MINUTES OF THE MEETING OF THE
U.S. COMMODITY FUTURES TRADING COMMISSION'S
TECHNOLOGY ADVISORY COMMITTEE
March 27, 2019

The Technology Advisory Committee (TAC) convened for a public meeting on Wednesday, March 27, 2019, at 10:04 a.m., at the U.S. Commodity Futures Trading Commission's (CFTC or Commission) Headquarters Conference Center, located at Three Lafayette Centre, 1155 21st Street NW, Washington, DC. The meeting consisted of four panels. Panel 1 discussed the impact of automated orders on markets, followed by a discussion of a principles-based approach to preserving orderly trading on exchanges. Panel 2 discussed consensus mechanisms used for virtual currencies and a comprehensive survey of the regulation of virtual currencies and other digital assets. Panel 3 discussed the existing cybersecurity regulatory landscape, and how regulation can be effectively applied to technological developments. Panel 4 discussed the current state of Distributed Ledger Technology (DLT), the future of DLT and potential recommendations, and the application of smart contracts and DLT to swap markets.

TAC Members in Attendance
Richard Gorelick, TAC Chair, Head of Market Structure, DRW Holdings LLC
Erik Barry, Credit Suisse, Head of Client Platform for Prime Derivative Services
Christopher Chattaway, Managing Director, Goldman Sachs
Thomas Chippas, Chief Executive Officer, ErisX
Paul L. Chou, Chief Executive Officer and Co-Founder, LedgerX
Charley Cooper, Managing Director, R3
Gary DeWaal, Special Counsel, Katten Muchin Rosenman LLP
Bryan Durkin, President, CME Group
Aubree Greenspun, Vice President, Product Development, Nasdaq
Christopher Hehmeyer, Managing Member, Hehmeyer Trading and Investments
Mayur Kapani, Chief Technology Officer, ICE
Brian Knight, Senior Research Fellow, GMU Mercatus Center, Special Government Employee, CFTC
Bradford Levy, Senior Vice President, Global Head of Loans and Chief Executive Officer, MarkitServ, IHS Markit
John Lothian, President and Chief Executive Officer, Jonathan J. Lothian Co. Inc.
Jennifer Peve, Managing Director, Head of Solutions Business Development and FinTech Strategy, Depository Trust & Clearing Corporation (DTCC)
Alexander Stein, Managing Director, Two Sigma Investments LP
Larry Tabb, Founder and Research Chairman, TABB Group
Haimera Workie, Senior Director for Emerging Regulatory Issues, Financial Industry Regulatory Authority (FINRA)

Speakers in Attendance
Mel Gunewardena, Chief Market Intelligence Officer, Market Intelligence Branch, Division of Market Oversite (DMO), CFTC
(Panel 1)

Elitza Voeva-Kolev, Market Analyst, Market Intelligence Branch, DMO, CFTC (Panel 1)
Bryan Durkin, President, CME Group (Panel 1)
Adam Nunes, Head of Global Business Operations and New Business Development, Hudson River Trading LLC (Panel 1)
Alexander Stein, Managing Director, Two Sigma Investments LP (Panel 1)
Gary DeWaal, Special Counsel, Katten Muchin Rosenman LLP (Panel 2)
Peter Van Valkenburgh, Director of Research, Coin Center (Panel 2)
Kathryn Trkla, Partner, Foley & Ladner, LLP (Panel 2)
Charlie Mills, Partner, Steptoe & Johnson, LLP (Panel 2)
Thomas Price, Managing Director, Technology, Operations, and Business Continuity, SIFMA (Panel 3)
Josh Magri, Senior Vice President & Counsel for Regulation and Developing Technology, Bank Policy Institute (Panel 3)
Nina Neer, Director, Technology Operational Risk Management, Credit Suisse (Panel 3)
Gil Vega, Managing Director and Chief Information Security Officer, CME Group (Panel 3)
Jason Harrell, Executive Director and Head of Business and Government Cybersecurity Partnerships, DTCC (Panel 3)
Shawnna Hoffman-Childress, Global Co-Leader of the International Business Machines (IBM) Cognitive Legal Practice, IBM (Panel 4)
Charley Cooper, Managing Director, R3 (Panel 4)
Jesse Drennan, Senior Vice President – Global Business Process Engineer Global Foreign Exchange and Commodities, The Hong Kong and Shanghai Banking Corporation (HSBC) (Panel 4)
Tara Kruse, Global Head of Infrastructure & Data, International Swaps and Derivatives Association (ISDA) (Panel 4)

