

**MINUTES OF THE MEETING OF THE
U.S. COMMODITY FUTURES TRADING COMMISSION'S
TECHNOLOGY ADVISORY COMMITTEE
FEBRUARY 14, 2018**

The Technology Advisory Committee (“TAC”) convened for a public meeting on Wednesday, February 14, 2018, at 10:00 a.m., at the U.S. Commodity Futures Trading Commission’s (“CFTC” or “Commission”) Headquarters Conference Center, located at Three Lafayette Centre, 1155 21st St., NW, Washington, DC. The meeting consisted of four panels and one special guest speaker. Panel 1 discussed blockchain and the potential application of distributed ledger technology (“DLT”) to the derivatives markets. Panel 2 discussed market and regulatory developments in virtual currencies and related futures products. Panel 3 discussed developments and challenges regarding automated trading (“AT”) technologies. Panel 4 discussed cybersecurity developments and best practices. The special guest speaker presented on “The Future of Machine Learning, Artificial Intelligence, and Computing Power.”

TAC Members in Attendance

Erik Barry, Head of Client Platform for Prime Derivative Services, Credit Suisse
Neal Brady, Chief Executive Officer, Eris Exchange
Christopher Chattaway, Managing Director, Goldman Sachs
Paul L. Chou, Chief Executive Officer and Co-Founder, Ledger X
Charles Cooper, Managing Director, R3
Peter J. Curley, Managing Director, Promontory Financial Group/IBM
Gary DeWaal, Special Counsel, Katten Muchin Rosenman LLP
Bryan Durkin, President, CME Group
Richard Gorelick, Head of Market Structure, DRW, Inc.
Christopher Hehmeyer, Managing Member, Hehmeyer Trading and Investments
Brenda Hoffman, Senior Vice President and Head of Nasdaq’s Global Technology U.S. Market Systems & Global Information Services
Mayur Kapani, Chief Technology Officer, ICE
Brian Knight, Senior Research Fellow, GMU Mercatus Center, Special Government Employee (SGE) for CFTC
Justin Llewellyn-Jones, Chief Operating Officer and Global Head of Derivatives, Fidessa
John Lothian, President and Chief Executive Officer, John J. Lothian Co.
Timothy McHenry, Vice President, Information Systems, NFA
Chuck Ocheret, Chief Innovation Officer, NEX Group
Jennifer Peve, Managing Director, Business Development and Co-Head, Office of FinTech Strategy, The Depository Trust & Clearing Corporation (DTCC).
Alexander Stein, Managing Director, Two Sigma
Larry Tabb, Founder and Chief Executive Officer, TABB Group
Supurna VedBrat, Global Head of Trading, BlackRock
Yesha Yadav, Professor of Law, Vanderbilt University, Special Government Employee (SGE) for CFTC

Invited Speakers and Panelists in Attendance

Jerry Brito, Executive Director, Coin Center

Tim Estes, President and Founder, Digital Reasoning
Phyllis Schneck, Managing Director and Global Leader of Cyber Solutions, Promontory
Financial Group/IBM

CFTC Commissioners and CFTC Staff Speakers in Attendance

J. Christopher Giancarlo, Chairman, CFTC

Brian Quintenz, CFTC Commissioner and TAC Sponsor

Rostin Behnam, CFTC Commissioner

Daniel Gorfine, Chief Innovation Officer and Director, LabCFTC, Financial Technology

(“FinTech”) Branch, Office of General Counsel, TAC Designated Federal Officer

Daniel J. Bucsa, Deputy Director, Data and Reporting Branch, Division of Market Oversight

Naeem Musa, Deputy Director, Policy and Planning Branch, Office of Data and Technology

Amir Zaidi, Director, Division of Market Oversight

I. Opening Remarks and Introduction to 2018 TAC Agenda and Scope

Mr. Daniel Gorfine, TAC DFO and Acting Chair, called the meeting to order, gave welcoming remarks, and introduced Chairman J. Christopher Giancarlo, Commissioner Brian D. Quintenz, and Commissioner Rostin Behnam, who all gave welcoming remarks.

