begin that is the proposed definition of "direct electronic access."

Really, the question has been raised not only in the proposal but in a number of the meetings that have followed since the proposal was published. A question as to whether these

definitions are capturing the right population: Are they over-capturing? Are they under-capturing? And certainly this notion of direct electronic access is foundational to that question. So, I'd like to open that up at this point.

Sebastian.

MR. SCHOTT: Thank you, Ward. And one thing I could add is that, you know, as the discussion focuses on this term, it's important to know that direct electronic access plays an important role in an item that Commissioner Giancarlo mentioned, which is: it is a trigger for the new registration requirement. So, it's one of the prongs that would lead to registration.

MR. SCHOTT: Richard, would you like to kick us off?

MR. GORELICK: I'd be happy to. Thank you, Ward. So, I appreciate the opportunity to participate in this important discussion. The purpose of this Committee has been to foster dialog on the role of technology and automation in

today's modern electronic markets, and with Reg AT we again return to that topic.

There is already a substantial public record in this regard. This Technology Advisory Committee has repeatedly discussed market structure issues and risk management practices at exchange trading firms and clearing firms. We met two years ago to discuss the Commission's concept release on automated trading, and this discussion and the concept release itself created a useful and detailed record of the various control safeguards and surveillance procedures that have been put in place by the industry over recent years.

I also believe that the empirical evidence that's been discussed at the Technology Advisory Committee presented over the years has shown that increasing automation and competition have made markets on balance more efficient, more liquid, more transparent, and lower cost for investors and hedgers. But I'm not here to defend the status quo. We can always do better, and we

should always strive to improve the quality and resilience of the markets. I've consistently supported a regulatory environment that promotes their competition, encourages innovation, enhances transparency, manages systemic risk, lowers cost for investors and hedgers, and gives regulators the tools that they need to detect and deter market abuse. It's important to note that, in general, moves towards open, electronic, centrally-cleared markets further these valuable objectives.

Overall, while well intentioned, I find that the Reg AT proposal that currently stands is somewhat confusing. In some places, it's too broad and in others too narrow. While some provisions are certainly helpful, others may be counterproductive. I don't have time today to go into much detail, but I'm concerned that Reg AT could amount to a whole lot of work by the industry and by the Commission to accomplish relatively small gains in market integrity and would risk negative unattended consequences. I'll

touch on a few concerns today.

First of all, the source code provisions are very concerning. The proposed requirement to turn over valuable IP to the government as part of a simple document request is simply unprecedented and unreasonable. It violates standards of due process. The secret formula for Coke Cola and the source code for Google Search algorithms are not available on demand to regulators without a subpoena.

A trading firm source code is no different. Many modern trading firms are very much technology businesses. Much of our staff writes software, and our source code contains valuable IP. The proper protection of intellectual property lies at the heart of our private enterprise system. Government agencies must make a reasonable showing of cause and get a subpoena to gain access to private intellectual property. Moreover, it would set a dangerous precedent with foreign governments, such as China, who have sought to impose similar source code

requirements on U.S. firms.

I appreciate that the Commission has indicated a willingness to revise these provisions, as this part of Reg AT must be fixed.

Next, much of -- it seems to be cutting in and out. Is it? Can everyone hear me okay? Okay.

Next, much of the role is geared toward preventing the defined term of algorithmic trading events, which are defined to include both algorithmic trading compliance issues and algorithmic trading disruptions. Both definitions, in my opinion, are too broad. For example, Reg AT would make not following a firm's own internal policies an algorithmic trading compliance event. The more comprehensive a firm's internal policies, the more liability they would risk. Counterproductively, rational actors would be incentivized to have internal policies and procedures that only do the bare minimum required by law.

Similarly, Reg AT would penalize firms

for disrupting or materially degrading their own trading. This makes no sense to me and might encourage firms to continue trading in the face of potential risk management issues. These provisions should be eliminated from their respective definitions.

On the other hand, some provisions are too narrow. For example, the requirement for firms to have pre-trade risk controls is limited to firms that are using algorithms. Firms that conduct electronic keyboard trading would have no such requirements. In my view, pre-trade risk control should be required broadly for all firms conducting electronic trading.

The SEC's market access rules should be studied as a possible alternative approach. These rules were introduced to require pre-trade risk controls for all firms with electronic market access and do not hinge on whether a firm uses an algorithm or not.

It should be noted that when the SEC studied volatility spikes in the equities markets,

or so-called mini-flash crashes, they noted that the majority of such events were caused by human mistakes -- such as fat finger errors - rather than algorithmic trading bugs.

We should also consider that the futures exchanges already have robust pre-trade risk controls for all users with limits configured and managed by FCMs.

I also continue to question the need for a new CFTC registration requirement, given that the Commission already has extensive access to information in exchange audit trails and membership files.

The cost benefit test is elusive, and it is curious how or why proprietary trading firms with direct electronic access who use trading algorithms but who never set foot on the trading floor would fit into the definition of floor traders. If the CFTC believes it has a gap in its ability to supervise some trading firms, I believe it should propose that registration requirement separately.

Altogether, the rule seems to impose costly burdens on the broad and growing group of firms using algorithms to trade in the futures market without commensurate benefits. The markets are dynamic and constantly changing. Mandated risk controls, documentation, training, audits, reporting, certifications like those in Reg AT that are too prescriptive could quickly become obsolete as markets, technology, and training strategies evolve.

Creating checklists and written policies might give the appearance of reform but in practice don't make markets safer or more resilient and could instead create unintended incentives to the contrary. I think it's worth understanding that the primary new requirements in Reg AT, from my read, are to create lots of safeguards, lots of laws, lots of policies and procedures around things that are already prohibited by law.

Costly new rules will limit the ability of smaller firms to compete in these markets and

reduce competition and should be expected to ultimately harm market quality and raise trading costs for investors and hedgers. The trading community has a direct interest in well-functioning and resilient markets. We want to comply with the rules of the road. We welcome improvements that make the markets safer and more efficient, and I look forward to working with the Commission and its staff on solutions to help achieve the right balance.

Thank you.

MR. GRIFFIN: Thank you, Richard. Focusing back on just trying to look at the scope itself in terms of who will be captured really on this first prong of the discussion, the activities that would trigger coverage under the rule, with respect to direct electronic access, are there any thoughts or feedback that Committee members might want to give with respect to how that is formulated? Is there a breadth issue either, again, too inclusive or not inclusive enough that you'd like to share?

MR. HEHMEYER: Chris Hehmeyer from NFA. I have my NFA hat on, and in reading Reg AT and the proposed -- which I compliment the Commission for putting this out there and casting the net broadly to get the conversation started. And so I certainly would guess that from your chair that's a good way to start to approach this.

From NFA's perspective, some of the language in the preamble conflicts with some of the language that's in the proposed regulations. In the internal memo that we had, the term was used "strikingly broad," and this has come out, I know, in some of the legal conferences where lawyers have gotten together to try to debate what exactly the ramifications are for the way that it's currently written.

NFA is not looking to try to extend its footprint over the automated traders. NFA certainly stands ready to take on responsibilities if the Commission sees that NFA should do that. But it's important that if they, for instance, were to become -- the automated traders were to

become members of NFA, that NFA has got, then, enforcement responsibilities if those don't conflict with the exchanges. And the exchanges have a lot more experience in dealing with the proprietary traders and the automated traders, and so getting this definition right is very key. And I know that there are a lot of people that certainly are willing to pitch in and try to help get it right between private enterprise and government.

But it's very important -- I have a letter from -- I pulled out my TAC file, and I have a letter from Commissioner O'Malia thanking me for coming to the Committee and imploring us to try to get the definition of HFT correct from 2011. So, we've been at this for a while. And it's tricky. It's not a -- I'm not -- in NFA, the discussion is not one of throwing up our hands, "Oh, my gosh, I can't believe this." It's a tricky proposition to try to get this definition correct and to try to accommodate the interests of trying to have the markets thrive by the prop.

traders, the exchanges who have a lot of experience with this, and the public that wants some sort of oversight, which the Commission and the NFA could possibly provide.

So, I just say all of that in that it's important to try to get this right and possibly a subcommittee of some people representing those different groups would be one that could try to knock out this language. And I think a lot of the comments will be along those lines of trying to make sure this definition is a good one.

MR. GRIFFIN: Steve.

MR. JOACHIM: Yes. To comment on what Richard talked about, I think that from FINRA's perspective --

CHAIRMAN MASSAD: Steve, can you speak up?

MR. JOACHIM: Sure. When we look at Reg AT, we see many similarities in actions the SEC has taken or FINRA has taken, and we want to compliment you on the coordination. We think, though, that it is critical, especially as we move

forward in these new automated spaces -- not so new but in terms of regulatory activities -- that we stay very heavily coordinated and we keep our actions in synch because so many of the electronic environments or automated environments are cross-product and cross-markets.

Being sure that we're staying in synch thinking about these markets in the same way, thinking about the approaches to the regulation of those environments in the same way is important, while recognizing that there are differences in the markets and there are clearly some traders that will operate in only one market rather than another. But it is important to get the core concepts so that the SEC, the CFTC, and FINRA are all working and coordinating our actions in a way that will move the market forward and our visibility of the markets more insightful and more accurate.

MR. GRIFFIN: Bryan, before you go, if I could just ask Committee members: If you'd like to make a comment, if you'd just flip that up that

would be very helpful. Thank you.

Bryan.

MR. DURKIN: First of all, please allow me to compliment you in terms of the work that you've done in preparing this. It's been, boy, I think a five-year effort in terms of the work that we've all collectively done as part of the Technology Advisory Committee, and a lot of those efforts were reflected in the proposed rulemaking and we thank you for that in terms of acknowledging the advances that the industry and the Commission collectively have done together to adopt best practices.

And, Sebastian, you highlighted that the main kind of focus is to preserve and protect the integrity of these marketplaces that we all represent. We couldn't agree with you more on that priority.

The rulemaking or the proposed rulemaking itself is so extensive that there are areas of complexity that I think are making the ability to define what should be, like, the chief

priority for us to be able to move together even more difficult to discern. And we would just proffer an idea to separate out the registration requirements that are proposed here, because there are a lot of complexities just associated with how those requirements would be applied, and we'll get into those in great detail when we submit our response.

But, you know, how would this apply to various users in the marketplace? How would ISBs be brought into this, or wouldn't they? So, there's a lot involved in the application of that definition itself. And so we're wondering, might it be prudent to separate that from the risk controls that we all want to get right for the marketplace in terms of, you know, the good efforts that have been undertaken by various industry constituencies, the DCMs -- the CFTC has proffered and has implemented certain requirements itself?

There's a lot of good that's been achieved there, you know, as a starting point:

What's working well with those controls? Where should we be taking them a step further? As we talk about the order routing food chain itself and the application and parameterization of those controls, there's a great deal of complexity associated with how these would be applied. I'm heartened to hear you say today that this was developed with a certain mindset of flexibility associated with the application of these controls.

It didn't come out that way in the report. Where it says that there may be some flexibility, there are also very, I think, granular approaches that have been taken in terms of how these are to be applied across every aspect of the order routing process from, so from the AT level to the FCM to the clearing firm to the DCM. So, I really feel that we could do well working together to kind of delve into that a bit more deeply so that we're all very, very much aligned and clear in terms of how best those should be applied.

MR. GRIFFIN: Larry.

MR. TABB: Thanks, Ward. I want to ask a question. I don't want to put too many people on the spot but, Rich, you talked about the IP issues involved with registering algos and things like that, and I guess the question would be to Rich and Chris -- you're a proprietary firm -- and I guess, Pierre, from a Goldman Sachs perspective. You guys, the three of you, have been involved with developing algos. What, you know, not necessarily from an RGM perspective but more on a theoretical basis, what's the impact of having this IP, you know, put into a registry? Would that impact how you write algos? Or is this just more issue that you don't want other people -- you know, the risk of people looking at it and they jeopardize you? Would that change kind of how you think about writing algos? Would that reduce the quality of the algos that you put into the market? Would it force you to think about do I really want to be in the futures market? I don't know, what kind of -- you know, and you don't have to actually answer for RGM. I (inaudible -- mic

noise) for proprietary issues, but theoretically, you know, how does that impact? And I guess the same would be for Goldman or for Chris from your history.

(Interruption)

MR. GORELICK: Okay, we'll try this. So, from my perspective, I'm not sure that it would change the way firms actually write their algorithms. I'm not sure that that is an important factor. But it certainly may affect firms' willingness to participate in the futures market but, if it does, cause them to expose their IP to turn over to regulators or the government agencies without due process.

I would say that from my perspective, the risks that go along with that are pretty standard. When we have the IP within our firm, it's our responsibility to protect it as we see fit, and when that is out of our firm, whether it's with a government agency or with anybody, any third party, really we lose that control, and that intellectual property becomes vulnerable to folks

leaving the agency and going into private business and working for competitors. That would be a concern. Cyber security certainly becomes a big concern when you have code or valuable IP from a variety of firms at one location that might become an appealing target for hacking, and the like. So, I think the general issue is we lose the ability to protect that IP once it's out of our shop.

MR. HEHMEYER: I agree with Richard. The question of due process is above my pay grade. I'm not sure about how the law works, but instinctively the idea that private enterprise trade secrets just have to be made available at any time to any government person that feels that they should be taking a look at it without a subpoena without justifying why they believe a market's being manipulated, which they certainly have the power to do today, is one that certainly in our industry is cause for, well, what is it that's hoped to be gained by having the trade secrets always available as opposed to a subpoena.

However, I will point out that it's lost on many people that for the members of the exchanges that CME certainly has that power today. We've got a tag 50 that's sending orders that they believe may be manipulating a market and CME shows up tomorrow and says, we want to see the code that belongs to this trade identifier, that we'd show it to them or be out of business. So, a lot of that is available in oversight, but it's protected. The government issues get much broader, as I say, on the legal side of it as Richard I think described. But I think there is this concern in the industry of trade secrets always available to government.

MR. LAMY: Yes, Pierre Lamy from Goldman Sachs. I second what Richard was saying. The concern is the risk that -- increased risk that this information could be leaked outside through cyber security threats and the like and also the fact that besides increasing the risk is decreasing the right of knowledge that we would have, that the information has been linked because

information is more broadly available and more broadly disseminated.

MR. GRIFFIN: I know we have a couple extra cards up, but -- Mr. Chairman.

CHAIRMAN MASSAD: Yes. I appreciate the comments on the source code issue. We certainly heard previous comments to this effect.

And let me just say, you know, source code is not the first and it's not the only form of confidential information that this Commission has access to or has had access to, and protecting confidentiality of information is incredibly important to what we do, and to the markets. Our job is to preserve the integrity of the markets. We can't do that if we can't do our job in a way that protects confidential information.

I'd like to suggest -- I mean, Reg AT is a big rule. There are a lot of aspects. We only have a limited time today, and I think we tried to tee up -- I think Ward and the staff tried to tee up -- a couple of specific issues that we might talk about, the first being this kind of scope

question, the second being whether we've got the right package of risk controls, and I think the third, I believe, is the self-trading.

We could have picked other issues, of course, and all of you, of course, are invited to submit written comments to us. But if we could try to focus the discussion on a few issues, I think it will be more productive. And maybe as a way of doing that, just so I understand the comments that Bryan and Richard made earlier in terms of separating the registration requirement, that's not quite the issue that was teed up. But it is related, because, you know, I think Ward, by teeing up the definitions, was really trying to get at are we capturing the right universe of participants, if you will.

If you separated the registration requirement, wouldn't that mean that we're just talking about a package of risk controls that would essentially apply to the exchanges and the FCMs and, I guess, maybe anyone who's otherwise registered with us already -- We could say, you're

subject to it also.

But I want to make sure I understand what the thrust of that suggestion means.

MR. DURKIN: May I comment now? So, embedded under the risk controls, there are a number of controls that today are in place based on best practices. There are other ones that are suggested or represented in here that, you know, we don't feel that the Commission has a full maybe appreciation or understanding of how they're applied today and how those would be applied according to this rule down to the granular level of the actual AT person and how these controls would be expected to be parameterized and whose responsibility would it be.

There's a lot that appears to be incumbent on the DCM itself in terms of its understanding, knowledge, or awareness of the actual AT user and how they might interface, you know, with the platform and having some obligations associated with how those controls are affixed, where today those would be under the

control of the FCM. They'd have the capabilities to have far more granular application down to the account level or the individual. It doesn't seem clear to us in the report that that's what's intended today. It looks like you're expecting it to put more of that on the part of the DCM as it applies to the clearing firm, to the FCM, and to the individual AT user.

So, we may be confused in terms of how we're interpreting it, right? And, you know, we need more clarity in that regard, and we're fully prepared to lay that out in the context of our comments, Mr. Chairman. But this is the area that, you know, this group has focused on immensely over the last several years, and I feel that it is -- or we feel it's an area that we're all fully aligned, in terms of the intent and purpose, and we just -- we would suggest we should focus on trying to get that part of it right and make sure that we're all clear on what the expectations would be and what would be required under the federal requirements themselves.

CHAIRMAN MASSAD: I'm sorry, just to be clear, "that part" being?

MR. DURKIN: The risk controls, sorry.

CHAIRMAN MASSAD: But, again, then -- maybe, Sebastian, you can help me out. Who would they then apply to?

MR. SCHOTT: Yes, so I think the question, Mr. Chairman, is a very good one. If the focus is on getting the controls right --

CHAIRMAN MASSAD: Right.

MR. SCHOTT: Assuming that there are things that need to be amended in the proposal in that regard, even if we arrive at a perfect set of controls, they would be limited only to the existing registrant population, and so the question may be, you know, Mr. Chairman, is what happens to the unregistered part of the market that is a large part of the market, that can have a significant part of the market no matter how well we get the controls, no matter how perfectly we devise a set of controls? If they're not applicable to a group of people, then, you know,

how much are we moving the ball forward?

MR. DURKIN: May I respond.

CHAIRMAN MASSAD: Go ahead.

MR. DURKIN: So, our response to that would be no different than it would apply today, which is in the context of we require all of our firms to apply our risk controls. And they have the obligation to ensure that they're effectively managing the business that's coming through those firms and trading on our markets. And if we find any evidence that there's been some violations of our requirements or our rules, then we take the appropriate action against those participants.

You know, I would also make a point in terms of a registration requirement. I mean, today we require large trader reporting, and many of those people that are reporting on a day-to-day basis are not registered in any capacity, but they're required to submit that information, and so the CFTC certainly has the authority over those folks. And so we would make a very similar, you know, analogy in that respect.

Furthermore, in terms of anybody that is accessing our markets today using automated systems, we do have a requirement that those be acknowledged and represented to us, and we have a very specific way of identifying through our tagging system who's utilizing those systems, and then we go in and we will look at how they're utilizing those systems.

Back to the registration part of it, Mr. Chairman, you know, there's a reference in the proposal that we're thinking captures a fairly limited population of market participants. But, again -- and we will explain this in more detail in our comments -- some of that definition seems to be contradictory at least in our reading of it. And so when we look at it, we see this applying to a much broader potential swath of market participants. And some of that is based on interpretation in the context of whether or not this brings in users of systems that are provided by ISVs. And right now it doesn't seem like it's contemplated, or at least specifically called out,

I should say, in the proposed rule. But it's not specifically stated that it isn't either. And so we're a bit confused in that regard and, you know, we want to understand what's the responsibility and liability for having misinterpreted the language, because it needs some greater clarity.

MR. GRIFFIN: Richard?

MR. GORELICK: Thank you. I would -- Bryan said a lot of what I was going to say. I think the Commission would continue to have both direct and indirect ways to enforce these risk requirements on firms that are not registered with the CFTC both through the exchanges as well as sort of with direct authority. And I'll let others comment on the legal authority for that, but I believe -- and I've been told that there's not a requirement that a firm be registered with the CFTC to be required to comply with CFTC rules.

MR. GRIFFIN: Gary, welcome.

