FINANCIAL INFORMATION FORUM

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July 18, 2016

Brent Fields, Secretary
Securities and Exchange Commission
100 F Street, NE,
Washington, DC 20549-1090

Re: SEC Release No. 34-77724; File No. 4-698; Consolidated Audit Trail National Market System Plan

Dear Mr. Fields,

The Financial Information Forum ("FIF")[1] on behalf of our Consolidated Audit Trail ("CAT") Working Group ("FIF CAT WG") would like to take this opportunity to comment on the SEC filing of the Consolidated Audit Trail National Market System ("NMS") Plan, filed on April 27, 2016, which incorporates the Clean Version of 12/23/15 Amended and Restated CAT NMS Plan ("CAT NMS Plan" or "Plan")[2]. Over the past 4 years, the FIF CAT WG has been actively reviewing and commenting on the body of documents published in development of the CAT NMS Plan. And, as a member of the CAT Development Advisory Group ("DAG"), FIF has responded to numerous requests by the Plan Participants ("Participants", a.k.a Self Regulatory Organizations or "SROs") for research, cost studies or additional information to better inform Plan Participants of the industry perspective and particular challenges presented by the CAT NMS Plan.[3] Consistent with FIF's focus on implementation issues, FIF CAT WG comments are specifically drawn from a practical, technical and operations implementation perspective.

1.0 Executive Summary

FIF CAT WG supports Regulation NMS's Rule 613 requiring the creation, implementation, and maintenance of a consolidated audit trail, and its goal of improving the ability of the SROs and the Commission to oversee the securities markets. Better oversight will lead to greater confidence in the markets that will benefit all stakeholders. Rule 613 also provides additional benefits to the FIF membership because it will enable elimination of a variety of regulatory reporting systems as they are replaced with the comprehensive CAT system.

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[1] FIF (www.fif.com) was formed in 1996 to provide a centralized source of information on the implementation issues that impact the financial technology industry across the order lifecycle. Our participants include trading and back office service bureaus, broker-dealers, market data vendors and exchanges. Through topic-oriented working groups, FIF participants focus on critical issues and productive solutions to technology developments, regulatory initiatives, and other industry changes.

[2] SEC Release No. 34-77724; File No. 4-698; April 27, 2016

[3] See Appendix 1 for a complete list of documents submitted to the SROs and/or the SEC.

Since FIF's involvement when Rule 613 was approved in 2012, and throughout the evolution of the CAT NMS Plan, FIF has fostered a collaborative partnership with the SROs to help them draft a plan that takes into account industry costs and implementation impacts while meeting Rule 613's objectives. It should be noted that many of the issues and concerns included in this comment letter have already been identified, documented and provided to the SROs over the last few years in the form of white papers, survey results and cost estimates, to assist the SROs in the formation of a CAT NMS Plan.

FIF CAT WG is appreciative of the SEC approval of exemptions to certain provisions of Rule 613 ("Exemptive Relief")[4], which allowed certain changes to be incorporated into the CAT NMS Plan based on the feedback provided by FIF CAT WG, the DAG and other industry participants. The SROs' exemptive relief requests ("Exemptive Relief Request")[5], which include six critical changes to the CAT NMS Plan requested by the industry, are an excellent example of a collaborative work effort between the industry members of the DAG and the SROs to identify and quantify (where possible) the issues, and to define constructive solutions that meet regulatory requirements while addressing industry structural issues and cost concerns. FIF CAT WG fully supports all aspects of the Exemptive Relief, except for the requirement to specify Customer Identifying Information on order origination, which is discussed in Section 3 of this document. Other examples of aspects of the CAT NMS Plan that reflect industry input are specifying 50 millisecond ("ms") clock offset and reporting clock synchronization events based on "pattern and practice" standards.[6]

FIF CAT WG is disappointed that many of the points reiterated in this letter were not resolved during the development of the amended CAT NMS Plan, prior to publication, especially relating to duplicative regulatory reporting systems Retirement Plans and Implementation Milestones. Overall, it is important to note that the CAT NMS Plan lacks details about the interface and functionality to be provided which are needed for the industry to determine the adequacy of the CAT system and the complete technical and economic impact of implementing the CAT NMS Plan. Unfortunately, this will not be possible until a Technical Specification is available for review by the industry. Therefore, FIF CAT WG is unable to completely provide the level of specificity in certain of our comments that the Commission may be seeking at this time.