CFTC Commissioners and Staff in Attendance
Brian D. Quintenz, Commissioner and TAC Sponsor
Rostin Behnam, Commissioner
Dan Berkovitz, Commissioner
Dawn D. Stump, Commissioner
Mike Gill, Chief of Staff to J. Christopher Giancarlo, Chairman
Daniel Gorfine, Designated Federal Officer (DFO) and Director, LabCFTC

I. Opening Remarks

Mr. Gorfine, the DFO for TAC, called the meeting to order. Commissioner Quintenz gave his opening remarks. He welcomed and thanked all committee members for attending and specifically acknowledged Mr. Gorelick as the new TAC Chair. Commissioner Quintenz previewed the day's agenda, highlighting issues that would be discussed and briefly described the panels' guest presenters and special presentations. Regarding the DMO Market Intelligence Branch (MIB) staff report entitled, "Impact of Automated Orders in Futures Markets" (Automated Order Staff Report) to be presented during the first panel, Commissioner Quintenz stated that it would serve as a substantial anchor and reference point in the journey to achieve an objective, data-driven understanding of the impact that automated and algorithmic trading play in our markets.

Next, Mr. Gill, Chief of Staff to Chairman Giancarlo, who was absent due to illness, delivered the Chairman's opening remarks. He applauded the TAC on its structure, focus, and timeliness in exploring emerging issues and technologies impacting the markets. Mr. Gill expressed enthusiasm to hear the guest speakers' insights and feedback, and thanked the MIB staff for presenting its Automated Order Staff Report, which is what the Chairman had in mind when he conceived the MIB.

Following Mr. Gill, Commissioners Behnam, Stump, and Berkovitz each gave their remarks, respectively thanking Commissioner Quintenz for his leadership. Additionally, Commissioner Stump noted her excitement for the MIB Automated Order Staff Report presentation, work that she considers to be very helpful for agricultural markets. Commissioner Berkovitz made specific points about each of the four upcoming panel discussions: (1) the timeliness of considering automated order trading, given its major role in today's financial markets; (2) the ABA's strong record of providing thoughtful analysis and recommendations that have informed the Commission's regulatory structure; (3) his view, expressed during his Senate Agriculture Committee nomination hearing, that data protection and management warrants Commission focus going forward; and (4) his enthusiasm, in the wake of recently attending a conference about DLT applications in energy markets, for the presentation on how DLT can impact and improve market function and Commission oversight.

Commissioner Quintenz then introduced Chairman Gorelick, who said that he was honored and looked forward to working with his TAC colleagues in providing feedback and recommendations to assist the Commission, among other things, in being "an effective modern regulator." After discussing some meeting housekeeping details, Chairman Gorelick turned to Mr. Gorfine, who made the following disclaimer: "[T]he views and opinions expressed in this meeting regarding products, entities, and services do not necessarily reflect those of the United States Government or the CFTC. Additionally, any reference to such products, entities, or services is not an endorsement or recommendation by the United States Government or the CFTC." Mr. Gorfine then invited comments from the public about alternative technological solutions to address matters discussed during this meeting, and directed the public to the Commission website for comment related to submission instructions.