Chairman Giancarlo acknowledged the Commission’s goal in ensuring that the efforts of the TAC and LabCFTC are mutually reinforcing. Commissioner Behnam supported TAC plans to address Regulation AT issues, such as pre-trade risk controls and cybersecurity. He also acknowledged support for the FY2019 budget request. Commissioner Quintenz, the TAC sponsor, remarked that the Commission should only pursue additional regulation after it has: (1) identified specific risks associated with automated trading; (2) examined how those risks are being addressed through the market's incentive structure; and (3) determined if regulation can play a proper role in alleviating those risks. Regarding cybersecurity, he expected the TAC to explore solutions to improve data transmission, storage, archival and disposal.

Mr. Gorfine responded that the 2018 TAC will pursue plans of action and make appropriate recommendations to the Commission. He then summarized the agenda for the meeting and recognized the contributions of CFTC staff.

II. Panel 1: Blockchain and the Potential Application of Distributed Ledger Technology (DLT) to the Derivatives Markets; Risk Surveillance Activities of the Commission’s Division of Clearing and Risk

Jennifer Peve presented first and mapped out the landscape for DLT implementation. She discussed the trade information warehouse (“TIW”), a repository which provides life cycle event processing services for approximately 98 percent of all credit derivative transactions in the global marketplace, and DTCC’s decision to restructure the TIW using a combination of cloud and distributed ledger. She explained that the initial phase of DTCC’s implementation plan has been focused on two key objectives: first, to minimize the impact on market participants and second, to minimize any potential for operational risk by ensuring the solution’s quality control. She also identified three main components of distributed ledger architecture: data, privacy and sharing, and other items for consideration such as governance model, interoperability, scalability

and performance. Ms. Peve stated that the development of common standards and protocols required to support “rearchitected” practices and processes is critical when implementing DLT, and concluded that significant industry commitment is required to realize the potential of distributed ledger.

Charles Cooper then discussed the effect of rapid technological innovation and the assumption that technology evolves at all levels as rapidly as personal smartphones. He stated that large scale, enterprise grade overhauls of the way systems and processes work in not just financial services, but in all sorts of business that blockchain could be applied to, do not change that quickly. He also stated that the implications of blockchain technology for financial services are massive and go to the heart of how capital markets operate. He further stated that we are now at a point where real applications are going to be put in the market. He then argued that appropriately built and deployed blockchain technology could make the Commission a more effective regulator. He also encouraged U.S. regulators to engage with blockchain innovators, since he felt foreign regulators have outpaced the U.S. in FinTech innovation.

Finally, Daniel Bucsa discussed how the CFTC might become more technically current by making an effort to evaluate the costs and benefits of DLT. He identified three significant advantages that DLT regulation could offer: (1) better regulation through increased functionality, by incorporating Commission access into distributed ledgers of reporting parties; (2) sharing of data and greater access through DLT, which could transcend fragmentation and avoid duplicative regulatory efforts; and (3) reporting via blockchain. Mr. Bucsa, however, highlighted some unknowns that need to be resolved before regulatory reporting via DLT can be a viable goal: (i) standards and interoperability; (ii) the CFTC’s implementation resources; and (iii) whether DLT will be attractive to all entities with reporting obligations.

Following the presentations, committee members discussed a range of topics related to the panelist presentations. Chuck Ocheret noted that in order to promote transparency it would be important to demonstrate that a system has a proof of existence and is non-repudiable. He explained these concepts by stating that once a result is published to the outside world, the publisher should be able to prove this publication, that this result should not be able to be recalled, and the market should feel assured that this result has never been tampered with.

Regarding the role of regulators in participating with industry groups, Brian Knight cautioned that there should be a level-playing field and certain market actors should not be favored over others. He further offered that while regulator engagement with emerging technologies may be worthwhile, it would be important to do so in a fair and transparent manner.