1.1 Summary of Recommendations

FIF CAT WG's summary of recommendations address the most critical issues identified with the CAT NMS Plan and represent the most costly and risky aspects of the Plan from the perspective of FIF CAT WG. Details of these recommendations and the underlying issues which cause concern for FIF CAT WG, as well as suggested changes which facilitate implementation of these recommendations, are discussed in the Appendices of this document.

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[4] SEC (Release No. 34-77265), Order Granting Exemptions from Certain Provisions of Rule 613 Pursuant to Section 36(a)(1) of Securities Exchange Act of 1934, March 1, 2016.

[5] Letter from Robert Colby, FINRA, on behalf of the SROs, to Brent Fields, Request for Exemptive Relief from Certain Provisions of SEC Rule 613 of Regulation NMS under Securities Exchange Act of 1934, January 30, 2015 ("Exemptive Relief Letter"); SROs Letter from Robert Colby, FINRA, on behalf of the SROs, to Brent Fields, Supplement #1 to Exemptive Request Letter – April 2015 Supplement, April 3, 2015 ("Linking Executions to Allocations and Allocation examples"; SROs Letter to Brent Fields, Supplement #2 – September 2015 Supplement, September 2, 2015 ("Account Effective Date").

[6] CAT NMS Plan, Article VI, Section 6.8, Timestamps and Synchronization of Business Clocks.

- **Duplicative Reporting/Retirement of Existing Systems** – Once CAT reporters achieve satisfactory CAT reporting data quality, broker-dealers should be exempt from reporting to duplicative systems. The CAT NMS Plan should define the term Retirement Error Rate[7] to be used as the basis for the exemption such that firms that achieve the Retirement Error Rate are no longer required report to existing systems. The launch of CAT should be tied to retirement of duplicative systems, or elimination of duplicative reporting as an interim step to retirement, within a defined Trial Period of no more than 6 months.
- **Implementation Milestones** – Implementation milestones should be established after the Technical Specifications are published, and the activities and timeframes should be based on "best practices" for specification reviews, testing and risk mitigation.
- **Error Rates** – The Maximum Error Rate and the Retirement Error Rates (for each duplicative system) should reflect the quality of post-correction data.[8]
- **Error Correction Timeframe** – Current OATS 5-day correction timeframe should be used until CAT System and CAT Reporters can demonstrate that a shortened error correction timeframe is achievable.
- **Customer Identifying Information** – Customer Identifying Information including account information should be supplied to CAT via a customer definition process and cross-referenced by the Central Repository via Firm Designated ID for analysis purposes.
- **Open/Close Indicator** – The Open/Close Indicator on Material Terms of the Order should only be required for Options, not Equities.
- **Time on Allocation Report** – Time stamp should be removed as a required element from the Allocation Report.
- **Access to CAT Data** – CAT Reporters should have access to their own data stored in CAT for error correction and other purposes.
- **Clock Synchronization** – The current CAT NMS Plan requirement for millisecond level time stamps and 50 millisecond clock offsets for electronic order events should be maintained. The Plan should be changed to reduce costs for managing clock synchronization and ensure fairness and sequence accuracy.

Other areas that are important to FIF CAT WG and are discussed in this comment letter include the role and composition of the Advisory Committee, the definition of "Material Amendment" and Security and Confidentiality.

Of the above recommendations, the most important priority of FIF CAT WG is the expeditious elimination of duplicative reporting obligations and rapid transition to CAT as the "consolidated" single regulatory reporting source. FIF CAT WG recognizes that for the Participants to rely on CAT as their data source for surveillance and reviews, high quality, comprehensive data is required. FIF CAT WG believes both the Participants' goals for reliable data, and other industry members' goals of managing costs, can be met. We offer a number of recommendations which can significantly reduce the duplicative reporting burden on the industry while ensuring the data quality, accuracy and timeliness required by the regulators to support continuous and enhanced surveillance of the marketplace.