II. Panel I: Automated and Modern Trading Markets Subcommittee Presentation & Special Presentation from DMO

Chairman Gorelick opened the panel by introducing two DMO staff members, Mr. Gunewardena and Ms. Voeva-Kolev, to present the Automated Order Staff Report. Mr. Gunewardena explained that the report, which examined nearly 2.3 billion transactions from 2013 through 2018, reflected the start, not the end, of work on automation; and he then gave the floor to Ms. Voeva-Kolev to review the report.

Ms. Voeva-Kolev began by explaining that, based on interviews with numerous market participants trading different commodities, DMO staff recognizes that market participants, aided by technology, can place large numbers of transactions for significant volumes. The study endeavored to understand what, if any, effect this technology-driven trading had on futures markets, by analyzing internal CFTC transactional data to compare manually-placed to

automatically-placed orders. The study generally found that: (1) the percentage of automatically-traded orders has increased for all commodity futures markets; (2) automated orders are smaller in size and have shorter resting times than manual orders; (3) automated orders are almost exclusively limit orders; and (4) historical end-of-day price volatility during the studied 2013-2018 timeframe has not increased year-to-year at a correlated rate with the steady increase in futures markets automated trading (although this does not imply that automated trading has not affected short-term market events). Ms. Voeva-Kolev, using a PowerPoint presentation, explained the study's methodology and findings in greater detail, after which she answered several questions.

Ms. Voeva-Kolev's presentation elicited several comments from members and panelists. These included comments suggesting potential areas for further analysis. Additionally, Mr. Durkin commended the report as validating that automated trading reflected a natural market evolution, a point he said the TAC had been emphasizing for a number of years.

Chairman Gorelick then gave the floor to the subcommittee members, Messrs. Durkin, Stein, and Nunes, for discussion of a principles-based approach to preserving orderly trading on exchanges. Chairman Gorelick summarized the discussion as affirming the view that U.S. based exchanges are currently in compliance with International Organization of Securities Commissions (IOSCO) principles, although swap execution facilities (SEFs), due to their unique trading mechanisms, present some unique questions, a topic for potential further subcommittee consideration.

Following the presentation, Chairman Gorelick asked members for any questions. There being none, the Chairman stated that after a few minutes the meeting would continue with the next panel.

[Break]

III. Panel II: Virtual Currencies Subcommittee Presentation & Special Presentation from ABA

Following an introduction by Chairman Gorelick, Mr. DeWaal explained that the Virtual Currency Subcommittee has been working to understand and formulate recommendations for the Commission with respect to cryptocurrency derivatives contract approval through the self-certification process and for new applicants. He noted that after reviewing comment letters submitted in response to the Commission's Request for Input concerning Ether, the subcommittee wanted to better understand Ether's likely transition from a proof-of-work to a proof-of-stake consensus mechanism, which was a "hot topic" in the comment letters. Mr. DeWaal then introduced Mr. Van Valkenburgh to speak on the issue.

Mr. Van Valkenburgh began his PowerPoint presentation by explaining that consensus mechanisms refers to the actual technology to get all of the computers on a peer-to-peer cryptocurrency network to agree on the type of things (user onboarding/authentication, accounting/recordkeeping, management/oversight) that the operator in a centralized paradigm, *e.g.*, PayPal, would handle. DLT is such a technology. It is fault tolerant because data requiring

consensus is stored redundantly on every computer on the network and visible to everyone. In lieu of transaction timestamping, consensus on an open-DLT network is reached on whether a batch of transactions, *i.e.*, a block, happened before another; and this is done by requiring that each block incorporate a piece of data, *i.e.*, the output from a mathematical hash function, from that which preceded it. Both proof-of-work and proof-of-stake consensus systems employ a provably fair lottery for picking who is going to be mining the next block or creating the next block in the blockchain. In contrast to proof-of-work systems, proof-of-stake systems rely on a miners' time-valued ledger investment in the cryptocurrency as the key differentiator in picking the lottery-winner, not a miner's investment in high cost computing capacity and electricity expenditures.