Regarding the role of DLT in derivatives markets, Yesha Yadav sought to expand discussion regarding how DLT could impact clearing house models, including settlement and counterparty risks, as well as regulatory reporting. Ms. Peve responded by noting current challenges with scaling DLT, but also suggested it might help to mitigate settlement and counterparty risks. She concluded by noting that the industry was likely some time away from broad implementation of DLT clearing and settlement solutions.

Bryan Durkin emphasized the need for data standardization and harmonization in DLT systems and suggested that the TAC could further explore DLT through a subcommittee.

Following the discussion, Mr. Gorfine then made a motion for the Committee to recommend to the Commission that the Commission consider creating a subcommittee on DLT. The motion was seconded and passed without opposition or abstention.

III. Panel 2: Market and Regulatory Developments with Virtual Currencies and Related Futures Products

Mr. Brito presented first and updated the audience on cryptocurrency technology and public policy developments since the first public meeting held on this subject, in 2015, under the auspices of the Global Markets Advisory Committee. He affirmed the proliferation of new cryptocurrency networks and tokens--there are now over 1500 cryptocurrency networks and tokens tracked by Coin Market Map. He explained that while some are essentially copies of Bitcoin with few differences to distinguish them, others are remarkable platforms, such as Ethereum. He then discussed a second set of new cryptocurrency networks like Zcash, Monero and Dash, which aim to improve Bitcoin's design by adding privacy protecting features. Mr. Brito also mentioned J.P. Morgan's Quorum, an enterprise-focused, closed blockchain solution looking to incorporate technology from Zcash to keep transactions confidential to the involved parties, but verifiable to the larger network. He then identified scalability as a major technical challenge for developers. He suggested that employing second-layer solutions like the Lightning Network or the Roping Network on Ethereum could potentially facilitate massive scaling in supporting secure, off-chain transactions.

Regarding public policy, Mr. Brito stated that the top issues facing cryptocurrencies are consumer protection, securities regulation, tax policy and anti-money laundering regulation. To date, consumer protection has been addressed mainly via state-by-state money transmission licensing, which he deemed inefficient and burdensome, and he noted that the law does not reach custodial questions as applied to cryptocurrency networks. He further observed that state-by-state money transmission licensing currently has no provision for market supervision of exchanges. He then addressed the application of securities laws to cryptocurrencies, the distinction between cryptocurrencies as commodities and tokens as securities, and FinCen's 2013 Virtual Currency Guidance. Finally, Mr. Brito discussed the IRS guidance which treats cryptocurrencies, such as Bitcoin, as property for tax purposes, and legislative efforts to create a *de minimis* exemption for personal cryptocurrency transactions.

Gary DeWaal presented next beginning with a brief history of the commodity options markets and how they were initially considered very problematic and were banned. In the present day, commodity options are generally thought of as solutions rather than problems. Mr. DeWaal also cautioned that newer state proposals to regulate virtual currency might be in addition to rather than replacing the application of money transmission laws to virtual currency. He also discussed the commencement of state securities law enforcement actions against unregistered ICOs. He then followed with a discussion of the applications of the Howey test to common things, such as Teslas. He suggested that the TAC could help clarify the distinction between a commodity and a security and move the regulatory discussion along.

Richard Gorelick gave a presentation on the cash and futures markets for cryptoassets. According to Mr. Gorelick, since algorithmic trading has yet to become a dominant market

feature, OTC trading is still important. He asserted, however, that the launching, by major exchanges, of cryptoasset-based futures contracts has demonstrated the overall maturity of the business as an asset class. He cautioned that challenges remain with settlement mechanisms, but physical settlement could allay some concerns. Finally, Mr. Gorelick called for greater regulatory clarity and cooperation, suggesting that the US adopt a smart principles-based framework.

Amir Zaidi presented on the Commission's recent proposed interpretation on the "actual delivery" exception--which emphasizes possession and control--that may apply to virtual currency transactions.