MR. DeWAAL: I agree with Bryan a hundred percent. Large trader reporting, the rules around the CFTC's concern about positions

and speculative limit positions -- they have used that authority to require a whole bunch of requirements on nonregistrants, including filing form 40s and similar documents.

The CFTC has clear authority, in my view, to capture other participants other than the so-called AT persons today. That authority is 4c(a)(6). 4c(a)(6) is the sister provision of 4c(a)(5), which is the anti-spoofing provision, the anti-market disruption. 4c(a)(6) expressly gives the Commission authority to promulgate such rules and regulations as in its judgment are reasonably necessary to prohibit the training practices described in paragraph (5) -- that's the anti-spoofing -- and any other trading practice that is disruptive of fair and equitable trading. So, it actually gives you broader authority than just under the prior provision. So, it seems to me that under that provision alone, the Commission would have authority to capture customers who otherwise weren't registered.

To me, it's an imperative, because right

now as I look at a box, a matrix, and the old adage, "A picture's worth a thousand words" -- and I wish I could draw one -- you've got a big gap in the proposed regulatory scheme. You've got a principle that says that AT persons, whether their access is DEA or non-DEA, could pose sufficient disruption to the marketplace that they're required to go through the entire panoply of risk controls as well as pre-trade testing of algorithms.

You then say that there's a new category of persons, who are not currently AT persons, who possess that danger -- the so-called DEAs. But yet you do leave exposed this whole other group, and it seems incumbent that risk controls are a function of everybody. Anybody who engages in algorithmic trading needs to have reasonable risk controls to prevent market meltdowns. And, again, along the chain there might be different levels of controls required. But it seems odd to exclude a group when that same group is included simply because they're registered. It's not the

registration category of the group that makes them possible to cause market disruption; it's the trading itself.

MR. GRIFFIN: Mr. Chairman?

CHAIRMAN MASSAD: If I understand you correctly, then what I think I hear you saying is: Don't make all these participants register but apply these controls to not just who you thought you were going to apply registration to but to even a broader group. So, that brings us back to at least these definitions of who do the controls apply to?

MR. DeWAAL: Well, I --

CHAIRMAN MASSAD: What you're saying -- I think you -- at least Gary is saying and I think Richard was saying; Bryan I'm not quite sure is saying it -- I thought the two of you were saying: Yeah, it shouldn't just be: apply the controls to the DCMs and the FCMs but to some set of traders. Bryan may have been saying: Apply it to the DCM and we'll figure out who to apply it to as far as participants in our market. But someone somewhere

has to decide what traders are going to be required to comply with risk controls. Either we have to decide that or the DCM has to decide that -- I think. And so that requires some definitions.

MR. DeWAAL: Sure. Right. If I might respond. I mean, I -- again, different types of controls could apply to different types of persons. You know, again, in comment letters I think it will be expressed more in greater detail, although there was a great attempt, I think, not to be prescriptive in a lot of the requirements. In fact, they probably are a bit prescriptive in many areas, and they are likely, I think, better adjusted.

But I guess the cardinal principle, again, is that if you're going to include all AT persons in that, the 4,000 potential registrants who were captured by this rule, you're capturing them whether they are DEA or non-DEA. You're making a statement that something about being registered, whether you're a CTA or a CPO,

something about that quality of being registered exposes the marketplace to their trading. Yet, other folks who might engage in the same type or more complicated trading don't expose the markets the same way, and that just seems to be illogical to me. It seems to be illogical. It turns risk on a function of a registration, and that may not be the case -- and is likely not the case.

MR. GRIFFIN: Sebastian.

MR. SCHOTT: Yes, if I could just follow on to what the Chairman was saying, I think -- so, assuming for the sake of the conversation that, you know, there are points here. I think, nonetheless, the question remains: What is the activity, and how should it be defined such that a population, whether it's DEA or something larger, is subject to these rules? How do we define the activity that brings you under the scope and just, you know, what do people think about that?

MR. GORELICK: I would say that it should be a very broad group, maybe as broad as all electronic trading. In my view -- I've worked

on best practices with the FIA and with other groups, and we've always said that all electronic trading should have risk controls, pre-trade risk controls, et cetera -- and my view would be that that is what we should be recognizing here, and not all risk controls should be appropriate for all market participants. It really depends on the nature of a firm's business, and the like, but to select out a subset of that group and say we're going to only apply these rules to those folks I think really would miss the mark and possibly leave out some of the most risky and potentially disruptive behaviors as we've seen in other markets.

MR. GRIFFIN: Gary, last comment.

MR. DeWAAL: I was going to say that personally I think that the definition of algorithmic trading is not bad. I mean, a little tweak here and a little tweak there, but I agree with Richard.

One thing that I think is important to note: It appears -- I'm not a hundred percent

sure this is correct, and I think this will emerge in comment letters later, but I do think that one of the issues is even as the rule is written today, is the number really 420 people who the CFTC is going to capture? Is it really 320 theoretically AT persons today and a hundred new potential AT persons tomorrow? I suspect that's not correct, and the reason being is because today my understanding is the definition of automated trading systems at the exchanges is more narrow than the definition of algorithmic trading as proposed by the CFTC. So, to the extent that staff is utilizing an analysis of tags and things like that, they'd be picking up what the exchanges consider to be automated trading systems, which is likely more narrow. So, immediately, that's probably going to increase the group. How? Hard to tell, hard to tell. But, you know, it's likely one of the analyses.

But I do think as a bottom line the definition should be broad -- I agree with Richard -- because you're drafting a rule not just for

today but for tomorrow, and you don't know what kind of systems are going to be developed between today and tomorrow, and you want to make sure that by -- if you draft it too narrow, you're going to exclude something that comes in, you know, a day after the rule is finalized, and that you don't want to do.

MR. GRIFFIN: Well, speaking of the ever-changing nature of not just the market but the market practitioners in this area, I think, you know, this might be a good point to transition away from the scope question, this registration question, and maybe dive a little deeper into those pre-trade risk controls and what's being proposed and really looking at the scope, what's captured, and try and make sure that we have a clear sense from the members how well -- you know, in terms of breadth, in terms of content -- that proposal covers some of those affirmative requirements.

Floor's open. Let's start basic. Sebastian, you want to take it?

MR. SCHOTT: Yes, just since no one else was talking.

We've heard a couple of things over the course of the meetings we've had with industry participants and even today. There's a little bit of confusion as to how the pre-trade risk controls would work, so I thought I'd just put out a couple of points that have raised confusion.

So, we are proposing pre-trade risk controls at the AT person level, the clearing FCM level, and the DCM level. Those controls are similar in the way they are described, but one point of confusion has been whether in fact there needs to be coordination or similarity in the actual design and implementation. So, I just want to be clear that that's not the case. Each entity, whether DCM, FCM, or AT person under the rules can design the controls and calibrate the controls as it sees fit for the role that it plays in the market. And in fact, we would expect that a DCM, an FCM, and an AT person would have maybe sort of distinct interests or distinct risk

tolerances with respect to an order. So, I just want to make that clear that it's sort of specific to the entity that you are and the risk that you perceive as that entity despite the similar language in the rule text as to the nature of the controls.

MR. GRIFFIN: No comments.

CHAIRMAN MASSAD: So, I take it we got it right.

(Interruption)

CHAIRMAN MASSAD: Exactly. We can go final, like, tomorrow. You're all happy with the package of risk controls and how they apply. This is great.

MR. GORELICK: I'd say I think they're very -- there's a lot to say, and it's probably hard to get it out in a meeting like this, but there'll be a lot more detail in the final comment letters that come in. That said, I think they're not too far off in terms of the specific pre-trade risk controls that are delineated.

I think the important pre-trade risk

controls for any electronic trading -- not just algorithmic trading, again -- are to make sure that before a trade you check the order size to make sure that the order is not too big for what, you know, a particular firm can bear, what their credit limits are, their risk limits, their risk tolerances, et cetera.

And the second thing that's important to check pre-trade is frequency, that you have not sent too many orders maybe of the same size and the same -- of a size and direction within a certain period so that you, post-trade, have an opportunity to enforce lots of limits, more sophisticated limits, around your desired trading.

So, I think, generally speaking, it's not too far off. I think my concerns will be not in the details of the pre-trade risk controls but all of the layers of additional requirements that are piled on top of those risk controls to make sure that you're actually doing what you're supposed to be doing. And I would leave a little bit more discretion to firms to figure out how to

make sure that their algorithmic trading or their electronic trading doesn't violate laws or rules.

CHAIRMAN MASSAD: Sorry, Richard, "by all those other requirements," let me make sure I understand what you mean.

MR. GORELICK: I think there are a lot of details in the testing that may not be suitable for all types of trading. I think there are, you know, and may not even be able for different types -- from exchange testing environments, for example.

I think that some of the written supervisory procedures and controls may not be suitable for every type of business. I think that the -- clearly, I think it's appropriate that algorithms need to be supervised by an individual, a named individual, at a firm. I think that it's an important thing that the rules get right, in that we don't want this idea where everyone points the fingers at the computer and there's no one to take responsibility.

When an algorithm is traded in the

market, even if it has artificial intelligence, as Commissioner Giancarlo mentioned, there needs to be a human person at the trading firm responsible for that algorithm, and that person needs to be named in advance and understood so that if there is a problem the exchanges and the regulators know who to talk to.

But I do get concerned about some of the specific training requirements, the testing requirements, and in particular, the annual certification requirements, where on an annual basis a firm would have to go back to the exchange with a very extensive document that might list all of the risk parameters that they chose to set it throughout the course of the preceding year. And that's something to me that just seems unnecessarily burdensome, especially when most of these risk parameters are set with the exchange day in and day out, and the exchanges in real time have access to the same or very similar information. So, it's that type of additional requirement built around these pre-trade risk

controls that give me some pause.

MR. GRIFFIN: Gary.

MR. DeWAAL: Yes. You know, it's -- I like to see what's going on around the world, not just in the United States, and I was struck that last week, the Singapore Exchange, which had had very, very -- and still has, I might add -- very, very prescriptive requirements around its pre-trade risk controls, has proposed a modification to its rule 2.1. And the rule basically eliminates all the specific requirements and simply comes up -- and this is just one provision -- it says obviously -- it's just a general sentence. It says that a clearing member -- this only relates to a clearing member, but again this is a Singapore Exchange -- in order to clear the trades, it has to have pre-trade controls, and it says as such: The checks must be appropriately set to effectively limit the firm's risk exposure to trading members to prevent the taking on of excessive risk. One sentence. If you look at the rule before, they had many of the types of

specific requirements that were listed in 1.80.

And, again, to Richard's point and to some of the points that I think you'll hear over and over again, the danger of making this too specific is that you're not going to allow for the evolution of the marketplaces. You're not going to allow for the evolution of what might be best practice in a couple of weeks. Keep in mind that the way that this rule is constructed because of the definition of algorithmic trading compliance issue, it's a violation potentially of the rule for a firm to violate its own internal policies. That doesn't exactly encourage firms to run out and adopt the best practices. And the problem of coming up with a prescriptive rule -- and, again, I do think the effort was not to be prescriptive, but when you compare, as I said, the Singapore Exchange proposed rule with what's being proposed by the CFTC, you can see the difference, the danger being too specific, and coupled with the fact that firms, I think, are going to be discouraged from being innovative in adopting best

practices going forward, is that you are not going to be flexible enough to deal with what is the best practice going in the future.

MR. GRIFFIN: Paul and then Chris.

MR. CHOU: Yes. So, I would just suggest that understanding the context around a lot of the trades and the message throttling in particular is going to be very important, because many different markets in asset classes have extremely different and unintuitive, appropriate message profiles for how many should be going per second. So, you know, if you take the equity options world, if you're a market-maker in S&P 500 stocks and all the series of options around that, and nothing moves for the entire day, then you sort of have this profile where you see no messages per second and then the second all the stocks move up at once, you might see enormous amount.

So, I think understanding the context of when that's happening, it's going to be important. If the underlying asset moved, obviously that

makes sense, and it's unlikely that that's manipulation.

But if you have too little -- if the thresholds are too low, essentially what will happen is certain people won't be able to update fair markets for other securities and the execution quality will probably suffer for customers, so.

MR. HEHMEYER: There have been a lot of very good things that have been said, and I certainly agree with a lot of them. You know, it seems to me that this balance that you'll be trying to achieve between how broad to set the rule and then how many people you have in the net that you would require to be registrants or members potentially of NFA, and again, I'll say that the NFA stands ready to do what the Commission deems that NFA should be doing. But you've got the -- I think you'll find, in the industry, that there's a lot of desire to have it clear what's expected of people, because that's the best practices now. And so I don't think

you're going to get push-back on trying to make the market safer and more sound with regard to these algorithmic practices by most of the people that are engaging in most of the activity.

So, you're not going to get, I don't believe, push-back -- as Richard was saying, well, in codifying best practices. The problem would be in creating some of the bureaucratic work of filing a lot reports by people who really aren't the intended targets, if you will. And that's going to be a balance, I think, for the Commission in trying to get that right.

MR. GRIFFIN: You know, speaking on the multi-layered approach -- and, Bryan, I don't know if you would be best for that, or Pierre perhaps -- I mean, in terms of, you know, who -- or upon whom -- the pre-trade risk controls are imposed, the rule obviously looks at, again, multiple layers throughout the process, whether it's the AT person, the clearing FCM, the DCM. In terms of that structure, do you feel like that is well covered? Is the need for application to clearing

FCMs -- is that a necessary obligation, or something that perhaps should be discussed further?

MR. DURKIN: First of all, in terms of the controls themselves, I mean, many of these are ones that we've implemented as an institution, right -- and we're firmly behind the intent and purpose behind this. No question. So, I just want to be very clear on that point.

Where we find confusion, and even today it was very helpful, Sebastian, to hear some greater clarity on the intent on flexibility and how that would be applied in this multilayered approach.

We need to define that a bit more clearly and will opine on that in our comment letter in terms of how you might, you know, consider approaching that multilevel application. But, you know, again, it's a little confusing to us. Just on the slide that's referenced here today, multilayered approach requires risk controls at AT person, clearing member, FCM, and

DCM. Then it says, "Each entity has discretion to set appropriate design and parameters," which is positive. But then it goes on to say, "To ensure minimum standards for parameters, entities must report settings to the DCMs," and this is to establish, I think, some kind of baseline or floor, whatever, in terms of making sure everybody has some baseline parameters that they're trying to work towards.

But, you know, these are the types of things that we just need some clarity on to figure out, and what are our obligations as a DCM to make sure that this is being carried out in the appropriate manner, and what are each one of those participants in those order routing chain obligations.

MR. SCHOTT: Sure. So, both in response to your comment and maybe Chris -- the pre-trade risk controls are intentionally, I think from staff perspective, broad in that they say have a maximum per-unit time. We don't tell you what the maximum is; we don't tell you what the unit time

is -- just have a number divided by a number. So, the purpose of some of the reporting that has been discussed is because the rule in theory lets you have a pre-trade risk control of, you know, a million orders per second -- to be facetious about it -- there's a desire to have some check that in fact that flexibility hopefully that is reflected in the rules is not going to be abused.

MR. GRIFFIN: Gary. Oh, sorry. Commissioner Bowen.

COMMISSIONER BOWEN: Yes, thank you. I just want to make sure -- thank you so much for the comments. What I'm hearing is that we have been overly prescriptive, and we have not necessarily captured the risks that are posed by these types of trading activities. And so therefore, by even listing or defining people, whether they're DCMs, ATs, or FCMs, we may not be capturing the very people who are coming to the market and presenting potential risk. Am I hearing that right?

MR. DURKIN: Yes.

COMMISSIONER BOWEN: Okay, thank you.

MR. DeWAAL: One question that I have, because it jumps out at me as something that's not entirely clear in the proposed rules is when the staff refers to "clearing member," FCM, an FCM that's a clearing member, are you placing all the obligations on the FCM that's carrying the customer's account? Are you placing the obligations on the FCM -- the clearing member FCM -- that is sponsoring or granting the access? Or both.

MR. SCHOTT: So, that would be a useful thing to have a comment on, because the proposal is around the member that is clearing the trade.

(Interruption)

MR. SCHOTT: I'll try to shout. So, we have received questions as to whether the better approach ought to be the executing firm that's putting these controls in place. So, I think that would be a good point for discussion here. But the proposal is the clearing firm, not the executing firm.

MR. DeWAAL: I mean, from a pure point of technicality, both FCMs are a clearing FCM with a relevant DCM, because in order to sponsor somebody's access or grant access, you have to be a clearing member FCM. So, that's where the danger -- that's why it's a little unclear in the rule, because everybody who grants or sponsors access is a clearing member FCM -- unless you're self-clearing, by the way. And it's potential that somebody could self-clear -- and, by the way, they would not fall within this rule necessarily -- that's another potential exclusion.

But to me what's relevant, because here -- this rule is all about avoiding market disruption. And therefore the appropriate party, to me, is the gatekeeper, who is granting that market access. So, in a situation where one executing broker on behalf -- one executing FCM on behalf of multiple customers grants access, they seem to be in a far better position to control that access, than the firms that ultimately are receiving the trades -- this is not, like, 1.73,

which effectively is really a credit control. This is really all about disruption. So, I do find that -- you know, I agree, I think it's something that should be clarified when the final rule comes out that, in my view at least, the gatekeepers are the more appropriate party.

MR. GRIFFIN: Being cognizant of time, this would be a good point to move on to the last topic that we certainly wanted to raise today, which was the question of self-trading. And this has been an area where it's certainly gotten a great deal of focus from a number of parties, and, really, there are a couple of questions I think that have come up that would be helpful to discuss here.

First, the way that self-trading is proposed in the rule: Does it define the population of trades appropriately, first of all? And, second, is there enough flexibility in terms of implementing the self-trade prevention tools at the DCM level and how that may go about?

So, Bryan, if you want to jump in.

MR. DURKIN: First of all, compliments to all of you in terms of the discussion that we've had over the last few years on this very topic and how it's informed the definition of how this would apply. You've recognized that there are legitimate situations where there may be transactions occurring within the same firm for the same proprietary account opposite each other, and you laid out, you know, how that would be permissible or allowable with a certain level of reporting obligations and whatnot. And I think that's a big advancement and cannot compliment the Commission enough for making that recognition.

Now, assuming that that occurs and, you know, we stick to that criteria, when you remove those transactions from our calculation and how we've reviewed it just having taken a particular day in February where this was called out in terms of the level of self-matches, it would be down to a fraction of one percent, a very small fraction of one percent of activity.

And, you know, we're really happy to

share that information with you. I think you'd find it interesting, and it's just to kind of frame out, you know, what, in terms of possible disruptive practices, are we talking about here if we're acknowledging now that, you know, there is a reasonable basis for certain types of these transactions to be occurring with the caveats that have been outlined, to what end, then, are we trying to address a problem? Or how big is that problem? And so we'll articulate that again in our comment in greater detail and specificity, but in terms of how the DCMs' protocols are to be applied, you know, again, we're going to be asking for some more guidance from the Commission in terms of what the expectations are under this rule and ensuring that the protocols that we've put forth effectively comport with your expectations. But, again, I think we have to really focus on what is the problem here that we're trying to solve, and the universe of what this is being now applied to is a very, very small fraction of activity.

MR. GRIFFIN: Sebastian, if you'd like to maybe speak briefly on the intent behind the rule, how it was structured, and some of the thinking that went into those points.

MR. SCHOTT: Sure. Let's see, is my mic working now? Yes? Okay, good.

So, from the staff perspective, the approach here was, again, a little bit like our pre-trade risk controls, and we thought we were being flexible, but we have a mechanism around reporting, and the mechanism around reporting is designed as a counterbalance.

So, as you mentioned, Bryan, there's the premise that there are certain activities, self-trading, that when it has characteristics about independent decision-makers and so forth, that that's permissible.

Now, having made sort of that statement and proposing to codify it in rules in effect, we're also looking to make sure that that latitude isn't abused through a measure of transparency that says, it's happening, that's good, now let's

identify how much of the self-trade, how much of it is happening? And so I think that's the primary desire: To acknowledge it, to permission it, but to be transparent about how much of it is happening.