Mr. Van Valkenburgh then gave an overview of how proof-of-work systems—used by Bitcoin, Litecoin and a number of other cryptocurrencies—function. The first person (miner) to solve the hash function (essentially a very difficult, math problem requiring expensive computing capability and electricity inputs) is the recognized authority for writing the next block, and checking the validity of each signature, *i.e.*, private key data, for the transactions in the block; everyone else on the network can see and check the miner's work. The miner's effort is rewarded by the right to form a new block in which it allots itself an amount of the cryptocurrency (as prescribed in the rules of protocol), and this is a money creation transaction visible in the block so others in the network can verify that the correct amount is allotted.

Mr. Van Valkenburgh noted the pros and cons as Bitcoin mining has evolved away from Satoshi Nakamoto's original vision of a very democratic and open system [of] people running normal looking desktop computers around the world all participating somewhat, equally to one dominated by a handful of people via expensive dedicated application-specific integrated circuit (ASIC) mining farms, basically a big server warehouse. On the pro side, it operates as a security feature against 51 percent attacks (*i.e.*, attacks by someone who has obtained a majority of the network hashing power) against large networks like Bitcoin or Ethereum because the cost (capital investment in specialized computing power as well as electricity) to mount the attack would be tremendous. On the other hand, 51 percent attacks are a real threat to poorly capitalized or small cryptocurrencies that share a mining algorithm with a larger cryptocurrency because middling-sized miners of the large cryptocurrency (*e.g.*, Ethereum) might pass the 51 percent threshold if they switched their hardware to mine the smaller cryptocurrency (*e.g.*, Ethereum Classic).

Mr. Van Valkenburgh then discussed proof-of-stake systems, explaining that instead of earning a winning lottery ticket through your computer's calculations and sacrifice of electricity, you must sacrifice the currency's accessibility (time value), the more currency previously staked in the block and held there without being accessed, the more power. A winner is picked randomly each block cycle, every 10 to 15 seconds in Ethereum, and the odds are greater the more someone has at stake in the system. Mr. Van Valkenburgh described two potential problems with proof-of-stake systems: (1) the nothing-at-stake problem, *i.e.*, the ability of miners to manipulate the system to make it appear that they have coins staked to the power on the network when they no longer do and for which checkpointing may be a counter; and (2) forks that occur when some subset of a community fundamentally disagree with the rest of the

community and change their consensus mechanism rules so they are no longer compatible with the network's original protocol.

Mr. Van Valkenburgh closed with an examination of implications for traders and funds, including these thoughts: (1) the proof-of-stake/proof-of-work question is generally not relevant since there are alternative ways to build a provably fair lottery for block creation; (2) there may be some impact on best practices, *e.g.*, checkpointing, documented procedures; and (3) institutional participants should be wary of poorly capitalized cryptocurrencies given their susceptibility to a 51 percent attack, and have well-documented procedures to govern in the event of forks.

Chairman Gorelick gave the floor to Ms. Trkla, and Mr. Mills, to discuss the recently released American Bar Association (ABA) white paper. Ms. Trkla, as chair of the ABA Innovative Digitized Products and Processes Subcommittee (IDPPS), spoke first. She explained that the IDPPS was established after CFTC former Chairman Giancarlo urged the ABA Derivatives and Futures Law Committee to be more active on the issue of Bitcoin and virtual currencies. Ms. Trkla then described the IDPPS's structure, mission statement, and three working groups, including the Jurisdiction Working Group (JWG), co-chaired by Mr. Mills. She also provided background about the JWG's recently issued white paper on state and federal laws applicable to cryptocurrencies and other digital assets.