Before turning to the TAC members for discussion, Mr. Gorfine asked Mr. Durkin and Paul L. Chou to discuss recent updates regarding bitcoin futures and options at their exchanges. Mr. Durkin highlighted the strength of CME's successful Bitcoin reference rate in connection with the establishment of CME's Bitcoin futures contract, its trading and performance. Mr. Chou outlined the advantages of digital currency as a collateral instrument. He also described the effect of "hard forks" on Bitcoin and their risks to clearinghouses. In conclusion, Mr. Chou expressed the view that the TAC is uniquely suited to establish best practices and industry standards.

Mr. Gorfine opened the discussion for comments from TAC members, who then raised issues including, among others, issues related to custody, collateral, volatility risks and mining concentration. Mr. Curley commented that custody and accounting standards for crypto assets is fundamental to consumer protection and functioning markets and could merit some attention by the TAC. The TAC could consider what custody means for the various types of assets. Mr. Brito suggested that the TAC consider the actual delivery question in assessing what constitutes custody. He also recommended that the TAC take a look at the Uniform Law Commission's Virtual Currency Business Regulations Act because the licensing scheme turns on custody and what is defined as control under that Act. Along these lines, Brian Knight recommended that the TAC consider a working group to look at regulatory rationalization.

With regards to collateral, Ms. Yadev stated the TAC should keep in mind that currently some of the assets from a default fund are commingled with existing contracts. The TAC should consider whether to segregate and/or add more collateral if Bitcoin assets were added to the mix. With regards to volatility, she asked the TAC to consider how clearinghouses dealing with Bitcoin assets can protect themselves against the costs and potential of volatility. She questioned whether exchanges and clearinghouses need new tools, ways of thinking, and models to address these risks. Supurna VedBrat further questioned more generally the safety of the comingling and segregated models for collateral for Bitcoin and Bitcoin futures.

With regards to mining risks, Timothy McHenry asked whether there was any concern about the concentration in the mining function. Mr. Brito agreed that mining was an issue and that he thought that over time mining concentration would diffuse naturally. He cited to the race around the globe to find efficient sources of energy as one example. He also stated that the industry is building the technology to recognize and address this risk.

Following this discussion, Mr. Gorfine made a motion for the Committee to recommend to the Commission that the Commission consider creating a subcommittee on virtual currencies. The motion was seconded and approved without opposition or abstention. (Lunch Break)

IV. Presentation: The Future of Machine Learning, Artificial Intelligence, and Computing Power

Mr. Gorfine called the meeting back to order.

Tim Estes gave a presentation on the future of machine learning, artificial intelligence, and computing power. He explained that technology could be made to perceive very subtle indicators of intent in interbank communications to preempt certain risks from occurring, and taught to process language on a huge scale to capture certain kinds of conduct. He, however, acknowledged the difficulty of developing a curriculum to educate machines on highly sensitive and protected data.

Following his presentation, Mr. Estes responded to questions from TAC members. He commented that currently AI can be effectively employed in triage but betting on building large expert systems could prove disappointing. He was nevertheless optimistic about the increased sharing of sensitive data among market participants.

V. Panel 3: Developments and Challenges with Automated Trading Technologies

Next, Mr. Gorfine introduced the third panel. Larry Tabb presented first and identified three types of algorithmic trading: alpha generating algos, quantitative strategies, and execution algos. Comparing equities and futures, he stated that when equity market liquidity becomes fragmented, tick size, speed and queue positioning are all important factors, but less so on the futures side. In his view, instead of choosing winners and losers, regulators should create a level playing field based on transparency, fairness, systematic risk and clearing.

Mr. Durkin presented next and lauded the efforts of the TAC and the Commission in principles-based guidance on technology. He said that automated trading has contributed to significant volume and growth across all asset classes in providing greater liquidity and tighter spreads, explaining that all types of market participants rely upon this liquidity to achieve risk management and investment objectives at a lower cost. He also stated that algorithmic traders active on CME Group markets contribute substantial liquidity by providing continuous markets in CME's products, and also reminded the audience of the key role played by proprietary trading firms in providing liquidity and price discovery during the October 15, 2014 U.S. Treasury market flash rally.