MR. DURKIN: There's one other aspect that we're going to be seeking some clarity under the requirement where I believe it makes a reference to transactions that are under common control, and this would apply to those types of transactions, which had us a bit perplexed because we would look at those types of transactions as cross orders or crossing of trades, and, you know, we have facilities for those types of transactions to be permissible, and so we're going to be seeking some greater clarity on what the intent was there. Again, the driver was orders for accounts under common control but are for different beneficial account owners. So, I mean, it's not what we would typically have put under a definition of self-trading.

MR. GRIFFIN: Okay, we are about out of

time on Panel I. Before we close it, I just want to check -- Chris?

MR. HEHMEYER: Thank you. Can I go back to the bigger issue of the registrants for just a moment? And that is just a little perspective to some of those that maybe are newer to the industry.

When the NFA was created in the early '80s, it created the categories of floor broker and floor trader for purposes of registering the floor brokers and the floor traders while trying to avoid duplicative regulations with the exchanges, because they were already regulated by the exchanges. And so we went over -- we, floor brokers and floor traders -- went over and got our fingerprints at the NFA, and that was all we heard of it for 30 years. And so it functioned pretty well, because you had these people in the system and had data on them and the exchanges regulated them.

Then, it was somewhat my fault that this came back up under the swaps regulation

discussion, because those of us in the trading business kind of thought, you know, if we register as floor traders and only trade cleared swaps, if we get registered as floor traders, maybe that would work and function roughly as the way it used to work. And it then became a bigger thing, and so there's this awful application -- I went to the NFA and said: Could you handle this thing of floor traders? And they said: Yeah, it'd be a little difficult because they're individuals and not companies but we could make it happen; there's only a limited number of them. And so I said: Sure, we could do it. And so it ended up that the Commission came up with this set of rules for the floor traders, which now needs to be tweaked. So, there's this really cumbersome term, "floor trader," for these automated traders. And I'm somewhat guilty of contributing to that.

Having said that, the challenge I think for you all as this goes forward is this difference between a member of the NFA and a registrant of the NFA, because a member has much

greater responsibilities, has to file an annual report, has to be there for regular audits. Its books and records will get audited.

A registrant doesn't have that responsibility. And so here you're going to have the issue of the prop trading firms and the exchanges' rules again where we don't want to be duplicative with what the exchanges cover, and these professionals that have a lot of these systems and rules and best practices already in place and certainly could abide by those Commission rules if they come down -- that they have to abide by a set of rules that are to go with new releases of algorithms and things like that -- software releases -- which is important.

It's the software releases oftentimes that, in my opinion, where some of the danger comes. And so those need to be laid out. The professional firms I think are certainly willing to do that and welcome because it's safe and secure.

The bigger issue is if it's broad, do

you have 4,000 registrants or 5,000 registrants out there who might be a farmer that uses an ISV, and so that will be the trickier part. All of those people being registrants with the NFA may be good for the NFA business, but I'm not sure if that, from a public policy standpoint, is where you want to go. So, that's -- I just offer that as possibly part of the challenge of trying to get this right. It's somewhat nuanced.

Thank you.

MR. GRIFFIN: Thank you, Chris. Unless any Commissioners have any questions, comments? Great. Thank you, Sebastian, Marilee, Mark for joining us this morning. We're going to take a very short 15-minute break, and by "15," we're going to stick to 15 minutes so we can jump right into Panel II. Thank you.

(Recess)

MR. GRIFFIN: Thank you. I now would like to welcome our second panel, which will focus on swap data standardization and harmonization. Joining us on the panel are Dan Bucsa and Richard

Mo from the Commission's Division of Market Oversight, and Srinivas Bangarbale from the Commissioner's Office of Data and Technology. We also invited representatives from the four swap data repositories to join us: Marisol Collazo from DTCC is, of course, with us as a TAC member, and joining her as panelists are Derek Kleinbauer from Bloomberg, Jonathan Thursby from CME, and Bruce Tupper from ICE.

Dan?

MR. BUCSA: Thanks, Ward. First off, thank you, Chairman and Commissioners, for reinvigorating the TAC; members of the TAC for participating; and Ward for organizing today's activities. As other colleagues probably mentioned earlier, any comments that I make today are my views and my views only. They don't represent the Chairman, Commissioners, or any other staff at the Commission.

The second panel is not for staff to brief you on the history of reporting or where the future might take us. Instead, we wanted to share

our thinking and provide some background on the draft technical specifications in order to help frame the questions we asked for the pending comment letters. As a reminder, that comment period has been extended to March 7th for all of you drafting letters. More importantly, staff also wishes to take a step back and have industry take the lead and advise us by panelists sharing their expertise rather than the other way around.

It is well documented why and how entities interpret regulations differently and created new reporting templates with distinct data fields and formats. The agency has been focused on improving data and worked with a lot of you -- SDRs, reporting counterparties, industry organizations -- throughout the evolution of swaps data. We appreciate that cooperation and plan to continue to rely on that dialogue.

Swaps data has come a long way since the inception of reporting, especially considering that there was limited transparency for the market and regulators before Dodd- Frank. Today we have

a better understanding of what is happening in the swaps markets than in the past.

Staff distributed this Request for Comment to continue the work of improving the data, as well as our other initiatives such as the cleared swap reporting rulemaking. This is just one step in an iterative process to resolve the inconsistencies in how different SDRs and market participants report swaps.

To be clear, the Request for Comment is not a Commission action and doesn't change any regulations or reporting requirements. It is not intended to stimulate discussion on existing or future regulations at this time. Instead, the goal is to garner technical feedback from a data perspective on the prioritized list of data elements whether their definitions, formats, and allowable values are accurate.

In particular, we're not attempting to limit the different economic terms that could constitute a swap. On the contrary, we are simply searching for more robust reporting so the same

element is being reported consistently and transmitted to the CFTC under a common approach. The Request for Comment aims to better understand if the definition is not clear, the format not possible, or the allowable values not inclusive enough to represent swap transactions.

At this time, staff chose to focus on credit, interest rate, and FX swaps since those asset classes are much more standardized than others, such as commodity swaps, for example. There's no one-size-fits-all approach that works for reporting. The terms of swap transactions can vary greatly based on the risks one wants to gain exposure to or limit by hedging. The prioritized data elements listed are driven by use cases identified by staff across all divisions of the Commission in order to help promote our regulatory mandates.

Wherever possible, an existing data standard was used. In instances where a data element did not exist in another reporting regime or the options available did not fit the needs of

the use case, a new draft technical specification was created.

Staff conducted its initial review based on data actually contained in the SDRs, FpML and FIX messaging standards, known SEC reporting regulations, and ESMA reporting requirements. We also heavily leveraged the international harmonization work going on, such as by groups like CPMI-IOSCO. The Office of Data and Technology is co-leading some of those efforts, and my colleague, Srini, will take the lead on detailing some of that work.

MR. BANGARBALE: Thank you, Dan, and again my comments are mine only and they do not reflect necessarily the views of the Commission, the Commissioners, or other staff of the Commission.

I would like to take a couple of minutes to talk about the background in the international work and how the international work that the CFTC has been co-leading corresponds and works with the staff work that's being done here.

In September 2014, the Financial Stability Board published a report on aggregation of global swaps data for regulators, and they conducted a feasibility study. The CFTC co-led that effort. And that study recommended several things.

One was the development of standards for data elements, which different regulatory regimes had different standards for form and manner.

The second one was development of key identifiers like the LEI, the UPI for products, and USI or UTI for transactions. The LEI was well formed by then, so not a whole lot of further work was necessary, and the Commission has been an early adopter of the LEI standard.

As far as the development of data standards for other data elements and USI and UPI or UTI and UPI, the Commission has been leading the CPMI-IOSCO work on developing these standards. The CPMI-IOSCO formed this group in December of 2014 quickly following the publication of this report to handle these data elements.

So far, the work has proceeded on all three fronts.

On the data elements side, the group has published the first consultative document, and the comment period has closed but the group is considering comments and is working on more data elements. On UTI, the group has again published a consultative document, has received comments, and is expected to issue final guidance by late spring this year. On UPI, the group has published one consultative document and is expected to follow with one more consultative document by the end of the year.

The FSB has again taken charge of putting together a governance mechanism and an implementation plan for UTI and UPI. So, based on these, our document that we published as specs does not address UPI and UTI, because we intend to fully leverage all the international work that's going on in these areas. And since we co-lead this work, we are very much involved in it, and in fact two weeks ago we had an industry workshop

here. A number of you actually participated in that workshop to provide CPMI-IOSCO and the workgroup with your views on all the consultative documents that have been published by the CPMI-IOSCO workgroup.

On the data element side, the focus of the CPMI-IOSCO workgroup is on global data aggregation for systemic risk purposes. But the CFTC's remit goes beyond it.

As Dan talked about a number of use cases, we have a number of regulatory use cases, so our list of data elements is, by necessity, larger. There will be overlap. We are overlapping, and we are leveraging as much of the work of the CPMI-IOSCO that we can put into our specs. But there will be data elements that we will address that will go beyond what CPMI-IOSCO will address.

So, with that in mind, we also, as Dan said, looked at the work done by ESMA on EMIR and the regs by SEC and other documents available like the industry bodies. And we believe that staff

has spent a lot of effort and research into many of the technical and data standards aspect to come up with the draft spec that we have put out for comment.

Of course, you know, part of the process in the comment is to learn more about anything that we might have missed or any other aspects we should take into consideration, so the comment period is still open, and I would obviously encourage everyone to, you know, send in your comments with respect to the document we put out.

Thank you.

MR. BUCSA: Thanks, Srini. The comments that we do hope to receive will inform any subsequent decision-making by providing insight on how SDRs can transmit the data in a consistent manner. We want this to happen regardless of who is executing the transaction or which SDR has been utilized. We hope to continue to consult with industry now and in the future, and we place utmost importance on this.

That's why we think the TAC should

contemplate the reestablishment of the Data Standardization Subcommittee. It would provide a more permanent means for the experts in the space to have these conversations, share best practices, and collaborate with staff on how to deal with this complicated dataset.

Today, for this panel, we're going to talk about four of the themes from the Request for Comment: Reporting of events, particularly allocations and compressions; order data and package transactions; pricing information; and notional amounts. Of course, as time allows we'll talk about other themes as well.

Thank you again for your attendance. Looking forward to the discussion, and turn it back over to Ward to lead the conversation.

MR. GRIFFIN: Thank you, Dan; Srini. As Dan mentioned, today's discussion is going to focus on four of the themes from the Request for Comment. We have asked TAC members as well as our invited SDR panelists to co-lead each of these themes, and we're going to address them in order.

And then, finally, before we wrap the panel, we will discuss briefly the potential for reestablishing the Data Standardization Subcommittee and solicit the TAC members' views with respect to that.

Why don't we dive right into the first theme, reporting of events. Handling -- or, say, co-leading -- that discussion will be Jonathan Thursby from CME; Marisol Collazo from DTCC; and Supurna, who's on the phone, I hope, from BlackRock. Supurna, you there?

MS. VEDBRAT: Yes, I am. Can you hear me?

MR. GRIFFIN: Yes, we can, thank you.

MS. COLLAZO: Okay, so thank you for the opportunity to present to this Committee today on what I would consider a very important topic as it relates to regulatory transparency in the OTC derivatives market.

First I'd like to say I applaud the effort of the Commission to tackle this issue and to address it from a technical specifications

approach and solicit comments. I'm encouraged to hear that in taking forward this approach that you are looking at CPMI-IOSCO data harmonization work, because we think that's very important from a global perspective, and I'm looking forward to opening up this dialog with my co-panelists here representing other SDRs.

Before I go into the reporting of events, I'd like to set some context around data quality that I think will drive the four points as it relates to events pricing, notional and -- missing one. What am I missing? This -- yes, thank you.

So, DTCC -- we've been looking closely at data quality since commencing our global trade repository services back in 2012. Just to set some context, we are now covering nine jurisdictions globally across U.S., Canada, Europe, and Asia. And what this allowed us to do is it positioned us quite well to look across the datasets and understand where the issues lie both from jurisdictional level -- for example, under

the CFTC regulations -- as well as compared to regulations across the globe.

In that vein, we have really looked to take a very proactive approach on addressing data quality issues that we have seen, and we have been working closely with market participants, market providers, SEFs, clearing houses, as well as regulators to identify what is the root cause of the poor data quality in certain areas. And, in fact, we've been very engaged with Dan Bucsa and his team in providing the results of our effort -- whether it be through heat maps, through root cause analysis and recommendations -- and also actively participating in the CPMI-IOSCO Data Harmonization Working Group.

So, I just want to show a little bit of what we have learned and how we have evolved our own thinking around data quality. You know, there are a few components. When we first embarked on this exercise, we thought about sort of the traditional standards that, you know, you can Google search and read what does data quality

mean, and there are many white papers on this, and, you know, right away two key terms that come up are "completeness" and "accuracy."

Well, we looked a little further into exactly how do you achieve accuracy in particular, and so there are two points that I want to raise here. One is around validating the content of the data and doing so in a way where you're applying business rules to the data that's being provided. So, we think that's really important in terms of how we look at the technical specifications. What are the business rules that are going to lead to a reliable piece of information?

I would note that, based on discussions we've had with staff and our own read, we think there are some changes that need to happen under Part 49 rules that enable the SDRs to apply those business rule validations and have the authority to either perform inception management or potentially reject the trade, and, you know, the reporting entity has to try again.

So, you know, the other -- the second

part of this is what I would call data integrity. When I speak about the data integrity, what I'm really speaking about is the reliability of the content being provided. The reliability increases, we believe at least, when it is tied to existing processes.

For example, if a field is reported as part of an electronic confirmation process and the value is provided by that confirmation provider, then it's going to have a high reliability rating. And we see this play out quite strongly on CDS and interest rate swaps where it is a market where you do have a high percentage of trades being electronically confirmed.

The same is also true for cleared swaps as it relates to fields that are being captured for the purpose of either clearing or confirmation where these fields are required to be reported in terms of information that's being asked for that doesn't exist in existing market conventions or in practices or whether data needs to be transformed, values added, or potentially where we have a

redundant set of data fields. So, you know, the illogical sequence of having two or more fields in the same trade record that can contradict each other is what I mean there.

The danger here is that it then starts to fall further and further away from existing operational process or market structure, and there is where we're really seeing the data quality decline. And so I don't think that the measure of data quality is poor across the board. There have been improvements. Our analysis has shown cases of, you know, 38 percent on data quality up to 85 percent on certain fields. So, we are seeing improvements, but where we're really I think still quite struggling is on what I'd call sort of the outside the parameters of where the existing operational process is.

So, with that lens I'm going to turn to reporting of events, and then I'll open it up as well to my co-panelists to add their comments to it.

In thinking about reporting of events, I

considered three aspects:

One is: does a recommendation advance the data quality, and can the information be relied upon? So, essentially that data integrity test.

Two: are there global implications that need to be considered? Sounds like Srini has tackled some of that, so I'd like to explore that a little bit more.

And three: is the information readily available or accessible to make execution of such proposed standard executable and can we act on that?

So, starting with the first, and then looking at the definition around event type in the specification, when we look at the data quality aspect, we think event types in the proposed specification is over 30 values or 30 values that are provided there. We think there is a much more narrow definition. We think that's too broad.

Traditionally, event types really reflect price-forming changes as it relates to the

opening or closing of a transaction -- for example, a new trade, new execution, novation, or terminating a trade. These are all price- forming events; whereas, when you look at middleware providers, what they are really doing is performing actions on those events. And so the remainder of what we saw in the technical specification beyond those three we believe are much more applicable to actions. And these are really actions that are applied on a new trade, a novation, or a termination for the purpose of -- typically for position calculations, settlement activity, or confirmation processing.

I think this is a very important distinction, because the danger here is that we are trying to fit into an event-type definition, and this includes the compression and allocation point, the behaviors, and the actions that occur within market providers for other purposes. And I'm concerned, in terms of advancing data quality, that we're going to -- even in the place of a standard, we're not going to get highly reliable

data, because it doesn't presently exist in that infrastructure. And the result is going to be, you know, a lot of, I think, cost here in terms of passing that information through, but the likelihood of the data quality in our opinion is still going to be poor.

You know, the other application is the global consideration, and we think that event type is an important field for systemic risk and certainly for the need for data aggregation, so I'm encouraged to hear that that is something that is being looked at alongside of the other data elements workstream from CPMI-IOSCO. My caution here would be that there is full alignment, and that is worked through -- because I understand that's still work in progress -- and I would be very concerned about the Commission moving in advance of CPMI-IOSCO having really fed it through all of these scenarios and really collecting industry feedback on that.

The last point -- is the information readily available? I think, for the reasons I've

already stated, we don't think they are, and we would propose instead that the focus here be on really narrowing what is the objective, you know? So, we look at alternatives, because we do understand that there is a need to have a better understanding, and we believe that the objective here is what the Commission is looking to seek -- and happy to be sort of educated on that in terms of these use cases -- audit trail, being able to follow a trade from execution through its life.

There are other alternatives that can be explored such as linking trades when it relates to compression between the predecessor and the successor identifiers -- trade identifiers-- you know, and that would satisfy the audit traceability. There are other values as well reported in that trade record that would identify that the submitter of that data is a compression provider. So, that is another data element that has a high degree of accuracy and would enable the Commission to understand that it's a compression trade and one of the linking identifiers to that

compression.

What then remains is the question of the reason for the compression. Multi, bilateral, or blending are the three examples in the specification. As it relates to the reason, I'd like to better understand, in terms of use cases, what added value the Commission is deriving for that. We think that collecting such information again would be very difficult, and we're concerned about the degree of accuracy that as a swap data repository we would see in terms of that field being populated.

So, those are my comments. Thank you for giving me the opportunity to present on that, and I'd like to turn it over to perhaps Bruce, if you want to pick up.

MR. TUPPER: My name is Bruce Tupper. I manage ICE's global repository business. Appreciate the opportunity to speak on today's TAC panel. Thank you.

I think before we dive into the very specific questions that are posed by the draft

specifications, I think it is important to just kind of take a step back and look at the data quality in what the Commission receives today. With the sort of standing up a creation of SDRs, there was very little coordination on the output amongst repositories to the Commission, for which I know there have been public statements in that regard. So, if we kind of look back to 2012, all of us were busy working with our individual customer bases, trying to stand up our own technology and connect customers to us and make sure that they could fulfill their reporting obligation.

As part of that process, there was very limited guidance or coordination amongst the repositories on what the outputs to the Commission would look like and, more importantly, what are the methodologies and standardization of these fields and how do we aggregate those and report them as a collection? And as Marisol mentioned, it's more than just saying I have a field. There's a life cycle event. How do we communicate

that to you, and how do we each do that in a uniform manner?

I think it's important to look at efforts that the Commission's made and also compare that to other reporting jurisdictions. I've had the unique ability with ICE to also manage other jurisdictions, and what I can say is that I think the Commission's done a very good job with collecting a dataset that's manageable and one that relates to the swaps markets. In other jurisdictions, there was a very broad expansion of data, and what it's led to is these very large sets of data that are unmanageable -- for example, dual-sided reporting and the inclusion of orders. So, I really -- I strongly believe that the Commission got it right in the early days with single-sided reporting and also just focusing on transactions.

With that being said, I think we also have to look at harmonization and the benefits of that, and I'm very encouraged to hear that there is consideration to restart that group or under a

new subgroup that Dan had mentioned. I think that would be very beneficial. And I think the next goal is to work with the data fields we have and understand how those are to be standardized or validated and also given to the Commission in a uniform manner amongst all four SDRs. The end result is that the staff will be able to aggregate the data, process it, and then use it and have useful information, and I think that's the big challenge today.

So, those are kind of my high-level remarks. I know I was asked to also prepare some remarks on price data reporting and no-shows, Dan. I don't know if you want to do that now, or if I'm changing the agenda. You tell me.