Mr. Mills then described the white paper's specific subjects: (1) Background on Digital Assets and Blockchain Technology; (2) Commodity Exchange Act and CFTC Regulation; (3) Federal Securities Regulation, Securities Act and Exchange Act; (4) Federal Securities Regulation, Investment Company Act and Investment Advisers Act; (5) The Need for a Better CFTC and the U.S. Securities and Exchange Commission (SEC) Regulatory Scheme for Digital Assets; (6) Financial Crimes Enforcement Network (FinCEN) Regulation; (7) International Regulation; (8) State Law Considerations; and, (9) an appended 50-State Virtual Currency Regulation Survey. Ms. Trkla discussed CFTC and SEC regulatory overlap (and gaps) in more detail, including issues and uncertainties arising when digital assets incorporate a security component such as an initial coin offering; noted that the white paper's one advocacy point was to urge the agencies to attempt to sort out these issues; and highlighted tools, other than legislation, perhaps available to the agencies to do so.

Chairman Gorelick opened the floor to questions from the Committee members to the subcommittee and panel presenters. A number of questions were asked and discussed, which included the following topics: (1) Office of the Comptroller of the Currency (OCC) regulation of money transmitters; (2) regulation of tainted digital assets in a blockchain; (3) the JWG's consideration of rule of law/recourse implications with respect to underlying digital-asset cash instruments; (4) proof-of-stake/nothing-at-stake and checkpointing; (5) 51 percent attacks; and (6) tokenization evolution.

[Lunch Break]

IV. Panel III: Cybersecurity Subcommittee Presentation

Following the lunch break, Chairman Gorelick introduced the Cybersecurity Subcommittee, Mr. Price, Ms. Neer, Mr. Vega, and Mr. Harrell, as well as Mr. Magri from the Bank Policy Institute. He then gave the floor to Mr. Price, who introduced Mr. Magri as having led industry efforts to develop the Financial Sector Coordinating Council (FSSCC) Cybersecurity Profile (Profile).

Mr. Magri explained that his remarks and requests were based on over two years of work encompassing a multitude of working sessions and input from cyber experts, financial institutions, an open National Institute of Standards and Technology (NIST) workshop, federal regulators, self-regulatory organizations (SROs), and state-based organizations to improve cybersecurity and address challenges.

A particular challenge for discerning sector risk, according to Mr. Magri, is reducing the percentage of time chief information security officers and their teams must devote to compliance daily, at least 40 percent according to 2016 survey results, given that the industry faces a global shortage of three million cybersecurity professionals in 2019. He stated that his group identified and mapped the intricate array of government, industry, and SRO agencies and bodies currently regulating the space (depicted in a PowerPoint slide), highlighting significant overlap in the process. Using the NIST cybersecurity framework for organizational structure and Committee on Payments and Market Infrastructures (CPMI) IOSCO's guidance on cyber resilience for financial market infrastructure, his group worked with the regulatory bodies to straighten out the lines of what looked like a wiring closet into a much more succinct architecture. The group then built off of this streamline architecture to create a Profile that add governance and dependency management (reflecting its increasing global appeal) as higher level functions as well as extending it to be more diagnostic in nature.

Mr. Magri's presentation then listed countries involved or interested in employing a NIST framework; detailed benefits of the Profile approach to financial institutions, the supervisor community, and the ecosystem; mapped the process and main participants in developing the Profile; explained the public/private collaboration to achieve sector-wide scaling by impact; noted that 40 firms have committed to, or are actively exploring, implementing the Profile for the next 2019-2020 exam cycle; and quoted agency statements of support for the Profile. Before concluding with a slide identifying websites where the Profile could be accessed, Mr. Magri requested: (1) public statements of support (similar to those quoted) stating that the use of the Profile as input for examinations is acceptable; and (2) support for the Profile as a common baseline framework for cyber supervision in conversations with the Financial and Banking Information Infrastructure Committee (FBIIC) and with international regulators.