Ms. Yadav discussed disruptive incidents such as the August 1, 2012 occurrence involving Knight Capital, and various "flash crashes" or loss of liquidity events. She raised the concern that current liability standards are poorly designed when dealing with the risk created by high-speed, highly automated trading, since errors, misfires, and disruption can amplify as they move through the various markets in an interconnected system. She contended the strict liability standard could become onerous since traders are not fortified with system safeguards against

every possible eventuality. Similarly, with respect to negligence, minor glitches, if anticipated but not sufficiently safeguarded, could still cause serious, unforeseen harm. She suggested a modification to the reasonableness standard to address the kinds of harms faced by participants in today's marketplace.

Mr. Gorfine thanked the panel and opened the discussion for questions and comments. TAC members raised issues, including, among others, those related to fairness and the speed of execution algorithms versus proprietary algorithms. For example, Mr. Curley asked Mr. Tabb about execution algorithms being typically slower than proprietary algorithms, whether in futures markets there is more of a single queue rather than a multi-queue dynamic, and whether it really results in a form of structural disadvantage for parties using execution algorithms. Mr. Tabb responded that it could be less impactful on the futures side than the equities side, but it is hard to say whether this means poor outcomes for customer orders. He also stated that it is really important to have a better mechanism to measure and benchmark execution speeds, because then one would have a better idea of fairness. Christopher Hehmeyer addressed the difficulty of drawing the line between what is automated trading and what is not and how challenging it is to write rules that are not over-inclusive. He said the exchanges have done a good job of working through the complexities.

Based on the discussions, Mr. Gorfine then made a motion for the Committee to recommend to the Commission that the Commission consider creating a subcommittee on automated trading. The motion was seconded and passed without opposition or abstention.

Finally, Chairman Giancarlo gave his closing remarks as he needed to leave before the fourth panel. He discussed the ongoing battle that regulators, SROs, and "good players" must wage against bad actors, and closed his remarks with thanks to all.

(Break)

VI. Panel 4: Cybersecurity Developments and Best Practices

Mr. Gorfine called the TAC meeting back to order and introduced the final panel. Naeem Musa presented first and discussed the Commission's staunch commitment to cybersecurity and sought the TAC's advice for effective collaboration on cybersecurity challenges.

Phyllis Schneck presented next and identified a progression of roles in the current threat landscape: compliance, security and resilience. Stating that the focus should be on detection and institutional resilience, she recommended information sharing among regulators and industry participants during the early stages of a cyber threat. Ms. Schneck also discussed quantum computing and its potential to outpace blockchain. She considered tracking as the best use of a blockchain ledger.

Following the presentations, Mr. Gorfine asked TAC members if they had any comments on cybersecurity or emerging best practices on which the TAC could take action. Mr. Ocheret observed that no one security measure works alone, and multiple layers of security are necessary. Erik Barry responded that the attention should be on data custody, access and anonymization methods. He recommended that the TAC form a subcommittee to address these concerns.

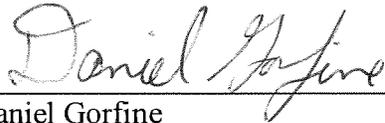
Given the discussions, Mr. Gorfine made a motion for the Committee to recommend to the Commission that it consider creating a subcommittee on cybersecurity. The motion was seconded and passed without opposition or abstention.

VII. Closing Remarks

In closing remarks, Commissioner Benham reminded attendees that market integrity takes priority even in innovation. He highlighted the importance of consensus on some baseline principles for the industry. Commissioner Quintenz reaffirmed the Commission's view that technology is a bipartisan issue and spoke encouragingly of the work that lies ahead. Commissioner Benham and Commissioner Quintenz thanked the participants and CFTC staff.

Mr. Gorfine adjourned the meeting at 3:58 p.m.

I hereby certify that the foregoing minutes are accurate.



Daniel Gorfine
Acting Chair and Designated Federal Office,
Technology Advisory Committee

12-10-18

Date