MR. BUCSA: I think we jumped around a bit prematurely, so we can hold off on this.

MR. TUPPER: Fine.

MR. BUCSA: Thank you.

MR. THURSBY: Hello. My name is Jonathan Thursby. I'm from CME Group. I manage CME's global trade repository business. I'm

thankful for the opportunity to sit on this panel and talk about data quality and data improvement efforts. I won't repeat a lot of the fine comments from Marisol and Bruce but would like to lend support to a couple of the notions, particular the concept of engaging in the international standards work that I know this Commission has been active in doing. I think we're seeing a lot of positive developments, particularly in the space of certain data elements -- UPI, UTI. I would also add in other international standard-setting efforts around LEI and the hierarchical rollup that are also happening, and I think that we're seeing great momentum and a lot of coordination around that.

Srini remarked about the event that occurred here -- the workshop that occurred a couple of weeks ago, and I think that's evidence of the positive inertia that we're seeing. And I think that we can be a beneficiary of that, and I think following those timelines rather than perhaps getting in front of those might be our

best course to ensure that the work that does occur at both the SDR level as well as the reporting participant level is in line with the international standards so that the cycles that are spent can be hopefully multi-purposed, particularly for organizations that have reporting obligations in multiple jurisdictions.

I think ultimately when we get to the desire to see data transferred across jurisdictions and be compiled together to give a broader picture, following those international standards is going to be our best course there. And I also would support the idea that we resume the data harmonization efforts that were previously led by ODT.

We had done that initially around credit markets. I think that resulted in cleaner data, and note that that happened within the SDRs without impacting the reporting participants. And I think that we had seen nice progress there. There was work for a second phase. There was engagement -- in fact, the SDRs had come out here

to D.C. And had done sessions on that. That work did get paused. It wasn't resumed, so I would put a vote in for resuming that, extending it to the other asset classes, and seeing how far we can get within the SDR community, particularly taking inspiration from the work that's happening by the international standard-setters, and let's see what that results in prior to turning to the market participants and seeking the entirety of the marketplace to take action on the data that they're reporting in.

And then finally I would just make a remark along with harmonization efforts to just see what we've had at times, but I think we can do more of, which is greater collaboration amongst the SDRs and the Commission staff to look at ways to improve, particularly with things around looking at technical standards and other elements that could be potentially imposed on recording participants to have that work done in advance in collaboration with the SDRs, I think is going to give us our best outcome.

And with that, I guess I will ask the question again, Dan, did we want to turn into the first theme?

MR. GRIFFIN: Actually, Dan, why don't I -- since we kind of jumped around just a little bit -- Derek, not to put you on the spot, but if you want to maybe chime in a bit from kind of that higher-level perspective from Bloomberg's standpoint to kind of set the table a little bit for the broader discussion. And then after that, Supurna, perhaps if you'd like to jump in and target in on the discussion of events.

MS. VEDBRAT: That would be great.

MR. KLEINBAUER: So, Derek Kleinbauer, product manager for Bloomberg Swap Data Repository.

Thank you for the opportunity to join today's TAC. I definitely look forward to a very healthy discussion.

BSDR supports the efforts by the CFTC to harmonize swap data in an effort to resolve reporting challenges present in the market. We

intend to file a comment letter on the draft technical specs for certain data elements. As we look to introduce these additional reporting fields, and I don't want to hop around again, but we are aware that for instances of reporting package transactions or compression events, I think a common theme that we're going to touch on today is the ability to link these transactions. Whether we have bifurcated reporting styles of MAT legs versus packages being executed on a platform or away from a platform, being able to properly assess that risk is going to be critical. And in order to do that, I think having the linking abilities is going to be key.

I would also say, you know, to the extent that we can leverage in certain fields here information that is already being reported upstream, say, by a swap execution facility. There are some elements on the order data side where the swap execution facilities are reporting elements to their trade surveillance. I think we could probably do a lot of leveraging there to

ensure that the fields are not only consistent to Marisol's point and Jonathan and Bruce's points, but to make sure the information is going to the correct location and what the intent of that information is -- whether it's to identify concentration of risk or trade manipulation, does that sit with SDR reporting, or does it sit with the SEF reporting? So, I think that's going to be critical.

But not go further beyond the agenda. I think we can probably leave it there and jump right into the reporting of events.

MS. VEDBRAT: This is Supurna VedBrat from BlackRock, and I'm not -- I'm going to try not to repeat what people already heard, and I'm going to talk about reporting of events looking at it from three different angles.

One is, like, the usability just from a practitioner's standpoint as we trade. We want to make sure that any of you feel that we introduce as much as possible. They can systematically be provided, you know, whether it's at the SEF level

or what have you.

The second is accessibility of data, and we need to be able to have access to the data that's reported either, you know, to help with analytics that the Commission can build upon in order to get the complete life cycle of the trade.

And then the third element of it is on linkage, because if you look at reporting of events that are outlined for discussion on compression and allocation, when a buy side firm is participating in any of these trade execution methodologies, it is very possible that the initial trade (inaudible) indicates of an allocation, what we would do is block trade it, and then that block would be allocated. But the block trade is executed on a SEF, and depending on what SDR -- what SDR the SEF is using as the reporting entity, you know, it could be different from the entity that the CCP is using.

For example, if you traded a trade on Tradeweb -- a block trade on Tradeweb -- and then we allocated it to the CME because it was a CME

swap, you won't have the full life cycle of that trade in one SDR. And for that -- in order to be able to understand, like, the complete trade, whether it's, like, from a surveillance perspective or a market risk perspective, it is very important that that data is accessible and the Commission is able to build the analytics on top of that data and be able to follow the swap completely.

You know, from a linkage perspective, one of the suggestions that we would like to make is perhaps giving the client or the market participant the ability to select which SDR they would like their trades to be reported to, because by providing that type of ability, you could potentially report the complete life cycle of the trade to a single SDR, which would make it much more accessible and easier to be able to do any type of analysis.

I think in the current proposal there are certain fields that we can benefit from. I think we also have to be careful with the number

of event types, and in certain situations you may have multiple events that may apply to a particular swap or, you know, with a unique swap identifier.

And then the other component of it to consider is there are going to be certain event types that you do at time of trade. So, for example, when you're trading a block and you're allocating, a time of trade you know that you're going to be allocating those trades, so it's -- and we can define that event type when we're trading. For a trading strategy such as compression, which you know, for purposes of risk management, it's considered to be much more a post-trade event.

You don't know when the initial trade was done, if that trade was going to be part of a compression or not. So, we also have to think through, as these event types occur in the life cycle of the swap, at what point do we include them, and when we include them, is there a method by which we can translate or transmit that

information both downstream and upstream, because I think in the current environment today, the data is flowing forward, which actually helps the integrity of the data. But if you start to include additional events that are happening on the swap, that type of information may need to be transmitted backwards.

MR. GRIFFIN: Thank you, Supurna. I want to open it up to the broader membership if anyone would like to chime in. Pierre?

MR. LAMY: Yes. Pierre Lamy, Goldman Sachs. And I would also like to point out that I also have been working on the FpML standard for many years, and I currently chair the FpML Standards Committee.

So, when I look at the proposal for the list of events that are being proposed, what strikes me, as Marisol pointed out, is those events are very, very detailed and go well beyond what is currently used on the marketplace. I know as part of FpML, we have standardized the way to report and to describe events. We do not go to

this level of granularity, and even within Goldman Sachs, the way we frame events, we also have a shorter list of events, because we don't think that we need to go beyond that.

So, I think I would echo what Marisol pointed out, which is as part of that (inaudible) recommendations, a number of firms would struggle to implement this very detailed set of events. And that would compound the issue that we're currently seeing as part of the quality of that reporting.

And I think when I look at the proposed consultation, it strikes me that there are two elements. There is trying to normalize a set of data which is currently reported and another set of elements is introducing further data elements for reporting. And I think I would be -- what I would suggest is (inaudible) the information that we currently report -- and I will talk later on today about validating the data that we would currently report -- before going to a further step and significantly enlarging the set of data points

that we look to collect, because unless those are completely indispensable, the risk is you will compound the problem of data quality by going through such approach.

MR. LEVY: Thanks. Okay, I'm just going to hit on the two specific areas of compression and allocations. I agree with a lot of the comments already made, and for those that don't know, we sit, as the other side of coin, to some degree for many of the SDR activities that goes on at DTCC, and we're a major provider of the data in on behalf of many of the end users.

You know, there may be rules that are already on the books that aren't really being looked at or enforced as much. We definitely see the data quality issues on trades that are part of other processes versus trades that are just put in as part of a reporting, and the quality is definitely higher. Just to validate what Marisol was talking about, we see that from our side.

But there's also maybe an element of functionality being out there, or ready in

providers like ourselves and others, that is just being underutilized and could be. We would agree that the granularity of the information that is looking to be provided is a bit too much, but we do applaud the attempt to get to that detail. But we do think it needs to be brought up a level.

The fact that a compression is bilateral or multilateral may be interesting. I don't quite understand why that would be relevant from a reporting perspective as much as it's part of a compression, because often compression trades, whether they're new or terminations, are not economic events. So, at a minimum, it's important to identify that trade as different, not necessarily to identify how granular you need to be in describing that difference, so just saying it's part of a compression may be enough there.

The other thing that we have done that is used to varying degrees is this idea of a bulk processing ID where there is some bulk event, credit events, or compression events, particularly compression here, where you can say not only is

that a compression event at the trade level, but it's also part of the bigger event. And again, just to validate what Marisol said, the bilaterals that get done off of third-party platforms are very tough. The data quality is not great, and people tend not to provide it even when we can take it, and then we therefore can't send it downstream; whereas those provided by the third-party venues for doing compressions, whether they're compression engines specifically or clearing houses, tend to result in better data.

So, again, just came off of what Marisol was going through.

On the allocation side, it's somewhat similar. You know, we have the ability to call up a block, to define a block USI for an asset manager trading with a counterparty. We can then take an allocation-level USI at the fund level to a counterparty. We can maintain those linkages and report the block as essentially the former real identifier, whereas the allocated trade is related to that identifier.

So, again, we are not the only ones in this market with some of this functionality. Some is embedded in other middleware, in other SEFs. We do think that there's a range of functionality that's available that will make the data better just by using some of the kit that's already available on the shelf.

Admittedly, people have not necessarily tried to optimize reporting as much as just say that they've reported. And I now think we're probably into the mode more of optimization; and, to Pierre's point, maybe the focus should be more on optimizing where we are but at a minimum, walk cautiously into adding numerous fields at a granular level. That doesn't necessarily add a ton of value to the industry until we figure out how to create some value from what we already have. We do believe that some fields need to be added. We just see the pattern of, if four is good then maybe twenty is better. Just because that granularity may be true; it just may not be relevant.

MR. GRIFFIN: Commissioner Giancarlo.

COMMISSIONER GIANCARLO: Thank you. Brad, I found that very interesting. You've referred to functionality and perhaps -- I don't want to use a word you didn't use -- but expertise that you have that might be underutilized. Do you feel that perhaps we haven't done enough to reach out to some of the expertise that's available or some of the market granular understanding that's available to inform our process?

MR. LEVY: Yes, I think there's a bit of that. We'll talk a bit more about some of the work we've done about trying to provide the CFTC with information about what is happening up and downstream.

We have a clear view a lot of what happens once a trade is done and beyond. Upstream is a little more challenging. We'll talk a little about order data, maybe being married with that. It's not necessarily that we should have that nor should it be in the SDR, but somehow it may need to be linked. And, again, we're going to pick up

on that thread in the next theme. But I don't know if it's people knowingly not doing something as much as just the usual -- if it's not screaming broken right now, it tends not to get the attention.

This is definitely something we all want to get through and make it better in terms of the data being reported in a less costly way and the data being usable, more importantly, and we just think it's -- really, people coming around to that now, given people are able to take a bit of a breath and maybe optimize what's already out there, which is really where our concern is, where we won't do that if we pile a bunch more onto what already exists. And some of what is being asked to be added could be very relevant and very real.

But as we all know, priorities and resources are stretched, and if there is a bunch of new requirements, it's going to be tough to optimize what we already have on the table.

COMMISSIONER GIANCARLO: It raises a concern I have, and I'd like to see if it

resonates with members of the Committee in that, a question as to whether we really have the right people around the table, whether we're going about this in the right way. There's an excellent piece in today's Wall Street Journal on the really just groundbreaking work that's being done in big data -- everything from consumer retail but all the way over to health care and public policy and social networking; and the science is just really breathtaking in its scope. And there are centers of excellence in this in places like Google and Amazon and others, and I just wonder whether we are really bringing this to this very important task. There's no question that getting this type of visibility into our trading markets, especially the swaps trading market, in the wake of the financial crisis is vitally important. I just wonder whether a primarily regulatory-driven effort -- and I don't mean to be flippant, but a government that's struggled to build websites, whether we have the expertise to build a big data analysis capability or whether we ought to be

looking to commercial centers of excellence and to market participants in a broader way to get this right.

MS. VEDBRAT: Commissioner, this is Supurna. You know, when I made reference to the analytics, it was exactly like the point that you're making. We have a decent set of data, and if we're able to actually build the right analytics on top of that data, which is essentially a sense of big data, it may help the Commission with some of its end goals, because right now the fragmentation of data -- and to Brad's point on, like, all the prophesies not being, you know, used to the maximum as such is causing some data integrity issues -- putting those two pieces together -- and I think we have the expertise within the TAC members and the broader community to be able to help with some of those analytics.

MS. FUHRER: I'd like to make a point on this topic as well.

On the plane on the way here I actually

read the same article and was intrigued by it, but in my view there really is a difference between the science of big data and the type of granular detailed information that we're talking about over here. And I think both of them play a part, but I think we need to be very clear that we understand what the different expectations are between the work that we're talking about here, which can be used in reporting, trade surveillance, et cetera, where when we go back, as the speakers were talking about, we're looking for data integrity, quality, making sure that it's very (inaudible), and, you know, I can go on and on about the types of disciplines we need to have around the data to make sure that it's usable and the conclusions that you come to are accurate.

The way I view big data -- and I have spoken on big data at different conferences in the past -- is -- and if you read the article in the Wall Street Journal carefully, it's more about trend analysis, causality, inferences, and so on, but not necessarily a cause-and-effect type of

thing. So, you could say that people who tend to buy a certain number of things may also go and see these movies or whatever. I'm just using, you know, things that are outside our purview on purpose. And it's a different type of conclusion, an important one but a different type of conclusion than I think we're talking about now.

So, to address the question: Should we broaden our view on data to include big data analysis? I think it's something we should talk about, but I would caution the Commission that we need to be very, very clear as to what our expectation is if we do include big data and big data kinds of science and big data analytics.

MR. GRIFFIN: I believe we had Steve and then Pierre. And we've got a few more coming.

MR. JOACHIM: We have -- FINRA has about 35 years of experience in the equity business of gathering, collecting, and analyzing data for regulatory purposes; the fixed-income business about 14 years. We've gone through many of the pains that you're going through today. So, we

understand and feel some of the pain and problems and difficulties you've got. But let me first address the big data issue, and I'll come back to that. Because we are actively investing very heavily in big data environments.

There's a process that has to take place, and I would applaud you and encourage you to think about big data analytics in the long term rather than the short term.

I think as Evelyn talked about before, some of these analytics are just beginning to mature, but getting your data structured in a way that you can analyze it effectively to use these tools, stored efficiently, as we move to big data and storage data, storage environments, we found incredibly dramatic improvements in terms of cost and analytic speed that you can achieve by using some of these new tools, even in their infancy today. So, I don't think it's too early to begin to look at these issues, study them, understand them. And, using external advice as well as internal advice is a powerful thing. And I offer

this in terms of going forward is, we're always happy to offer our good offices to help as you think through that in any way we can, with your staff, and share our lessons learned.

But I absolutely agree with what Evelyn also said, which was that the data collection process itself is not really a big data issue. It's a kind of roll your sleeves, get in the ground, get in the guts of the organizations, and work this thing through very carefully. It takes many years and takes time to get this data accurate, complete, and reliable; and some of the issues you're dealing are issues that are relatively common as you go through the process. But much of the advice that people have talked about today -- I don't want to repeat it all -- we think are very powerful tools. Keep things simple to start with. And settling -- and I do this all this time internally because I'm on the data ingestion side of the business in the creation of the database at FINRA, but our examination and rule enforcement people always want more.

And getting the right balance is very important at the right time, so everybody is ready to perform, because you have to get -- what you get in, you have to be able to rely on. It has to be accurate, complete, and timely. And to do that requires, at least in our experience, a real-time exercise of cleaning the data, validating it, ensuring it -- not just on the sender side but on the receiver side -- with an active dialog between the parties to ensure that the information is being done accurately and completely as close to real time as possible, and then a historical analysis on top of that to ensure that the data looks consistent and is fair. And then you should combine that with some kind of an examination routine to ensure that everybody's reporting, because one thing we found over time: No matter what the rules say, there's always some people who forgot, and we always, even 14 years later on the TRACE side, we still periodically find buckets of business that should be reported under TRACE rules that are not today. So, very important to do

that.

The validation process is critical. Thinking through the linkages, though, is really an art. We have spent many years working and refining through the process of linking equity orders to each element of the trade execution process as that's gotten more complex, as the business in the equity world has moved from being purely exchange driven to being over the counter and exchange driven.

Over-the-counter and exchange executions that require mobilization of lots of the data across many reporting venues, which is not unlike what you're doing with the SDR world, and thinking through those linkages and actively working through that process is a complex, detail-oriented process that requires a great deal of dialogue amongst all the parties but also with the regulatory view of what needs to be linked and how it has to be done. Some of that can be done by machines without human interaction; some of it requires coding and analysis up front.

What we do in the equity business and fixed income business isn't directly a linkage here; it's lessons to learn. There are things you can extract from our processes that we're more than happy to share with you and work with you to -- and then we've done some of that already, so we would offer our good offices to continue to help with that process. And we think, quite frankly, as you talk through ensuring you have integrity across global jurisdictions, in keeping those linkages tight as you think about instruments, it's important to think across -- especially in the package instruments where you're talking about the underlying linkages, people shouldn't have to report these transactions in multiple venues in multiple ways. We should find ways as regulators to be able to link across our environments so that the data can be reported once and reported once in one comprehensive way that allows us to link across those environments, and that requires a tremendous amount of coordination and effort. But there probably are ways where we can do that more

effectively and efficiently than we do today. So, I want to encourage you to continue to do that.

With that, I could probably talk for another hour, but I won't do that. But thank you.

MR. GRIFFIN: Pierre, I believe you're next and then Bruce and Jonathan.

MR. LAMY: Thank you. I would like to echo what Commissioner Giancarlo was asking, which is: Does the CFTC sufficiently leverage what exists already out in the marketplace or what is being developed?

I would like to comment on the specific question of data standardization, because I think the reason we are discussing these draft technical specifications is because -- the reason we have all those data quality problems is because there is not sufficient data standardization. So, there are definitely some topics - reporting of package transactions, we have noticed a few times -- on which there is a need for further data standardization.

But to a large extent, there is already

a very significant level of data standardization that exists in the marketplace and is not sufficiently leveraged as part of these, and what I see is, and what I'm being concerned about is, the risk in which we will see specific regulators developing their own definition and their own way in which they want to see the data reported despite the fact that there is definitely, under CPMI-IOSCO, a trend to try to normalize the data.

We still see those efforts being done, and I've been, once again, working for many years in developing the FpML data standard among which there is a large number of market participants. It takes a lot of work to develop those standards. And developing yet another way of doing things -- it's not the most productive way. What we should rather do is look into leveraging the standards and adjusting the governance of the standards if need be, because, speaking for FpML, we are very keen and we're very open to the idea of adjusting the governance of the FpML standard to reflect and to adjust as a reality of usage by regulators. It

is just -- and we think this is the right way to go, because those standards reflect the current usage in the marketplace.