Ms. Neer presented several slides to discuss cybersecurity oversight as firms move their infrastructure to cloud-based environments. Her presentation noted the intent to work closely with the CFTC to address unique challenges that will need to be accounted for in a shared-responsibility manner as infrastructure moves to the cloud. She acknowledged that the same cybersecurity requirements, strong governance, education, board and risk committee engagement, will apply whether infrastructure management is on premises or in the cloud. Ms. Neer also provided a visual reference showing the sliding scale of customer/cloud-provider

responsibility depending on the type of cloud-based infrastructure a firm may adopt, including infrastructure as a service, the presentation's focus.

Ms. Neer gave the floor to Mr. Vega to address fundamental precepts for a firm moving to the cloud. The following were identified and discussed: (1) the preparatory need for a thoughtful, deliberate execution approach; (2) the preparatory need for a strong infrastructure prior to migration that minimally includes data protection and encryption, service and application segmentation, intrusion detection system/intrusion prevention system (IDS/IPS) capabilities, security information and event management, and vulnerability management strategy; (3) the preparatory need for deployment strategies, including consideration of containerization, application and service re-architecture, and full automation of deployment and environmental builds; (4) the preparatory need for proper authentication and authorization controls; (5) the governance oversight requirement to understand and verify a cloud vendor's controls; (6) the governance oversight requirement to have an understanding of a cloud vendor's physical infrastructure and account for operational resilience; (7) the governance oversight requirement to monitor data access; (8) provider independence/open-source technology vendor management considerations; and (9) third-party risk management (TPRM) vulnerability scanning, and the need to differentiate firm versus cloud provider responsibilities.

Next, Mr. Harrell presented on vendor management, a topic that he noted has received significant attention from global supervisors and standard setting bodies in the form of supervisory rules, rule interpretations, guidance, and questionnaires; and that firms have addressed by incorporating information security requirements and/or risk limitations into vendor contracts. Over 15 supervisory documents from various U.S. and international authorities (links to which were provided in a slide) currently address vendor management. Mr. Harrell said that the subcommittee was continuing to review supervisory documents to understand the current regulatory landscape before making recommendations to the TAC, and gave an overview of the subcommittee's progress in that effort. Given the scope of the review task (including supervisory guidance going back to 2003), he requested additional time for the review and requested TAC input on two areas: (1) preference for whether the subcommittee's recommendations be prescriptive or principle-based since current guidance provides both, and (2) whether the TAC is open to a new approach for identifying critical vendors.

Chairman Gorelick encouraged TAC members to provide feedback on both the subcommittee's cloud-presentation as a prelude to having it formally propose recommendations at a future TAC meeting and Mr. Harrell's requests for direction. Chairman Gorelick then opened the floor for questions and discussion. With two exceptions, Mr. Chippas' support for a principles-based approach to vendor management and Mr. Magri's clarification (in response to a question from Mr. Kapani) that the cloud was one of a larger suite of cybersecurity components integrated within the Profile, the questions, comments and discussion among the members concerned the cloud presentation.

Mr. Greenspun questioned whether the subcommittee thought about recommending additional considerations for an exchange versus a broker/dealer. Mr. Vega said the subcommittee would consider the issue and come back to the TAC on it. Mr. Chippas asked whether the subcommittee thought about making differentiated recommendations reflecting

different organizational types and sizes. Mr. Vega said the subcommittee could work on clarifications so that the recommendations addressed smaller, as well as larger, firms. Mr. Chou supported elucidation of the cloud's scale advantages, *i.e.*, to see more vulnerabilities in a different set of contexts. Mr. Workie shared insights from FINRA's experience moving infrastructure to the cloud. Mr. Levy suggested that, for purposes of cloud deployment, distinctions be made between applications, data, and calculations that traditionally have been treated together as a system. Mr. Chattaway asked whether there is sufficient competition in the space, thus generating discussion on the question. And, Mr. Stein asked whether the subcommittee had considered some form of cloud service certification that would allow less sophisticated clients to rely on a vendor's certification. Ms. Neer and Mr. Vega indicated certification is an issue the subcommittee would consider.

Chairman Gorelick asked whether the subcommittee believes the current regulatory oversight requirements are insufficient for the risks and benefits of the cloud infrastructure. Mr. Vega responded in the negative. Ms. Neer answered that a principles-based approach is a good approach relative to a prescriptive approach. Mr. Magri requested that any type of guidance or regulation follow the architecture of the cybersecurity Profile.

When the round of questions was over, Chairman Gorelick introduced the members of the DLT and Market Infrastructure Subcommittee who would be presenting the final panel on the agenda, Ms. Hoffman-Childress, Mr. Cooper, and Mr. Drennan, as well as the guest speaker, Ms. Kruse from ISDA. Chairman Gorelick then announced a short break.

[Break]

V. Panel IV: DLT and Market Infrastructure Subcommittee Presentation & Special Presentation from ISDA

Following the break, Ms. Hoffman-Childress outlined the subcommittee's presentation. First, Ms. Hoffman-Childress would address the current state of blockchain. Second, Mr. Cooper would address DLT forward-looking technology. And third, Mr. Drennan would address real-world applications and next steps.

Ms. Hoffman-Childress' presentation made a number of observations about the current state of DLT technology (commonly known as blockchain), as well as reviewed its history. Her observations included the following: (1) by giving direct control back to the end-user, blockchain has the power to disrupt any industry that employs trusted third-party middlemen; (2) paradigm-shifting technological revolution involves a process of trial and error and blockchain is entering the trough of disillusionment cycle (down from the peak of inflated expectations) of the Hype Cycle for Emerging Technology (as shown on slide), meaning there will be marketplace ups and downs moving forward; (3) blockchain adoption is underway at varying degrees (ranging from awareness, experimenting, production, to not aware) across a multitude of industry segments (as shown on a slide); and (4) blockchain has tremendous promise within these representative industries.

Ms. Hoffman-Childress presented blockchain's history with a timeline slide depicting: (1) its conceptual origins in the 1990s through Satoshi Nakamoto's white paper in 2009 envisioning Bitcoin built on the blockchain concept; (2) its evolution to transaction use (*i.e.,* deployment of cryptocurrency in application related to cash and, later, current transfer in digital payment systems) in 2011-2013; (3) its evolution to contract use (*i.e.,* financial markets/applications use beyond cash transactions and, later, smart contracts) in 2013-2015; and (4) its evolution to application use (*i.e.,* permission blockchain network solutions and, later, large-sized market consolidation) in 2015-2017.

Mr. Cooper prefaced his remarks, noting that predictive comments should be taking with a grain of salt, a point reinforced by the irony that ten years after Satoshi Nakamoto's white paper, a manifesto against many of the institutions represented in the room, financial institutions, global companies, and federal governments were using and/or contemplating blockchain. He identified two rules of thumb for 2019: (1) this is already real, with R3, IBM, HSBC and others involved today in live-transaction volume occurring in different markets on the blockchain; (2) look to the things that are the most antiquated, broken, and reliant on legacy systems and processes in looking where blockchain technology is likely to be deployed next. He cited HQLAx, Tradewind, Finastra, and B3i as examples of what is happening in markets on R3's platform currently. Looking forward, Mr. Cooper expected the nascent deployment that is occurring now to reach scale in 2020-21; that large financial institutions, which are currently deploying blockchain solutions to handle transactions among their divisions, will continue to do so; and, looking more futuristically, that blockchain will converge with the other types of massively important and influential technologies out there, like AI machine learning and big data.