MR. TUPPER: I think in regard to the concept of big data, we look at the size of data that all the repositories consume, and it's a fair amount.

But I don't know if I would quite categorize it as a big data issue. What I would say is, as a repository, we struggle at times to understand what is it the Commission wants to do with the data and how can we best provide it. That is, we're very, very familiar with all the rules, and I understand all the work flows and how data should be sent to us. But what is very opaque, at least to me, is when I send data to the Commission, what is being done with that and how can I best help you facilitate your oversight duties. And without understanding that, it's very difficult, and each of us in the early days -- we took these sets of fields, and without guidance we created our own standards and validations around

it. Not to say who was right or wrong, but we were left to do that, and obviously there are three different sets.

We were able to harmonize our sets, I would say in a field of short order, with CDS, which has a high degree of standardization. Fine. So, we've proven that we could do this in a small set of data, but what we need to understand better is: How do you want to consume it, and what are you going to do with it? That will drive the -- we talked a lot about, without getting specific, various workflows -- package trades, you know, valuation reporting. I don't want to get into those details, but understanding that better will allow us to build the messages and the collection of fields to facilitate that reporting. And I think, really, that's what's going to help correct today's problem.

MR. THURSBY: I am going to attempt to maybe tie together a response to a couple of themes that were brought up about linking -- maybe leveraging better under leveraged standards that

are already existing today -- by way of talking about the SDR rules amendments for clearer swaps reporting. I want to start off by first acknowledging and complementing the Commission for understanding the two different market structures that really exist. The original rule set really was a one size fits all and I think there clearly are different workflows with different market participants engaging in that and what I would say though is that I would encourage that the outcome of that be in line with the proposals and the comments provided by CME both during this iteration as well as prior iterations on the topic, whereby the mirror act of the submission of the swap for clearing solves for the act of reporting and in extension to have the DCO perform reporting on the alpha side of an intended-to-be-cleared swap. The outcome of that is that you have all of the relevant data in a single data repository. You move from a situation of having hundreds or potentially even a thousand reporters down to say less than five and that is

immediately going to create the standardizations that exist within clearing organizations. That is going to create a homogenous data set there, as a large percentage of each of the driven markets are already cleared and more is moving in that direction. That's going to be a big boost towards data quality that exists and that is going to, I think, really better the overall goals which is having data that is standardized that is coming in, and I think the path to that is readily available and actionable. So I would encourage a relook at that direction and that path.

MR. GRIFFIN: Marisol?

MS. COLLAZO: So wow big data. I would certainly echo that the task we're looking to do really involves much more I would say collaboration and one of the comments that came out today is resurrecting or instituting this sub-working group. This is about -- it requires a high level of discipline and focus around looking at the data that is already collected. As SDRs we obviously have a lot of knowledge about the data

that we're receiving. In some cases we can look across and see where there are global harmonization opportunities utilizing the data provided already. That has to from our perspective be the key jumping off point. So perhaps in parallel the Commission should also look at big data and start to consider that. But to solve for the issues today, if we had more frequent communication with staff, really focus on perhaps a narrow set of the use cases that were being explored and see what does the data tell us? Internally within DTCC, that's how we started. You have to simplify the problem. If you start to look at all the possible permutations and take purely an academic approach, it is going to be too disconnected, and so the very simple approach we took is what problem we're trying to solve for and we had to collect the data and start to look at that. So my recommendation here is that, with the people that are both with the Commission as well as with the people that we can provide from an SDR perspective, we can solve for this. And as stated

by both Bruce and Jonathan, we actually did for CDS, for a very narrow set. In many cases we actually asked the CFTC to let us do the work and present back our proposals based on the analysis that we saw and where we could come to a common understating so it is absolutely solvable. It just requires what I would view as a bit more collaboration and more frequency in terms of getting together, understanding the use cases and really diving into the data.

COMMISSIONER GIANCARLO: Did we accept your offer?

MS. CALLAZO: Again I hope so. I hear that that is a proposal in terms of next steps in creating a subcommittee so not having heard too much content about that, I think that would be certainly very welcomed -- certainly by ourselves -- and this is kind of a recipe for what we can do going forward.

MR. MCDONALD: I totally agree with that. I think, with all due respect, I don't think this is a big data program. I think that it

is actually fairly simplistic. I think that, to a large extent, most of the analytics today exist to be able to look at the data we deal with TRACE and FINRA data and all the rest of that, and this is really a data quality problem for me and I actually think that around the table or in the room there are pretty much all the people needed to solve this problem and just to echo Bruce's point I think if we understand as a group better what it is you're trying to do with the data I think the group is going to be better placed to be able factor the data in a way that is more usable and we are certainly supportive of participating in that and helping solve this problem which I think at the end of the day is just about data quality and just the right people getting in a room together.

MR. TERRY: Hey Ward this is Marshall Terry on the phone. Sorry I couldn't make it today.

Can you hear me?

MR. GRIFFIN: We can hear you.

MR. TERRY: So just one thing I think that is interesting here -- and I agree with everything that has been said -- but as a small hedge fund manager up in New York -- I'm the COO of the firm -- I would caution that the folks you need in the room are not just the DTCC's and such. I think you need some of the folks that we connect through, whether it is the admins or what have you, because I do know one of the things we struggle with as a small manager is trying to figure out how to afford all these initiatives and I agree this isn't a big data management issue -- this is data management in and of itself. And it is a very expensive proposition, I think, for smaller managers and folks in general. So I would caution -- I applaud the idea of having these subgroups, but I might suggest if they're not in the room, that you broaden the offer to some of the folks that we rely on to interface with the likes of DTCC and Bloomberg and what have you. Meaning the fund admins or what have you, because they struggle mightily to try to connect all these

different end solutions. I think they can give you some insight on the upstream issues they have with folks like myself who are working with more limited budgets to try to meet these requirements. So it is just an observation from where we sit.

MR. GRIFFIN: Thank you Marshall. Bryan, and after Bryan, I think we may want to -- I know we're cognizant of time here and we had a few themes we wanted to try and get through. I know some of the co-leads had put some work in so, I wanted to make sure we try to cover some of that ground.

MR. DURKIN: Yeah we just want to be on record to support the resurrection of the data harmonization committee as well. You guys were able to tackle a really difficult process getting out of the gate by bringing all the SDRs together, working with the Commission staff and in this committee, they were able to solve a lot of complexities very quickly and people were extremely excited about the level of engagement and collaboration that was going both ways with

CFTC staff and the SDR representation to getting the problem solved. And so in line with Marisol as well as Bruce and Jonathan to get that committee resurrected, I think it will help solve a lot of these issues.

MR. HEHMEYER: Just one quick comment by way of -- I know it is different -- by way of some perspective though, if ICE or CME walks into our shop tomorrow and wants all of our data from three years ago it better be perfect, or they fine the bejesus out of us.

MR. GRIFFIN: Thanks, Chris. So I know we've covered a lot of ground here and we've skipped around a little bit, but I would like to try and refocus on the 25 or so minutes we have left on some of the other themes that we had discussed previously -- and Derek and Brad, I don't know if you want to take up and discuss anything on the order data and packages.

MR. LEVY: Yes sure and I think some of the themes are going to be consistent. These are just specific discussions around order data and

package transactions so I will kick that off. We don't have a place in the order data side of things as much, given what we do is more at the trader or immediately after and then down stream, but it is definitely relevant as we've been asked to provide certain information about what we see based on our flow and then how to marry that with what may be happening up stream. One thing at least just to separate the two topics on the order data side, one element that has been proposed is this idea of price discovery mechanism and there is a number of fields that have been suggested. Again it looks like an example of all of these do technically exist potentially in some situations or maybe rarely where there are ideas that could come about. But when you really think about it, what is the purpose of getting 10 or 12 different methods of price discovery and differentiating between RFQ versus RFS versus a limit order book versus a central limit order book. I think there is a category called permitted transaction which maybe is a catch all for things that don't fall

into the other categories. But again it seems like maybe there is something there where the good being the enemy of the great -- or the great being the enemy of the good -- and can we get some level of information so that it is clear that maybe things are moving to a more automated, centralized environment versus a non-automated centralized environment. There is also the element of voice trading and again the laws are what they are in terms of what is permitted. It does seem like there is some information that the regulators and the Commission itself is trying to get to, to understand how is the market evolving which we do think it is important to understand how that market is evolving. The question is, is that really part of the regulatory requirements or just part of an understanding, trying to get an understanding of how the market is evolving. So I think just that idea of order data maybe zeroing in a bit on the price discovery mechanism and other views from others here that may have a view on whether it is too broad, too deep, too soon and

maybe what kind of information might be valuable for the market as a whole and the regulators within it. So I don't know if anybody around the table, it's more people I would imagine that are involved in the execution space. I know this is a data -- more of an SDR -- discussion, but there is definitely a desire that we see, especially based on the proposal, to get not just that at trade down stream but a lot of the information that happened that created that trade or that got to the point of doing that trade, which again we don't see as a platform but we do understand the desire, we're just trying to figure out where is it really placed in terms of what is driving it from an outcome perspective, from a regulatory perspective. I don't know if anybody has any specific points on order, information specifically or the price discovery mechanisms that have at least been suggested in the request for comment.

MR. GRIFFIN: Dan if you want to jump in there.

MR. BUCSA: And, just to be clear to

frame the scope of that part of the document, it is only for executed transactions done on facility, was the limit to that order information, just to help guide the conversation going forward.

MR. LEVY: Yes, I understand. I guess our view would be it still seems a bit granular for just what is really the goal of the regulators. Do they want to understand truly the difference between a central limit order book order and a limit order book order. I understand that the desire may be to move more electronic or less, or maybe to have more anonymized trading then disclosed trading. The question is how granular do you want to go in the reporting requirements to get to that level of detail or do you want to utilize other mechanisms to understand that trend.

MR. THURSBY: And maybe just a take from a slightly higher level, to maybe ask the question, is it necessary or appropriate to collect that order information within the SDR. Is that not something that is already made available

through the regulatory oversights of SEF and DCMs, and is it not already available through a lot of the audit trail information?

MR. KLEINBAUER: Just looking through the order data and obviously having a part in Bloomberg SEF -- to echo Jonathan's point, a lot of this information is provided today by either SEFs or DCMs to their trade surveillance. So, it is not necessarily a matter of that information not being made available. It is what is the proper destination for that -- is it the SDR or is it another form of oversight? So perhaps a further discussion with multiple SEFs and DCMs would be a good starting point.

MR. LEVY: So I think one of the topics also in this theme that is probably going to get a bit more attention is the package transactions. This is something that has been a big discussion as part of packages. Some products are technically included in the regulations and some instruments within a package that may or may not be included in a regulatory framework do impact

the economics of the trade. We have spent a lot of time on this ourselves because it is important to be able to identify these trades and we'll look to do that at times. I would say in general the CPMI-IOSCO idea that you really look at that individual instrument level to really define a part of a transaction, then with the idea that there is some ability to indicate that this is part of a larger transaction and maybe even having an identifier somehow for that larger transaction. Again is it important that all of that is completely disclosed, clear, and everybody can add all of those elements up and get to an ultimate price, we're not sure. We think it is a big lift and maybe even a bit of an overreach from a regulatory perspective. But we think at least the most important thing is to say those are two apples that you could compare, that's an orange. At a minimum you should look at that differently. You may not be able to judge the color, the weight and everything about that orange but at least you know you can't just compare it to those other two

outright transactions. This is probably relevant for the compression discussion as well as how the market understands when it hits the tape, what is the value of that instrument? Other markets have dealt with this where it is effectively uneconomic trades or trades that are off market and somehow indicate just to the world that just warning this is a bit different and over time we believe that that difference can be more understood. Maybe that is where big data comes in, where people are looking at lots of disparate information and trying to understand trends as opposed to it's a regulatory requirement. I do think there is a place for big data and it is not in swap data reporting as much as financial systemic risk and how swap data reporting fits into that puzzle, different discussion. But the idea that packages can be defined just at the package level and then fully disclosed at every level up to the price or down at that instrument level or a bit of both. So our view is more at the instrument level with a wrapper to at least indicate that these are linked

and again we've from a platform perspective, in working with the industry, have been developing that level of functionality to make it clear at least that something is a package. So I'll just open it up there. I think others have more views on this topic.

MR. LEWIS: Just a very quick substantive point. Obviously the major use besides the CFTC is transaction cost analysis for all the things we're saying and I would urge the Commission -- in prioritizing, improving, in terms of the quality of the data and the usability of the data -- obviously to focus on pricing, but moreover to the extent that other prospective deadlines slip -- and I'm thinking particularly of package trades -- I would then accelerate the importance of addressing the data piece. Because I think that, to some extent, the data piece solves some of the problems that are trying to be addressed by mandating different execution systems, the MAT-ing and other things. So to the extent, like I say, the package trade requirement

may slip, fine. But that would argue I think for accelerating even in a unilateral U.S. basis, requiring meaningful price discovery by which I mean, actually, a usable price so guys can figure out if they're getting hosed or not. That would solve a lot of the problem.

MR. GRIFFIN: Jonathan.

MR. THURSBY: To answer maybe more specifically to the question that was posed, in the case of packages around identifying the package transaction. So in the case of the packages submitted as the component legs, we feel that the package or the strategy ID field that is proposed by the Commission is sufficient to link the components together. For packages that are submitted as one economic transaction, we believe to expect the product strategy ID field to be left blank and then the USI to be utilized. And with this, we -- Brad, I think along with your point -- recommended an ID field -- like a package trade indicator field -- be useful to enabling to see whether or not it is executed as a package or if

it is done as a single economic transaction. With respect to pricing, it was unclear to us whether the Commission thought that there would be interplay between the price field and the package trade price field. Should reporting parties be filling out one or both? So that was unclear to us.

MR. BUSCA: So to answer your last question Jonathan, the way to think about it and maybe how people could formulate their comments is if we're talking about a package and it's traded on a spread where there is some basis to be done, what is the right way for the Commission to understand either what was the spread that was exchanged or what were the strikes of the different legs and what is the best way to represent that in the data, is probably how you want to consider the letter.

MR. GRIFFIN: Any additional comments? Anyone on the phone?

MR. BUSCA: Just before we move on -- for real time tape and the public dissemination

purposes for all the SDRs, if there is a package swap that hits the tape, there is no identifier indicator for people to look at currently that it is one, correct?

MR. KLEINBAUER: Right, so we do have the ability to link transactions but in terms of being able to flag those in a public dissemination, I think that is probably where we get the most questions from market participants is seeing something hit the tape that looks off market to Brad's earlier point, that is in fact part of a larger transaction. So making sure that we can publically disseminate that not to introduce noise I think is going to be pretty critical.

MS. COLLAZO: Yes, so two things, not having the part 43 rules with me, I do think that the field -- so part 43 is quite enumerated in terms of what we can disseminate on the real time price -- I don't believe that that is a field. The one area of caution is before we consider adding it as a field, let's make sure the data

that is coming in is of high quality because the worst thing we can do is put that out there and it doesn't signal the right message. So, agree that it does produce a somewhat illogical result because it looks like an off market trade and we should look at it but we should have a baking-in period where we see that field come in, that we see the quality that is coming through, and then subsequent to that, that becomes a field that gets added to the real time tape. I think we have to use a lot of caution in terms of what fields we add to real time and that we're not misrepresenting information that could yield some other unintended consequences.

MR. GRIFFIN: Great. Now might be a good time to transition to our next theme, which is reporting of pricing data. Pierre, would you kick us off?

MR. LAMY: I will try to go swiftly through this short presentation, so as to leave room for discussion. So as part of the proposed specification, the Commission staff proposed to

normalize price information through four fields, which is the four spreads, the price, the price type and the price currency. In relation to that proposed specification the question I'm being asked about, do we need the additional data elements, these are derived from knowable values, should we have differences across asset classes, and also the question of how should we involve the case of post-pricing trade swaps. In order to comment on that, I would like to start by what is the current state of affairs as it relates to reporting of data. And if you could move to the next slide, CFTC Part 43 which was issued in 2012 actually normalized and specified the way price should be reported through the price notation and the additional price notation fields. I will not go through the full definition. I would just like to point out that the as part of those definition for price notation, it specified that the format in which pricing characteristics is real time reported to the public should be the format commonly stored by market participants for each

particular market or contract. So as we looked into complying with Part 43 rule on the market participant side, we thought that what we should do is look to document and normalize the way the market practice would fit into the reporting of price notation and additional price notations, because our concern was if we would not develop a standard approach for reporting and not bring the price information into those two fields we could be a little bit inconsistent across market participants. So, under ISDA, what we developed at the time, and I was involved as part of that, is a very detailed documentation, asset class by asset class, as to for each of the type of trades, how should we map the value into price notation, additional price notation. If you look at the next slide, this is just a snippet from a credit derivatives product into for each of the transaction types -- and this is just the subset of the transaction types -- with the comment that those transaction types we should report the spread in basis points, in this case it's --

percent of notional amount, et cetera. So that has been very thoroughly documented and at that time was shared with, of course, the Commission. An example of what developed, et cetera. So if we looked into where do we stand now with respect to the quality of the data that is being reported and DTCC worked with us to just take three months of data and see for a very small snippet of information on credit derivatives, is to what is the quality of the data with respect to that standard that was issued at the time and very interesting to see it is very uneven. If you look at CMBX it is 12 percent consistent with the standard when iTRAXX Europe is 90 percent. So if we stand back at this point in time the question is -- is that the data standard? Because the data standard was issued at the time and was worked out or is the question of first endorsing the standard which goes back to the question of the Commission leveraging market participants in the work that is being done. And number two, is validating against the standard and that is really for me the essence

of the recommendation, is on this specific topic of price reporting, the issue is not standardization because the standard was developed at the time and a very specific standard. The issue is endorsing the standard, number one, and number two is validating against the standard. We already have a standard. And I believe very interestingly, the standard was not based on specifically applying what has been ruled by the CFTC at the time. The second point as it relates to my other point is swap price, post-execution, is one of the questions that has been asked as part of this consultation, is we think that the reports should be postponed until such time that the price is known, because reporting a transaction without a price is not meaningful and could also expose information about investment strategy that is being pursued by the investor and by the market participants, so we would be better off postponing the reporting of this transaction until such time that the price is known.

MR. GRIFFIN: Gary, if you wouldn't mind

advancing to the last slide -- I don't know if folks in the audience saw the recommendations. Perfect. Paul would you like to chime in?