Mr. Drennan's presentation initially focused on three areas of real-world blockchain application. The three applications were as follows: smart contracting, trade reporting, and payment and delivery-vs-payment (DVP). To illustrate smart contract use (i.e., algorithmic, self-executing processes that can enable various types of value transfer between parties), Mr. Drennan described the example of DLT-based transaction data verification for credit-default swap exposure: the contract goes out, performs mark-to-market, calculates margin, and requests the margin exchange between protection buyer and seller. With respect to trade reporting, a slide explained that DLT systems help verify trades according to an agreed-upon set of domestic/international standards, creating an up-to-date ledger of trades for regulators and market participants. Mr. Drennan envisioned a move to "centralized contracts" as a way for firms to adopt trade reporting standards that have proven elusive for international standard-setters and upon which regulators could piggyback. Regarding payments, Mr. Drennan briefly described a number of digital payment initiatives: Ubin & Jasper, Universal Settlement Coin, JPM Coin, HSBC Everywhere, IBM Blockchain Worldwide, and IHS Markit Stax Payments. He noted that digital forms of payment could be extended to futures contracts DVP.

Mr. Drennan presented a slide listing next steps and recommendations, and solicited the TAC's advice with respect to those listed. These next steps/recommendations were as follows: (1) determine which aspects of derivative trading can benefit from DLT; (2) public and/or private pilots or small-scale testing of new technologies to transform markets; (3) industry coordination to facilitate understand of switching benefits, costs and barriers; (4) consideration of migration

and adoption patterns; (5) CFTC guidance on the application of current regulation to DLT (*e.g.,* can it support trade reporting regimes) and positive words on DLT adoption; (6) international coordination among regulators to create common standards for cross-border DLT uses (*e.g.,* in swaps); and (7) establish criteria for evaluating the impact of smart contract technologies on institutions' safety and soundness and systemic risk (*e.g.,* potential for reducing capital ratios by enhancing certainty of fund movement and product valuation).

Ms. Kruse gave a presentation on ISDA's Common Domain Model (CDM), a project intended to fill the need for a common blueprint for representing underlying transactions that tie back to the ISDA legal terminology that underpins those trades. She described CDM as a machine-readable and machine executable model for derivatives products, processes, and calculations. It is a code that can be downloaded in different languages and implemented directly, which could be thought of as the Google Translate for derivatives. Ms. Kruse stated that CDM uses a composable approach, *i.e.,* both the product and event model provide components from which more complex things are built, it features payouts, which are used to create objects when put together make products. CDM 2.0, the full version for interest rate and credit derivatives, is now open to all market participants under a free-use, open license. Ms. Kruse discussed the following CDM benefits: (1) it can enhance interoperability and straight through processing; (2) it can give regulators better oversight by promoting transparency and alignment between regulators and market participants; and (3) it can create an environment for innovation in financial markets. Before closing, Ms. Kruse previewed the next steps for CDM. She described a full model for data and processes within the collateral agreements, which can integrate CDM into ISDA Create and other collateral services, product scope expansions, further integration with technology providers working on financial market solutions, and implementation of reporting rules to demonstrate CDM's power to improve data quality and remove interpretation risk in regulatory implementations.

Chairman Gorelick opened the floor to questions and discussion, which included the following: (1) how the financial services industry could improve its rate of adoption of DLT technology; (2) how the Bernie Madoff fraud case would have played out differently in a DLT world; (3) the concern for potential new regulatory views on the outputs of smart contracts; (4) whether CDM can work across platforms other than DLT and open-source licensing issues; (5) DTCC's involvement with CDM; (6) how will the ISDA Master Agreement work operationally for contracting parties if some aspects of an arrangement are subject to a smart contract and some are not; and (7) how dispute resolution would occur with CDM.

VI. Closing Remarks

In closing, Chairman Gorelick, Mr. Gill, and each Commissioner thanked the panelists and TAC members for their participation and contribution to a very informative day. Commissioner Quintenz additionally characterized the information and thoughts elicited during the session as "remarkable" and affirmed the value of advisory committees to the Commission, before noting that much more work remains.

Mr. Gorfine adjourned the meeting at 3:13 p.m.

I hereby certify that the foregoing minutes are accurate.

Richard B. Gorelick

Richard Gorelick
Chair, Technology Advisory Committee

1/9/2020

Date