MR. CHOU: Thanks. I have some comments prepared about price reporting and the nature of price reporting and what I hope to show is that we're kind of going through this process right now. So a lot of the kind of issues for data standardization and how to represent complex trades, whether packaged or more exotic, are directly starting to affect us as we're starting to integrate at LedgerX. We're a recent SEF and DCO applicant so this issue of price reporting is top of mind for us as we're designing all the infrastructure, doing the testing and things of that nature and seeing the kinds of products that we can now list with the kind of data fields that we have. So I appreciate the opportunity to kind of share some of these stories here. LedgerX's goal, to give you context, is to be the platform to list, trade, and clear options and derivatives of Bitcoin. There are some nuances to that, in

that Bitcoin derivatives can look very different than traditional derivatives. Some of them can look similar but a lot of the unique properties of our asset class, as I'll show you, can make the design much more important and also therefore the reporting that much more important, just to get the transparency around a lot of these things. I'm not going to go too much into Bitcoin, Blockchain and things of that -- there is a whole panel after this and we're kind of short on time, but there are a lot of unique asset classes that have caused us as a SEF and a DCO to have to design a lot of things from the ground up. One of the lessons we've learned and internalized is that even a lot of these minor details have dramatic implications for the contracts that we can feasibly list or even think about designing without having to go through a lot of headaches and working through a lot of these data fields and the various SDRs that we have approached and are in the process of integrating with. Setting standards for existing instruments with multiyear

or multi-decade histories is difficult as it is. Our space, the instruments are much more different in nature and that applies to data fields as well. So one really good example that I use to illustrate this internally is that even simple constraints like the precision of the field that we have to report and how many decibel places it has to be can have many unintended consequences. So this is very germane for our asset class because it is sort of widely know that the total supply in producible Bitcoin is about 21 million dollars. What people don't often know is that an individual Bitcoin can be divided evenly into one hundred million parts. So you can have one one-hundred millionth of a Bitcoin. So right off the bat if we have certain precisions and decibel-point requirements, we will be so far off, order magnitude-wise, right from the values that we're discussing today. So this is of course not the case in U.S. dollars and kind of a whole lot of other markets are used to enjoying, but it is something that we have to think about a lot as it

reflects on the Blockchain essentially. One other thing to note is that Bitcoin's precision is not fixed so the precision can be increased over time and I in fact we fully expect it to do so if the market cap continues to grow. So now all of a sudden we're talking about a moving target that we have to hit for a data standard that is very vital to our contract. Reporting infrastructure for us is interesting as we built our SEF and DCO from the ground up because it is not in isolation. It is not just a piece of software that talks to our SDR. It is a critical part of everything else we do, especially as we are a SEF and DCO combined. So there are a lot of things that are blocked if we cannot comply with the reporting standard. One example that our CTO has spent a lot of time looking at is the Embargo Rule. So we are unable to broadcast trades and especially the prices and the formats associated with them to our clients until we have "transmitted" the data to the SDR. Now the problem is, transmission and transmittal has not been really well defined. So we don't

know when we're building software from scratch, so we see at a very granular level, does it mean that a piece of line of code is before another, or does it mean that we create the right data structure for the SDR, or is it after we make a best efforts approach to try to transmit that data over the public internet? So there are a lot of questions around that. And for our SEF -- this kind of goes to the market structure -- we actually expect the vast majority of our volumes to be on the limit order book. And in fact, we expect a lot of automated traders to be providing liquidity. This is sort of the nature of the differences in marketplaces. A lot of the players in Bitcoin are, by nature, technical. It is a little hard to understand, and so they tend to be inclined toward that style of trading. So things like the Embargo Rule that can introduce hundreds of milliseconds that might not be relevant for SEFs that are doing transaction volumes in a very different market are extremely relevant to us and in fact will make us right off the bat very uncompetitive in a lot of

ways that our customers have talked to us about. So there have been a few issues faced here that the asset class for the reporting standards are still in total flux and that filters down directly to us. My new details of the finalized regulations can have really material business implications for us as well and I'll add one final thing which I think is a subtle point. The benefits to kind of getting data standardization right are not just improving data usability and reducing the cost for SDR but it also impacts SEFs and ourselves that want to design very new and exotic looking products with very different terms because it makes it difficult. So more and more what we're finding here at LedgerX as we design a whole suite of derivatives that are based on this new asset class, is that more and more of our time is being spent on the SDR part. Now before starting LedgerX two years ago I never would have imagined that 30 to 50 percent of our engineering time would be involved in SDR integrations and trying to figure out how fields should work

together. Especially as a DCO there are a lot interesting things for us. Our DCO has reporting requirements that are very different then our SDR. The DCO is not subject to the Embargo Rule so we have a little mismatch there. And then just the inconsistencies between the integrations with the STRs end up having to have what I would call short cuts that are not sustainable if the data standardization is done because they'll no longer be necessary essentially. So I think LedgerX has a fairly unique perspective having built our exchange infrastructure from scratch and working with many SDRs. I'd really like to make it cleaner sooner than later because a lot of these hacks are very time consuming to build into the system and will hopefully just be unnecessary one day. So if any SDR has sort of a question as to what we've kind of been working on and what we're spending time on, I'd love to hear from it as well.

MR. GRIFFIN: Thank you. We are cutting it awfully close, but Brad, please.

MR. LEVY: Yes I'll go really quickly. I just want to make a point that we use the word standard a lot here which is valid. A standard without adoption is not a standard so I actually think we should start calling things something different when they're actually not adopted because it can't be a standard unless it is adopted. But I think if you just page back one and I'm always trying to get to cause and effect in having been a part of a lot of the standardization and creation of these products myself -- it looks very correlated to where people care where there is PNL and where there is people physically doing the business. So the iTRAXX CDX world has much more option because there is a lot more people and there is more business to be done there in the last five years. If you look at EM it is a little bit off the radar but it kind of falls into that, and if you look at CMBX and IOS it falls off the cliff because that business has been really struggling. So again it gets back to that point that you won't implement a standard

without the implementation of a standard or you won't get to a standard with the implementation. And if you don't have the people and the will from a commercial perspective to move to a new standard or a standard then to me this data just says to me there is probably not enough people or money to be made in that business to put the effort in to get that up from 12 percent or much higher if you look at what is going on in say the commercial mortgage industry. For me I would say the cause of that is just the fact that people don't care about those products as opposed to the standards not being right.

MR. GRIFFIN: Thank you Brad. Let's see if the Commissioners have any final comments or questions. I'm afraid we will not get to our fourth theme -- the reporting of notional amounts -- but I would like to very much thank our panelists both from the Commission and from the SDRs on what has been a very, very robust conversation here. I would like to request that everyone please be back by 2:00. We want to make

sure that we're able to start the final panel on time so that folks can make their planes and trains and so on and so forth. For those panelists and TAC members that will be joining us upstairs, please just congregate outside the front door here, thank you.

(Whereupon, at 1:17 p.m., a luncheon recess was taken)

AFTERNOON SESSION

(2:02 pm)

MR. GRIFFIN: Thank you. For our final panel, we will focus our discussion on Blockchain and the development of distributed ledger technology, with a particular focus on the derivatives markets, how such emerging technology may be applied to the derivatives markets, and what the ramifications may be to such innovation, be it to product development, market structure or regulatory concerns. We are pleased to welcome as panelists Sandra Ro from CME Group, Brad Levy from MarkitSERV, Robert Sams from Clearmatics, and James Slazas from ConsenSys. We have asked each of the panelists to make a brief presentation after which we are hoping to engage in a robust discussion. Sandra, would you like to get us started?

MS. RO: Hi. Thank you very much, Ward, and thank you for having us here today. I'm going to start off and just do a very quick primer, just in case there are those who are not quite as

familiar with what people bound around as Blockchain. I think it is one of the most overused words these days and I think it is pretty much in the press now everyday if not every other day. So, Blockchain itself. It is the distributed ledger and the supporting protocols underneath it, which constitutes the Blockchain. I think most people know the Blockchain is part of Bitcoin, and it being the public Blockchain. This technology I think has really captured people's imaginations and also financial services, because they hope and the view that it has the ability to offer and facilitate significant cost reduction, acceleration of processes including payments, settlements and clearing. I think there are views that this technology in its form could actually help to speed up many things that are going on in the financial world which are still very manual and considered slow. We'll debate that today. But in its truest sense -- the Blockchain -- how does it work? Let me just walk you through that very quickly. There is a block and there is a chain.

Every completed block is added to the Blockchain in a linear, chronological order. With every block -- and this is in particular referencing the Bitcoin Blockchain -- with a hash that is from the previous block. So all of these blocks are in order. So imagine it is like bank transactions that are cataloged, confirmed and then put into a block in order. And since the protocol -- the Bitcoin protocol, in particular -- was launched in 2009, there is a record of every transaction that has ever existed. Now imagine that for any other asset class we talk about, it is pretty amazing actually. So the Blockchain itself is a string of these transactions strung together and confirmed in a Blockchain. So let's talk about some of the benefits. Some of the benefits that people talk about is the fact that you've got a distributed system, its interoperability, its global payment network especially with respect to Bitcoin, it's auditable, immutable, it's transparent and for the most part, it's open source. I'm not going to go through every single one of these columns, but

basically what has evolved in the last couple of years is it started off with a public Blockchain of which Bitcoin is the most famous but there are others including Ethereum -- and James will be speaking particularly about Ethereum and smart contracts on Ethereum -- so I'll let him do that. There is also an evolution now that some purists disagree with, which is private Blockchains. So these are permissioned, trusted private Blockchains which take a different form and their consensus protocols are different. They may take lots of different elements. Often they may not be open source so they're proprietary. Financial services, I think, if you hear about all the consortium that are being formed, I think there is still a lot of debate as to whether it should be open source, it should be private proprietary, and this evolution will play out in 2016. There is a lot of building going on, there is a lot of experimentation going on, and there are still question marks around which is the best model. Today it is not clear. Risks to Blockchain

adoption. If we're going to wear the cynical hat, I think there's some things we should consider. Industry today has spent a lot of money building infrastructure that works, is robust, is scalable -- so I think there is a question to be asked -- because I actually personally think there is a lot of great potential for this technology -- but the question is, so what? There are a lot of use cases out there that people apply to Blockchain and say this is going to change everything and this is going to make everything better. Well is it really? I think the so what factor is what we start asking this year. Not every use case makes sense. To me we've got to start parsing down what is actually possible with this technology and it's going to take a number of years. This is not about an overnight determination of which use cases work or not and it is good that the world is looking at experimenting this year. I think 2016, 2017, we will start figuring out what this is good for and what this is not good for. I think that's going to be just as critical. Technology issues,

non- scalability, use cases not being relevant, security concerns, transaction anonymity versus privacy -- I think those are all concerns right now. Industry standards and harmonization -- that is another major issue because part of the beauty of this technology is the network effect. It is not like typical industry behavior which is I'm going to build something proprietary and hope everyone comes and buys it. This doesn't work that way. If you're not in the network and you don't get enough people in the network, you won't derive the true benefits of this. And then obviously regulatory hurdles and making sure that the regulations and the legal framework work across global jurisdictions.

MR. LEVY: Thanks and I'll give a brief presentation as well -- just a couple of pages. I'm going to try to move it along quickly to ensure that we have other time for both the panelists and the discussion. So I'm going to start off with a bit about what's important as far as we see it -- the key components, implications

for derivatives which is obviously why we're here, and then a bit on path to adoption, some similar points to Sandra but some different. So this is generic and the next page I'll try to bring it down a little bit to something more specific to the industry. We use the word natively here very specifically because assets that start out as digital are different and can more easily be digitized up stream and down stream and can be transported. Ultimately on the next page you'll see that's not the way our world will necessarily work where things will start out as a natively digital asset on a chain represented as a block. But just the idea that native digital assets could exist and that just questions things being issued for example initially on the chain and then starting from there. Then you get into the idea of smart contracts, which the chain exists and the smartness really allows actions to be taken on the chain and that is something that is a bit newer, as part of Ethereum -- again, you'll see some of that today -- and is definitely a step up from

where the Bitcoin Blockchain network exists. And then ultimately getting down to bigger shared repositories and this is not centralized data as much as data that is accessible by all that need to access it at the moment they need it. So it is a little complicated to talk about something that is shared but not centralized but that is really the point. These are the key components that we see. We do think that if things are issued on the chain it will be easier. If they're not and there is this idea that you have to take it from its former form into a digitized form, there is just a bit of a hurdle there. And then there's also scenarios as the industry ramps on certain use cases that things may be able to start out on the block but due to some limitations and functionality, et cetera, maybe they need to be off ramped depending on where the industry is in terms of the evolution. So that's the more general view and just to take it down more specifically to the industry. So what we're trying to figure out is a lot of what we discussed

today, which is the why, and then get into the what, but we do believe that Blockchain technology generally can immediately reduce some operational risks and costs, begin then to get into some balance sheet and then ultimately maybe even market risk and liquidity. But just to take these in order -- if you think about digitizing an asset, which we spent probably the better part of 15 or 20 years as an industry doing things like that, like putting swaps in a database and transporting that information on an API using FPML, that has been a long process. But clearly the process of doing that has enabled a lot of operational efficiency, and then the question is can Blockchain take it even up a level further by creating less centralized infrastructure that everybody has to maintain or integrate with and somehow be able to get people the information they need at the time they need it. This really combines the idea that there's a digital asset with the idea of a smart contract that you can manage events around it. Then you get into the

second area which starts to get into things like balance sheet and collateral management now. These may ultimately have the impact of increasing liquidity, et cetera, but we think that there are scenarios and value to getting to a point where things like collateral can be managed more effectively and balance sheets can be managed more effectively without necessarily changing what liquidity looks like but creating a lot of value beyond operational risk reduction or operational cost reduction. And then in the long road, we used the word securitization where these assets, if they live in this form just like they used to in paper, and you can wrap them together and create something where they all exist within it, there is this idea of bundling these and ultimately using this as a tool to get to higher liquidity -- or transparency, liquidity, less friction in the market -- we believe from a market perspective that that is possible. We also believe that there is somewhat of a natural order to going after these three elements. Operational

risk, balance sheet risk and market risk -- and the word risk here I'm using more liberally, it's not just necessarily about risks but cost as well or just efficiency outright. So we do see the spectrum of operational reduction, balance sheet reduction and then hopefully that will have the result in the long run of increasing liquidity in the markets overall. And we think it's possible, but again, the right order is critical, but we do think each step provides some value. But at the same time to Sandra's point on timing, we can't rush to the end game. There is no big game changer ecosystem that's been built overnight on one technology. The analogy I like to use is, iPhone would be irrelevant without the internet. Apple didn't invent the internet but they certainly have stitched it together and taken advantage of building out the ecosystem, and we think Blockchain will evolve in a similar way and a similar timeframe -- i.e., many years not months -- but we do think we'll see gains in the short run. The path to adoption -- and again some of

the same points that Sandra made -- network costs -- just because Blockchain exists doesn't mean it is better or will be less costly and there is always the conundrum of wanting to move to a better place or a new place but having to invest to get there and we don't think Blockchain is any different. It is not a silver bullet. We think it is real and valuable, but the questions are how do we get there without blowing up the costs or knowing that we're eventually going to get to a lower cost? One thing that has been talked about a bit in the markets and even here with Sandra's introduction -- this idea of trust. The Bitcoin network is based on the fact that everybody wants to remain anonymous forever and never know who anybody is other than they performed a function that the platform network agrees with. We don't think that that's necessarily the model that our industry will adopt. Identity will be key. We do think that the idea of private networks that are gated where you don't necessarily know who everybody in it is but they're all validated and

should be in that network. There is a big KYC element that is part of this discussion as well that could either be injected into the Blockchain workflow or Blockchain can actually aid in KYC itself. And then the last area -- regulation and compliance -- this is one where we do think that the regulators need to be a bit careful not to go too far in saying this can solve all of our problems but also not throttle the innovation, and really look at more objectives as I guess prescriptive, and that certainly seems to be the mode here for the most part and we think that suits Blockchain well. The fact that the TAC is having this panel and is considering a broader discussion around this over time is great and then some of the regulators including the CFTC and in Europe are really engaged and really helping lead the way as opposed to react or just be a part of the industry. At the bottom there's just a few things that we cite as areas that we're focused on when we say smart derivatives - contracts -- it is a bit more focused on credit for us specifically.

We're doing some work in the syndicated loan space. And then there is a few other things there, including what we're thinking about in KYC in terms of real use cases. We're still a bit in a put it up on the wall and see what sticks. We're not doing that in a vacuum -- we're doing that in partnership with many in the industry, whether it is providers like ourselves, Blockchain providers specifically, or the end users as well. The one point I'll leave you with on this deck, is there is no way to make progress in Blockchain without industry collaboration. I think again this is a forum that just oozes that. Even if you think about the words that are used in this space -- shared, peer to peer, distributed -- it all assumes some level of collaboration. And then we actually think open source is going to have a very big role in this space, probably more so then any other initiative in our industry, maybe ever. And there is already some initiatives going on there that we're pretty excited about, and we think the idea of open source plus proprietary -- or open

source used more proprietarily -- will be the right model, and there's things like the Linux Foundation and others that are starting to spin up real efforts there. It's not a normal, natural state for our industry to get together and think about contributing code. If you think about our first panel on AT, that was the opposite of that discussion for good reason, but this is one where we're going to have to take a bit of a leap that some of this stuff just needs to exist in the public domain, and we all just need to compete beyond that. And I'll leave it to Robert now to continue.

MR. SAMS: Thank you Brad. I'd like to talk about a few things. One, just to cover some issues of terminology, because I think it confuses a lot of people because it is new. Then I want to skip to just some general observations about the technology. And then conclude with some discussion about how the technology may be applied to the OTC derivatives market and some of the policy implications that there could be. About

the terminology I mean it is popular today to speak of Blockchain technology in the context of financial markets and in particular its applicability to post-trade. This is often qualified as permissioned Blockchain technology, to make clear that the consensus model is based on authenticated and legally accountable validating nodes, and to distinguish it from Blockchains like Bitcoin or Ethereum which are based on models of permissionless consensus. Today I'll instead use the phrase distributed ledger technology -- or DLT -- in place of permissioned Blockchain. It's not that there's anything wrong with the phrase permissioned Blockchain -- it's just that neither the property of collating transactions into blocks, nor the property of chaining those blocks together via cryptographic hash, are essential to creating an immutable and distributed ledger, so the terminology is a little bit question begging about the implementation details. I also think it helps to demystify the technology by making it clear that what we're really doing is finding

powerful new applications by combining technologies that are actually well established and well understood -- namely, public key signature, cryptographic hash functions, virtualization, distributed consensus algorithms, and peer to peer networking protocols. Now DLT is a network where every node on the network has a local copy of the global state of the ledger. And a consensus algorithm ensures that each node's local copy is the same as every other node's local copy, which is why we can refer to the collection of separate ledgers as a single shared ledger. Today every financial institution maintains its own system of ledgers, so in today's financial system it is also fair to say that ledgers of ownership and obligations are already distributed. But in today's system, consensus on the global state of who owes what or who owes what to whom is obtained by many iterations of reconciliation, which is usually labor intensive, expensive and slow. So distributed ledger technology works differently. The way it works is we can think of

it in two steps. Each node on the network first takes a set of settlement instructions, applies them to the current state of the ledger, and returns a new ledger state. And then secondly, each of the nodes on that ledger follow a consensus algorithm and come to an agreement with each other on the new state of the ledgers that each of them computed independently. Now there has been a lot of discussion about how this second aspect of distributed ledger technology can improve post-trade. If you replace reconciliation with a consensus algorithm, you can obtain substantial operational efficiencies through automation while reducing the time interval between trade and settlement, which releases capital and reduces counterparty risk. However, this narrative -- which has been described many times -- this narrative about the benefits of replacing reconciliation with consensus algorithm is silent on the first aspect of distributed ledger technology, which raises an important question. At what point in the post- trade life

cycle is an instruction generated and passed to distributed ledger technology. The post- trade life cycle is complicated. It varies from market to market and there are many processes in between the contractual event represented by a trade confirmation and the proprietary event of a trade's settlement. If distributed ledger technology comes only at the end of the life cycle, then some other technology or technologies are automating the post-trade process up until that point. But given that the legal validity of a ledger entry makes reference to every step in the life cycle, distributed ledger technology could end up turning a distributed industry-wide golden record into an intermediated technology service even if distributed ledger technology is itself a technology commons. This could have the rather paradoxical consequence of actually concentrating rather than decentralizing post-trade intermediation. On the other hand, if DLT is introduced at the beginning and encompasses the entire post-trade life cycle, then there is a

very different implication. Post-trade automation can be achieved through what we describe as decentralized clearing networks, or DCNs. DCNs are light weight consortium entities whose members are the nodes on the network and consist of the main participants in the market that the DCN clears. In principle this model can eliminate third party intermediation entirely, replacing it with a platform model, one that enables third party service provision but the platform itself is governed by DCN members rather than a third party intermediary. The market therefore owns the plumbing. Some DLT architectures like those derived from the Ethereum code base lend themselves to this second scenario because they are based on a model where the ledger state transition is general purpose computation and are therefore capable of expressing the complex business logic involved in processing the post-trade life cycle. These architectures I'll describe as programmable distributed ledgers, or PDLs. Other architectures, like those adapting

Bitcoin's UTXO model, are much more likely to fit into the first scenario for the simple reason that these architectures cannot by themselves implement the complexities of post-trade processes in their model of limited purpose ledger state transition. Moving on to the OTC derivatives market and some of the implications of some of these observations for that. I think one of the domains for the DCN model --

Decentralized clearing network model -- is most compelling is in the OTC derivatives market where we believe that programmable distributed ledgers are not only potentially transformative new infrastructure for the bilateral uncleared OTC market but also perhaps an alternative to central counterparties themselves or CCPs. One of the most interesting aspects of PDLs is that it challenges our background assumptions about what functions can only be performed through centralized intermediation. Consider the following functions performed by a CCP. Performing contract valuation, settling

variation margin payments, calculating initial margin, custody of initial margin and other loss absorbing capital, novation and netting, and managing closeout on counterparty default. Clearmatics is currently working on proving how all of these functions can be performed on a DCN that is by a membership governed network instead of a CCP. At their core, derivatives contracts are legal agreements with fully computable terms. They are quite literally algorithms described in the legalese of IMAs, CSAs, and contract specifications. Ignoring for the moment the role that CCPs play in assuming the performance of a derivatives contract to both sides of a trade, what CCPs in affect do is standardize and automate the aforementioned clearing function by centralizing the computations in the CCPs technology silo. The solution is sensible when the alternative is that the counterparts to a trade perform the computations independently. This is because until recently there has been no obvious means of definitively reconciling

complicated computations performed independently by two or more parties. Valuation disputes in the bilateral market are but one example of this difficulty. But we now have a model for performing computations collectively and come into consensus on the correct results. With a programmable distributed ledger there is not only a golden record of collateral and variation margin movements but also a golden record of all the computations involved in those movements. Everything is available on the ledger with machine readable auditability. We believe that one of the profound implications of this technology will be the transformation and revival of the OTC marketplace that are more transparent alternatives to markets with centralized post-trade intermediation. The function that a CCP performs that cannot be replaced by a DCN is that of guaranteeing both sides of a trade. It remains an unanswered question whether this impressive concentration of counter party risk at CCPs mitigates or amplifies systemic risks. But now

that the technology is providing practical means of unbundling the many functions performed by a CCP, it is perhaps worth revisiting the question. Another potential risk factor that the OTC derivatives market is the legal nature of the contractual agreements themselves, which are agreements that provide legal recourse against the defaulting counterpart's balance sheet. This is arguably a statutory innovation by the Commodity Futures Modernization Act of 2000, which does run contrary to a long standing Anglo Saxon common law principle that contracts for difference are not enforceable in a court of law. Therefore another question that we believe is worth exploring is whether there should be an alternative legal wrapper around DCN's computational contracts where it is not based on ISDA documentation at all. Instead it could be based on documentation that binds the counterparts of the trade to the output of the program implanting the derivatives deal on the DCN's programmable distributed ledger with recourses against defaulting counterpart limited

only to the collateral posted. In the long tail scenario, where loss absorbent capital is exhausted, it amounts to variation margin hair cutting. Such a scheme in many ways resembles the membership model of a 19th century exchange. We at Clearmatics are committed to developing programmable distributed ledger solutions that decentralize financial intermediation and would welcome the opportunity to open a dialogue with regulators to explore how this might be accomplished and in particular we would very much like to explore how Title 7 of Dodd-Frank might accommodate a DCN model of clearing, thank you.

MR. SLAZAS: Hi, thank you and thank you to the committee to be able to present a Blockchain solution and application. I'm just going to go fairly quickly through it and it is really basically going from where we had been discussing a little bit of Bitcoin to the Ethereum Blockchain. There's several different Blockchains out there. The Ethereum Blockchain basically allows that transfer of value that Bitcoin does as

well as programming applications within the Blockchain. There are a few different parts I just want to highlight. We're going to talk about a couple of different core components that can be built upon each other and basically construct all different types of solutions for financial institutions. So some highlights that will come out will be having identity, reputation and persona; the idea of oracles giving pricing and reputation feeds within the Blockchain; an ability to be able to have a transparency -- or basically an accounting system where you could have triple entry accounting; as well as the ability to use smart contracts throughout the whole process of different applications. So to set up what is on the screen, it is basically two counterparties have discussed to enter into a transaction. They have agreed to all the different terms, collateral requirements and things of that nature. So this could just be in the form of a bank talking to a hedge fund. So the first thing is the trader is going to enter in their password into their wallet

which is going to hold all of these different types of public and private keys and different attributes. What I mean by that is, again, Bitcoin holds just a value where in a wallet such as on the Ethereum Blockchain it has different attributes. So it might be, has the individual or counterparty been KYC verified, what type of trading entity are they, and things of that nature. So as a trader, basically just logging in the Blockchain is basically as you can see from the public address that this counterparty is on the Blockchain, so it is part of that identity system. Given that it is a bank, it has been KYC verified, of course. One of the first parts for looking at the smart contracts would be this counterparty has been given a designation of SD, or swap dealer. These are all different parts where an attribute not just that value, can be put into smart contracts. So this is a way to help maybe facilitate some of that data gathering that you're going through for the swap data repositories and things like that. The other

value that we have here is a little bit more after an ecosystem has been built, it is basically a reputation value. So it could be looked at as a scoring that a bank might use for calculating the credit risk and then being able to apply collateral requirements for counterparties. So as I said this is just the trader entering in the swap details. First, the counterparty on the phone had given a public address which is what I've entered in here, and we're first just seeing has this counterparty been verified, as well as what type of standing or what kind of entity are they. And so as you see here, one, they are in the system, so we know that they are a valid counter party. FEU's basically stands for Financial End User, or the type of counterparty. It could have been a swap dealer or hedging organization or some other type of counterparty. Again we have this reputation score. Now I'm going to enter in a couple of quick terms so we're going to make it a 10 million dollar total return swap, we're just going to make it last for 4

minutes, it will be long Microsoft, short gold. And what we would do here is basically again you can utilize smart contracts to be able to see if the trader was able to trade in these types of assets. This could also be earmarked within the system given that there is different requirements for the different types of asset classes and sensitivity. This again can be incorporated within the tracking of the system. Down here at the bottom we have different areas where a smart contract could be created where the swap documentation may say it has different types of terms -- you know, trading days, how it can be terminated. What we've chosen to highlight is just an example where if there is a downgrade in the reputation of the counterparty then there is going to be additional collateral required. The one part I do want to highlight here is this notion of basically an asset trading account. We're all familiar with collateral as encumbered escrow type of collateralized account. Here it is just a freely traded account and what we're going

to do is we're going to utilize that account to be pushed and pulled collateral as the market changes. That would be based off of the pricing of the securities or in this case the reputation of the counterparty as well. So all I'm doing is just publishing those terms to the Blockchain and so we can just see that we have a 10 million dollar total return swap. We see that the collateral has not been funded yet. We also see that each counterparty has a trading account of two and a half million dollars and three million dollars. And what we're going to do is we're just going to go through the typical process for executing a swap transaction. All of this is obviously just a POC so it's not built out to have multiple transactions or multiple collaterals, but again it is just to be able to show you a little bit of what can be done with the Blockchain. So, in the first part is that, as the trader, we need to fund the account. So we're going to encumber basically collateral. So the trading account -- again, that could be the credit risk allocated to

a specific trader, it could be utilized from a bank to push or enhance traders to want to trade on one end of the curve versus another. Here what we've just done is we've funded the collateral account. Obviously there is a tremendous amount of documentation. I'm not sure if we'll be able to add this in here. But basically the Blockchain is not very efficient in holding large amounts of data so when we have standardized type of documentation like the ISDA or CSA, what we typically do is we'll use something called IPFS, or Interplanetary File System. You can look at it similar to your Dropbox, except that you can't change the name or any of the documentation. And this long string of numbers and letters here is basically a hash that is put onto the Blockchain so that again there is no way to be able to change documentation that is associated with a specific transaction. Finally we're going to sign the agreement. Again this is all within one interface -- this could be going to the credit department, could be legal reviews it prior -- and this is

just again all of this is being put on top of the Blockchain. So you have this transparency and immutability. So there isn't a way to be able to change any of the terms that go in here. Obviously things can be revised but there's always going to be a log of being able to see what has been put on the Blockchain. From a regulatory standpoint of course this gives a very easy to be able to create a dashboard that gives complete transparency of all the different types of transactions -- swaps -- that are being entered into, what kinds of collateral is being associated with it. Different items that need to be analyzed. So again now for demo purposes this is just going to the other counter party. They're going to see the same type of terms and reply going through the same process -- funding the account, reviewing the documentation, and then entering into the transaction. Now that that's gone through, we have this notion of triple entry accounting, and basically what this is it's a confirmation on the Blockchain -- a confirmation

goes to each counterparty and then a confirmation on the Blockchain that can be referenced indefinitely. This can help again from a transparency standpoint and from an auditing and regulatory standpoint. So what we have here now is the transaction is ongoing. Up top you just have the prices and here that's what I meant by the oracle. You're going to have organizations -- they may either be centralized similar to the Bloombergs and Reuters of the world, or it might be a much more decentralized fashion. These are just utilized for obviously being able to price the assets. If there is a way that you have some type of listed or some type of way of being able to give a pricing on the underlying, then we're able to track what is the value of this swap transaction. So as you'll notice, every few seconds you'll see a black logo that pops up and that's basically a rebalancing. So every time that the prices are moving we're having a pull or push from the trading account into the escrowed collateral account, both of these standing on the

Blockchain. This becomes very powerful. Obviously from a tracking in a back office scenario, this is automatically happening and if you can just imagine having the initial and then maintenance level margins, now you can have a level that is basically rebalanced in real time. There isn't the delay of having someone call and say you need to deliver assets because your account is down. It also becomes a very -- much more -- efficient use of capital. Less capital is having to be tied up in a collateral account, as well as from a financial institutions risk standpoint it also reduces their risk. They're able to basically grab collateral as soon as needed given market fluctuations. We have here one of the smart contracts has been initiated where there was a down grade in my counterparty. So it went from 79 down to 74, and so immediately there was a pull of additional collateral from the trading account into that collateralized account, shoring up, given a change in a counterparty's creditworthiness. Again, given that it is a

freely traded account, yes, it could be depleted or moved after the trade is initiated and again all that means is then we're back to where we are today of people having to be on the phone saying you need to deliver collateral. You can easily put smart contracts in there to encourage counterparties to keep collateral or keep funds in there just because you would say well we'll give you a reduced rate if you have additional funds in your trading account. This is just as quick as I could go through of what the transaction is. What we've looked at are basically just what is identity, how you could use the reputation using the Blockchain from the transparency side of things, and the ability and really a way for regulators and financial institutions to be able to track what these transactions are utilizing the Blockchain. Thank you.

MR. GRIFFIN: That's great. Thank you. Why don't we open it up to the committee if anyone has questions they'd like to lob? Thoughts?

MS. VEDBRAT: This is Sapurna. I have a

question on this last section of the collateral management piece. What do you think would be the main concerns from an industry standpoint of moving to a much more efficient way of managing or moving collateral?

MR. SLAZAS: I would say that I think the -- probably one of the most important issues to be able to address would be the digitization of the assets. We are obviously going through an inflection point right now where we have this legacy world and we have the potential use of the Blockchain. So there is definitely going to be a need for being able to digitize legacy assets so that they can come on and off the Blockchain easily. If not there would be some type of arbitrage opportunity to be able to -- or a limitation of what an asset's value would be if we could not have it go back and forth easily. And from that standpoint I think that utilizing something -- having that kind of functionality would enable a tremendous amount of basically cost savings and risk reduction by being able to have

that movement.

MS. RO: From a technology standpoint that's absolutely correct but I think one of the big hurdles that we need to figure out how to marry is the fact that if you tokenize collateral, what happens in the event of a default or a bankruptcy? What regimes would cover these tokenized assets and if they're in transit from one jurisdiction to another, do these tokenized assets become recognized under law? There is a lot of, I think, advances happening on the technology side which is natural, being way ahead of legal and regulatory framework. So agree we definitely need to be looking at digitization of collateral and assets but we need to figure out also how we work with regulators and the legal framework to make sure that these things are recognized.

MR. LEVY: Yes, just to add a little bit on that, that's a really important point and when we look at the timeframe for this to really get adoption across the board the technical side is a

hurdle but it is probably the least meaningful hurdle. The legal framework has to be understood and then around that the regulations need to happen so there are definitely -- I don't think they're edge cases but there are cases that you have to figure out because a lot of what we talk about is solving for those default events, et cetera, as opposed to when things are happening in the normal course. In the normal course obviously these things don't matter as much but everybody is going to do that what if analysis. I'll introduce -- I know we've talked pretty technically at times today across the board here, but I think what was said is that idea of the digitization of the asset is critical as early in the process as you can. To the extent that it's not, you make it digital or need to off ramp it, that is really important. But there is this idea that there are apps that are basically written above the Blockchain that have the smartness of the contract in it where events can either be prewired in or can be more easily instructed when necessary, and to Supruna's

question, there is quite a bit of efficiency from the idea of these smart contracts -- not just the Blockchain -- but the idea that you can deliver these fairly small apps that sit in and around those chains to really drive the events. Those are things that will take time; we'll probably have to go after them bit by bit or several by several. That is not unique to how Blockchain technology is developing in our space or being talked about -- the idea of micro services, API's that interact with each other and more modular apps that leverage all of this is the way that technology is just being delivered and Blockchain is just another version of that. Where -- and again to the point -- you don't want to overload the network with a lot of data that's not necessary and have to ship that around all over the place because one of the issues with the Bitcoin network itself is its scalability and one of the things that we have to solve for is making sure that things can happen fast and for things to happen fast obviously the technology itself needs

to carry the load -- it should carry and the core Blockchain technology as stated and we understand this is not really fit for that. So the question is how many events and technology do you weave around that versus putting on the chain directly and that will be a big part of the technical debate as well as the legal regulatory because these things have to manifest somewhere to give people comfort that it is being done properly in any event including defaults.

MR. GRIFFIN: Cliff and then Steve.

MR. LEWIS: Just a couple of points. I was wondering if this would be a sensible session or not because the talk to ticket ratio as they said on the floor was very high on Bitcoin and distributed ledger stuff and this was very, very impressive thinking. But just to come back to a couple of points -- and I think it's particularly related to what Brad was just talking to and how important it is and how heartening that the Commission is interested in this. Because the impediments to -- I think it is a mistake to start

focusing too narrowly on the technology or even on proof of concepts which you can dummy up pretty quickly. The question is to sort of go back to what's within the Commission's gift and begin to identify and sort of using this as a metaphor -- really, it's the distributive ledger, it's that concept of a different model than the existing clearing model which is really what this is about. And of course because of regulatory changes some of which you guys have fought the good fight on and had, as President Carter said, an incomplete success on, the industry is faced with a huge challenge in terms of the cost of clearing. And in particular the cost of clearing that's imposed on end users -- so the most innocent participants in the market are the ones that are facing the biggest challenge. And as you listen to the description of the Blockchain model, I think it becomes pretty obvious immediately where there would be serious cost savings to the extent that that clearing model has to change to be more of a direct clearing model. Rather than having

intermediaries who because of capital costs are going to be ill-suited to provide efficient services, how do you begin to facilitate an alternate model? I think what's been just described here as you go back to basically things that as you can tell the clearinghouses are already thinking about, you have some avenues that the Commission could be thinking about proactively -- and I gather you're doing that -- whereby relatively small adjustments to some of the regulatory requirements, it may be possible to facilitate new mechanics for the system -- in particular the mechanics of pays and collects, the mechanics of the way collateral gets moved -- that may make it easier to go to a more direct clearing model, which pretty clearly is going to be the future because the cost of paying the balance sheet charges for, in effect, better credits than the banks to access risk management tools, is probably unsustainable in the long term. So this again I think is a terrific way not only from a technology standpoint but really in the classic

Christensen sense of a really disruptive technology, technology in the sense of business solution for the biggest challenge that I think the industry is going to have which is how do you continue to use things like futures even though it is going to get a lot more expensive as all of these new changes come on stream.

MR. JOACHIM: I think some of my questions are kind of in line with what Cliff is talking about but maybe a little bit more practical. I'd be curious to hear from you if you thought through the implementation issues of doing something like this. It sounds to me like when I listen to the description of what you're talking about it's a zero sum game. Either everybody's on the network or everybody is off the environment. What happens if you're in an environment where some counterparties are on and some counter parties are off -- how do you kept those environments in sync? How do you really create an orderly transition to a disruptive technology like this in a way that the risks of that transition

don't overwhelm the benefits that you might achieve in the long term, so pay a high rent or a high risk for many years while you do that transition while 10 years down the road you might get some value out of it?

MR. SLAZAS: I would say not that it's a zero sum game -- there's definitely much more efficiencies that are gained as the ecosystem gets fully built out -- but when we talk about smart contracts, and those are part of the Blockchain, there is a little bit of an incongruence I think. You can just imagine there are efficiencies internally that an institution could gain without incorporating with other banks at all, and at ConsenSys we work with a lot of different financial institutions from an internal standpoint, a consortium and public viewpoint. And so what I would say is it's probably more of a -- institutions are going through their learning phase and their experimental phase right now and so they can gain, definitely, abilities within their institution. I think by having the dialogue

open with several, that we can incorporate a lot of different types of efficiencies. I think we spoke about KYC for a single institution -- that might not garner as much benefits as if there was a consortium of different intuitions. In the example that I was going over, that could just be a way for one institution to interact with other counter parties of their own -- so, disregard maybe that reputation side, because the credit department has already gone through that -- but could transact with each one of those counterparties from an efficiency standpoint. They may say, again, it may be run by the dollars and said we'll offer out the same swap five, ten basis points cheaper because if you're going to utilize this system. Or some institutions may say you have to do this if you're going to transact with me. So I think it's going to be a growing process. I don't think we're going to have a date that going to just say we're just turning on everything and now we're all a part of the system. But it will be, what I envision, a multitude of

many different types of Blockchains, private, consortium, one to one, and public.

MR. SAMS: If I could respond to that as well, Steve. Yeah, I mean you don't trade with yourself you trade with counterparts and that naturally means that there is a network effect and you're right, the value of a decentralized clearing network is proportional to the amount of usage. But that's not really any different from a clearing house or a CCP. And the level of complexity that's involved in setting up something like this is pretty similar to the level of complexity in setting up a clearinghouse or a CCP -- you need to have a critical mass of usage for it to be worthwhile. Two things I want to say. One is that this technology is about -- the implementation of it is going to be incremental. We're not talking about everybody getting on a single network. There will be a myriad of networks and it will be important that the industry encourages interoperability between them in order to gain the benefits. But it's quite

possible to take some markets that have a relatively small number of participants and implement this technology live first and gradually move to larger and larger markets. But there are also quite powerful reasons why the industry would want to put the effort into going down a route like this. These are largely because of the networked nature of post- trade and clearing, if you take a particular derivatives contract, for example, there is a natural monopoly in clearing something like that and the natural monopoly is carved along the domains of whatever the netting set is and the risk modeling. And obviously if you have an intermediary in the middle a natural monopoly plus an intermediary is problematic for the industry. There are competition concerns and to have an alternative of being able to perform the functions of a clearinghouse without having to concentrate that natural monopoly in a commercial entity is a pretty powerful incentive for putting in the effort to try to do this.

MR. GRIFFIN: First we'll go to Marisol,

Evelyn and then Larry.

MS. COLLAZO: Thanks. So there was certainly interesting points raised. I just mentioned that from the DTCC perspective we're certainly looking at this Blockchain technology as well and we actually recently issued a white paper around what perspective we take on this and certainly from a financial transactions perspective, what and how Blockchain can be used. Very much the discussion around disruptive technology, we tend to think it's more of an emerging technology around how financial transactions can be processed. As I think was already mentioned, lots of focus on technology but there are common themes here that we need to be cautious as we proceed, which is, you still have need for standards because of this network effect. You need to ensure that -- looking at the demo -- that the smart contract and the terms of the contract are agreed by the community. You also need to have governance around those standards and around sort of that network effect. There are

also other sort of considerations here that at the heart of it, what is the problem that we're trying to solve for with the use of the technology and so in thinking about that, you have to break it down into its parts -- we think, at least -- in terms of are we solving for identity information, so client onboarding, KYC, things of that sort. Our thinking here is this is pretty sensitive non-public information and it is not the right place to start just yet and there may be an opportunity, but given this is what we see as the most highly sensitive and most prone to cyber attacks, not the best place to start. However there may be other opportunities, such as master information around securities as an example. There we do think that that has an opportunity to look at a decentralized processing. One of the key things I would caution as the Commission is thinking about what role Blockchain may play and certainly what would be the regulatory lens which you want to apply on this. It's thinking about where are the opportunities in terms of what problem are we

trying to solve for -- is it about getting closer to settlement? So we certainly know we have the goals of moving to T plus 2 settlement -- what are the enablers to doing those types of things, as another example? Collateral -- yes, another example. So there are areas where I think the use of this technology could serve to solve some problems and create some efficiencies, but we need to make sure that in thinking about kind of the full process and where we're looking to go, that we start with the question of what problem are we solving for -- is it really yielding the efficiencies that the market needs; in some cases it may have already hit a level of maturity in terms of efficiency. Yet another case is the opportunities may present itself so I do think it is much more nuanced in looking at the specifics of the problem that we're looking to address.

MS. FUHRER: Thank you. First of all I'd like to thank you all for the conversation around the Blockchain. I've been thinking about these issues for quite a while and was very much

looking forward to this conversation and I do have a question that I kind of want to throw out to everybody for conversation. One of the things I can't stop thinking about is, is there any confluence between this morning's conversation and this conversation. And what I'm thinking about besides the use cases -- and I agree with everything that Marisol and the others have said -- implicit in my mind -- and I'm curious if people agree or disagree -- is that in order to effectively build distributed ledgers, implicitly we have a high degree of standardization in place, and not only a high degree of standardization, we have a high degree of commonality. Everybody on the network is seeing the same information. This transparency to all the node members. And when I think about -- coming from Promontory -- about the regulatory implication is, can we make that information available on a real time basis to the regulators without having to go through the permutations of different kinds of reporting and then the regulators could do with the information

what they want to do with the information. So I have less of a commentary to make --

I just wanted to share some of the things I've been grappling with and I'm curious as to what other members of the TAC and the Commission think on that.

MR. LEVY: Yes just one specific point on that. We think about the regulators as a node as opposed to there are nodes and they're overseeing the nodes. They themselves become part of the network and have their own permissioning based on whatever rights they're supposed to have as a regulator. In the normal market structure there is a market, there are participants, and the regulators regulate the participants and the market. That doesn't change, other than the fact that they're in the network this time more directly or that is physically possible. With encryption and keys and tokenization, you can give them access to the information they need when they want it, more on demand, and weave that into the whole concept of smart contracts and the chain

itself. So it is different than the way a lot of think about regulators where they are outside of the network and looking at it from the top -- we think of them as a node, with just -- arguably, most of the time, will have super access, and that may scare a lot of people, but that is -- (Interruption) --

Well, I don't know your trading capabilities at the panel, but it's probably read only. But yes, you can go very far on that. There are even times when maybe regulators need to take actions in markets, which I think they've done from time to time, and maybe they go from a read only node to a I'm buying equities today node. Maybe that doesn't happen in this country as much, but it happens. So, we think of them differently than a typical regulatory framework, which is why we think the engagement directly from the regulators is different this time because they are actually a participant in the network in our view more than just a regulator of it.

MS. FUHRER: Thank you.

MR. GRIFFIN: James, do you want to jump in?

MR. SLAZAS: Sure, and yes, again, I agree with Brad and I don't want to go too technical. There's a fairly unique structure that we look at when we're applying these types of transactions where we see Blockchains where it would be one to one counterparty Blockchains with the regulator as a third node. So I know that we've only been talking about where it might be this multitude of different nodes, and everybody is on the system that does give transparency so people can all see what your trades are and my trades are. That is not as beneficial as potentially putting a Blockchain between you and I and then regulators have another node, but then again there is a consortium where all this information is then shared on a consortium Blockchain as well.

MS. FUHRER: Right.

MR. SLAZAS: Maybe a more technical conversation but absolutely -- the idea is it

feels like having a type of dashboard for addressing systemic risks and different types of issues that could come up -- it can get very -- that's part of the infrastructure and the ecosystem.

MS. FUHRER: Thank you.

MS. RO: I mean I can attest from a CME Group perspective -- the few industry consortiums that we are a member of, there is very much the inclusion of regulatory bodies to be at least -- in the very least, an observer status in the network or further to that, having additional powers inside of the network. But this consideration spans globally -- it's not just about US regulators but it would include obviously UK, Europe and Asia regulators as appropriate.

MS. FUHRER: Thank you.

MR. GRIFFIN: Larry?

MR. TABB: My issues are, you know, how do you -- can you -- separate the settlement process from the transacting process or from the contract process? The issue I seem to have is

when you start shortening the settlement cycle to such a short period of time, cash really doesn't become a significant issue because you have a balance of cash generally hanging around. But margin and securities -- they are rehypothecated, they're lent out, and how do you get them back, and how do you make sure you're not short? And even with cash, there is a lot of times, there are payments going out in the morning and the cash coming in in the afternoon, and how do you manage that float in between? And if all that stuff happens in real time or happens so close together you wind up with all sorts of other problems, so if I'm a long-only --

Getting into the securities side, not where you guys are -- but if I'm a long-only and settlement is like in three minutes or real time basically and I've lent my securities out, I've got to actually get them back before I actually trade which means that I've got to call all my borrows in and let everybody know who's borrowed my stock that I'm going to be selling it. I'm

exposing the world to what I'm going to do beforehand, which is like not going to ever happen. There are some real challenges on the collateral side. Rich, I'm sure you understand that pretty well.

MR. SAMS: Can I jump in on that? I mean I think you are absolutely right and there has been a lot of discussion around, well, the Blockchain can radically reduce settlement times. Some people say the trade is settlement, that trade and settlement become the same thing and most of these ideas are ill-considered because the difference between trade and settlement serves a lot of different functions -- one of them is the liquidity in settling a trade. A trade is a contractual event settlement is when assets actually change hands. And one of the ways the liquidity works in the market is having a buffer between the two where there is a netting process that takes place between the interval of trade and settlement. And if you have this real time gross settlement model in every market, you wouldn't

have any netting and if you don't have any netting you're basically in a situation where in order to buy the asset you need to sell the asset first. It is ridiculous. So netting serves a very, very useful function in the market in terms of liquidity. It serves a useful function in the market in terms of reducing counterparty risk because your settlement risk is based on a net rather than a gross basis. So what I foresee is that the trade settlement interval will shrink. How much it shrinks will differ from market to market. There won't be a standard distinction between the two and the optimal interval between trade and settlement for a particular market is going to be a balancing of two offsetting factors. The positive factor of reducing counterparty risk and capital usage by reducing the window on the one hand, and on the other hand, the reduction in trade compression that happens when the settlement window is very narrow and what that optimum is is going to differ from market to market. So it will shrink but it is certainly not going to go to

zero.

MR. GORELICK: Thank you and thanks for your panel discussion. I found it very interesting and informative. My question for all of the panelists gets back to something that Sandra said at the beginning, which is the scalability concern. There have been some widely publicized scalability issues with the Bitcoin Blockchain that were going to be addressed in various ways. How do you see the technology scaling to markets in which there are millions of transactions a day and the need to continually build that Blockchain indefinitely?

MR. SLAZAS: Sure, and I can speak, I would say mainly to the Ethereum Blockchain as well as the consortium Blockchains that are run off of Ethereum. One is, the foundation itself has been working on the scaling issue where right now we have a proof of work similar to the Bitcoin Blockchain. There will also be a couple different technical sides of things but a proof of stake and a sharding of addresses to increase the

scalability. The goal is for that to be released 9 months to 18 months from now. From a consortium or private Blockchain, there the scalability issue really doesn't come into question. There you can have a scalability; we're working from more of a credit card processing and commercial banking aspect, where it is hundreds of thousands of transactions per minute type of thing. So it really would be dependent on what is the framework, what is the marketplace that we're looking at for that scalability issue.

MR. SAMS: I think it is important to draw the distinction between these public Blockchains and this so called permissioned or governed Blockchains, because the reason why scalability is so hard in public Blockchains like Bitcoin and Ethereum is because you have to build them in such a way to mitigate against the risk of what's called a civil attack. Because anybody can be part of the validation set -- they're anonymous. So you have to raise the cost of participating in that network as a way of

preventing a single party from taking a significant proportion of the consensus process over. In a permissioned Blockchain, you don't have to mitigate against that simple attack so already without some of the innovations that Ethereum is working on around sharding and some other techniques -- even without those innovations we can achieve some fairly high level of through-put and scalability with permissioned networks already. And it gets down to details about which consensus algorithm you use, what networking typology do you need, can the nodes be collocated in one geographical location or do they need to be geographically dispersed? But they are all imminently solvable problems in the permissioned context.

MR. GRIFFIN: Mr. Chairman.

CHAIRMAN MASSAD: Thanks. Well let me thank you all for the presentations which have been very, very interesting. I want to follow up on a couple of comments that have been made -- Marisol and others -- about what's the problem

we're trying to solve, and Sandra I think kicked it off by sort of raising the so what question. There was an article I read and probably a lot of people in this room read a while back in The Economist that talked about this and talked about the potential application of this technology and situations like the lack of a centralized land registry in a third world country. We're obviously in a very different place which is, we've got an industry that already has incredibly sophisticated technology, lots of digital records, and even to the settlement time, I think Larry properly pointed out that it may not be a technological barrier that's keeping, say, securities settlement at least at T+3 -- it may be market participant preferences for doing that. So Cliff raised the question on, well, maybe this is a path to a direct clearing model, which I think is an interesting idea and so let me ask you two questions. Because I think as a Commission, I think all of us -- I think I can speak for my fellow Commissioners -- in saying we want to make

sure we're at least not standing in the way of new technological developments and potentially encouraging technological developments that can be beneficial. So if we were to have this session two years from now, what would you be pointing to as the applications of this technology? What do you think you would be pointing to as the things we would then be talking about as the advances? And maybe they wouldn't even be specifically in derivatives -- maybe they'd have to do with KYC issues or AML issues. But more specifically then, what then -- in thinking about that and thinking about where you see the development taking place -- are there particular things we as a Commission should be thinking about in terms of our own rule set or in terms of what we do that can at least ensure we're not standing in the way, and maybe even we're encouraging things?

MR. SLAZAS: So what do I want in two years?

CHAIRMAN MASSAD: Five, if you want -- if that's easier.

MR. SLAZAS: I think, coming from the premise of, I look at a lot of the over the counter market as the area to first be addressed. And not that I'm glad the CME and everyone else is obviously working on this because it does make sense. But from the over the counter side of things, what I would envision is a dashboard for yourselves that you would be able to, if you had different parameters, from the earlier panels today, being able to have that access and that kind of data in any type of real time fashion, where not just that trade is the settlement type of conversation, but the transparency and the immutability of all those transactions I think is extremely cornerstone to this. We haven't really defined it too much, but even the security that the Blockchain does bring to the ecosystem, obviously we would be talking about a lot of very sensitive data. I think that in just a few short years that we would be able to provide some type of mechanism where you have a window into that space and I think it can be done in parallel to

what is being done currently off the Blockchain. And I think that that might just be another window for you to see where that market risk is. From a building out standpoint, I know that many of the financial institutions are looking at how do I address this KYC issue, how do I address my collateral and different issues how can I move money around either internally or through different trade finance situations. But I think that the derivative and over the counter landscape -- definitely we'll have a lot more clarity in what our risk exposures are.

MR. SAMS: Yeah, a couple of -- I outlined in my beginning talk this concept of a decentralized clearing network, and what we sincerely believe can be accomplished within the next couple of years is an alternative way of clearing an over the counter market that doesn't have a central counterpart. One of the things that we would like to be able to explore with the CFTC is whether a DCN would be considered a designated clearing organization under Dodd-Frank

or whether the products that a DCN clears would fall into an exempt category from central clearing. To have a process or a format whereby we could communicate with the regulators in considerable detail about what the mechanics of a DCN would look like and enumerate a lot of open questions regarding the regulatory framework and be able to get some clarity on that before significant capital expenditures put into attempting to build something like this. I'd say lastly the OTC clearing topic is obviously a very topical one -- controversial across a number of dimensions -- and I think it is encouraging that the regulators are looking at the technology today. I think it will be very helpful if the technology can actually start to help inform some of the debates that currently take place independently and that don't make reference to the technology at all. Because I do think the technology has some very enabling properties that could be quite decisive in some of the regulatory debates that are taking place in the OTC

landscape, both over here and in Europe and the UK.

MS. RO: I'd like to take a very practical situation that I heard recently where CFTC asks our market reg for some data information regarding transactions that have occurred. We have one half of that so we have to go out to our FCMs and ask them for the other parts of the information, make the phone calls, takes them a week or two to get their various departments together, collate all that information, gets back to our market reg team, and then they have to review and obviously send that back to you. Why does it take two to three weeks? To me that is astonishing. Not because anyone is doing anything wrong, but that information is just in different places and it is siloed. This technology can actually help mitigate that. Whether it needs to be real time or not, it doesn't really matter. I think the point is two to three weeks to get your information is too long. I think that is probably an extreme example but there is technology today

to actually make it far better and I think if we can have that in a couple of years' time, we'll have a better marketplace because that visibility and transparency will be there.

MR. LEVY: Just the way we think about the timing and just back to my presentation of it -- one to three years, we'll think they're be real ops efficiency and ops risk reduction through chains plus event in data management, and that's a little bit of the point that I think Sandra just made. There are real gains that we can make in the next three. We think in the two to five year timeframe that's where collateral could be impacted more so on just the operational side and then maybe over time on the actual balance sheet side. And then in that five to ten year timeframe, that's where we could see some real impact on liquidity, but we think that is the order and the rough timeframe,e and if you look at other big disruptions or big technologies whether it is PC, the Internet, mobile -- it all takes about 10 to 15 years to make a true impact, front

to back. But we think there could be real impact -- not front to back, but in pieces of the process in the next couple of years. But not too much before that.

CHAIRMAN MASSAD: And in terms of our role in that, again, without having to look out 10 years, because that is a little long, but in the shorter term, in terms of the things that we should be considering or at least engaging on, are there particular things --

MR. LEVY: I think it's a little bit of what are the problems we have today and can Blockchain help solve them more quickly then what we're doing today. I think that's maybe a bit too glib or simple but I do think it is about, let's not take a technology in search of a problem -- let's look at the problem and say can this technology help us. I also believe there is something real to the crowd sourcing of engineering solutions as opposed to looking at a few entities to ramp up their scale to Rick's point earlier -- I think it is going to be

different this time. The exchanges or we or a big bank is not going to solve the scalability issue -- it is going to be solved by the industry more collaboratively -- a big piece of that will be through the open source engineering efforts.

MR. GRIFFIN: Marisol, then Paul. If I could just remind everyone we are running short on time, so if we could keep our comments relatively brief, thanks.

MS. COLLAZO: I'll be very brief. I think one area to look at, Chairman Massad, is going to be in terms of the technology being put in place. Often the question is where does the data reside? Where is the database? A lot of the regulations tend to focus on that, just generally speaking, so I think that could be a potential area, in terms of being an enabler of this type of technology that that is a limitation as the technology emerges.

MR. CHOU: So we sort of discussed Blockchains and smart contracts. I'm sort of interested in some of the other complimentary

services that are needed like oracles, for example. CME, for example, with the brand name, I wondered if you guys ever considered leveraging your brand name to actually start broadcasting prices as an oracle, as a service? For both your own chains and any around the world. I think that would have some interesting regulatory implications.

MS. RO: That's a very interesting point. I think we're looking at a lot of different areas right now. I have to say, that is one that is a little bit lower down the food chain in terms of discussion but I appreciate you saying that, because actually that makes a lot of sense.

MR. LEVY: Yes, we think oracles are going to be an important element because there is going to be so many chains, side chains and assets around those chains. Something needs to organize that a bit more than certainly what goes on in the Bitcoin space today.

MR. GRIFFIN: Gary?

MR. DEWAAL: To the Chairman's question,

one thing I was just thinking about as I heard this conversation was not what's here today and what's here tomorrow -- it's really what happens in between. So during the time period that perhaps there's disintermediation of FCMs -- because you don't need them, you can do all these transactions bilaterally. What happens as the FCM business is slowly killed? What happens to folks that actually have to rely on it but there's not enough scale at the FCMs to actually maintain it. Interesting, for those guys who remain, to stay in business. I was just looking for the fun of it at some of the Commission regulations -- 1.31, 1.35 -- the recordkeeping rules. They probably have to be adapted. There's a lot of rules that probably have to be adapted to accommodate this, they don't fit nicely but frankly, they probably don't fit all that well today and could use some clean up. But I do wonder about this period of transition. How does the business work during the period of transition?

COMMISSIONER GIANCARLO: I remember

something Sharon said at the beginning of the day, talking about when we got out of law school in the eighties, and I was remembering a story. I was in law school at the time in the early eighties, I was talking to a grad student who was an engineering student, and I asked him what he was working on, and he said he was working on a new technology called asynchronous transfer mode which I still remember now and I said what is that. Remember this is the day of just the mainframe computers and he said it allows one computer to talk to another computer. And I thought to myself, why would anybody need that? And now I look around the room here it's rainy outside, I imagine most of you are using the computing power of one of these to call a series of cabs to be outside in the rain to take you to the airport. A whole series of computers talking to one another 35 years later, so sometimes it's just not even possible to envision what new breaking technology will lead to, but the critically important thing is that we allow it to develop and it not be

strangled at birth. And I think we're at the birth now of the Blockchain. I think it is vitally important that we as regulators take account of what we're hearing here and look at our regulations and see to what extent do they favor an old model of data recording and ledgering, and whether we need to take some affirmative steps to loosen that up so that this very important technology can develop and lead to whatever it is going to lead to. But it will lead to some things as technology always does and I for one am excited to see how it will develop.

MR. LEVY: Commissioner, if I could just -- I think by cab, you mean Uber, is that right?

COMMISSIONER BOWEN: I just want to thank the committee for the great work. I learned so much today and I have lots of great takeaways including the fact that we shouldn't be overly prescriptive and should look at sort of trading activities to make sure we're capturing the right people. The staff has done a great job on the swap data harmonization and it is clear we need to

do more work in that area and I clearly support reconstituting the working group that did such great work before. Blockchain, as a regulator, I just need to be mindful of what it means to be a node on the Blockchain.

MR. GRIFFIN: Any further comments? Wonderful.

CHAIRMAN MASSAD: Thanks, everyone, once again.

MR. GRIFFIN: Sandra, Brad, Robert, James -- thank you for helping to lead a very good discussion here today. Before we adjourn, I just want to thank all of the TAC members, both for your contributions and for participating again with the last minute rescheduling, courtesy of the blizzard and so on and so forth. And we really do appreciate your attendance and participation. Also a very special thank you to our outstanding staff, both for their assistance in organizing this meeting as well as all of the behind the scenes logistics, everything you don't see, the folks who are behind this glass pane back here --

they really helped to make this happen, so thank you. As well of course, all the contributions of our CFTC panelists earlier in the day. With that, this meeting is now adjourned. Thank you.

(Whereupon, at 3:35 p.m., the PROCEEDINGS were adjourned.)

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CERTIFICATE OF NOTARY PUBLIC

DISTRICT OF COLUMBIA

I, Carleton J. Anderson, III, notary public in and for the District of Columbia, do hereby certify that the forgoing PROCEEDING was duly recorded and thereafter reduced to print under my direction; that the witnesses were sworn to tell the truth under penalty of perjury; that said transcript is a true record of the testimony given by witnesses; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this proceeding was called; and, furthermore, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

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