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[7] See Section 2.1 for more details.

[8] Error rates should be determined via measurements initially during the Industry Test, and verified during the Trial Period, when the CAT System and the CAT Reporter data quality rates can be measured and a projection made as to what rates are both achievable and will result in high quality reporting.

1.2 Summary of Issues

FIF CAT WG has significant concerns with the CAT NMS Plan, the most critical of which are highlighted below:

- Lack of an aggressive, detailed and committed Retirement Plan of Duplicative Regulatory Reporting Systems, which will result in excessive costs for CAT Reporters due to the management of duplicative reporting over an extended period of time.[9]
- An unrealistic and incomplete set of milestones does not contain sufficient testing time for the industry, lacks two iterative review cycles for technical specifications, and does not include risk mitigating strategies and approaches, thus exposing the industry to unnecessary risk.
- An ambitious error rate and error correction timeframe are prescribed without the corresponding information to justify those targets and little or no specificity on what tools and support are required to be provided by the Plan Processor to enable the industry to achieve the targets. This will cause unnecessary costs on CAT Reporters to perform cumbersome and time-consuming repairs and result in poor data quality.
- Inability of CAT Reporters and Submitters to have bulk access to their data in CAT.
- Addition of time stamp on CAT Allocation Report introduces a significant new unanticipated[10] cost to the CAT Reporter. FIF WG believes this information is costly to provide and will not provide the regulatory benefits expected.[11]
- The requirement to specify Customer identifying information on original order remains in the Plan, which is contradictory[12] to the Customer Information Approach Exemptive Relief Request.[13]
- The requirement to specify an Open/Close indicator on Material Terms of the Order for equities on the CAT Order Report is data that is not captured today and represents a change to current industry processes that is significant enough to require new, separate rule-making along with industry comment, prior to implementation.

Issues and concerns with other topics of importance to FIF CAT WG are included in this comment letter with additional detail in the Appendices.

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[9] "Based on data provided in the Plan, the Commission believes that the period of duplicative reporting anticipated by the Participants is likely to last for 2 to 2.5 years."; SEC Release No. 34-77724; File No. 4-698 (p. 473)

[10] Cost surveys and other estimates previously provided did not anticipate the inclusion of a timestamp on the Allocation record.

[11] "Allocation time at the subaccount level is critical for determining whether some customers are systematically given more favorable allocation treatment than others. For example, when a broker-dealer places an order or series of orders for multiple customer accounts that generates multiple executions at multiple prices, it is possible that different customers receive different prices in the allocation process. However, if some customers systematically receive less favorable prices than others when they should be receiving the same prices for their executions, this could indicate that the broker-dealer is handling allocations improperly."; SEC Release No. 34-77724; File No. 4-698 (p. 239)

[12] "Also, SEC Rule 613(c)(7)(viii) requires that, for original receipt or origination of an order, CAT Reporters report "customer account information," which is defined as including "account number, account type, customer type, date account opened, and large trader identifier (if applicable)."; CAT NMS Plan, Appendix A.1.a.iii

[13] "Under the Customer Information Approach, broker-dealers would be required to report only the Firm Designated ID for each new order submitted to the Central Repository, rather than the "Customer-ID" as defined by Rule 613(c)(j)(5) and as required by Rule 613(c)(7)(i)(A), and the Plan Processor would associate specific Customers and their Customer-IDs with individual order events based on the reported Firm Designated IDs."; SEC Release No. 34-77724; File No. 4-698 (p. 128)

Together these issues represent serious risk to the implementation of CAT, added cost and unnecessary potential disruption to the industry as a whole. Without sufficient adjustment to the CAT NMS Plan to address these issues, the effectiveness and success of the Plan will be jeopardized.

1.3 Document Outline

This comment letter highlights key recommendations which address FIF CAT WG's issues and concerns with the CAT NMS Plan. Generally, the following topics are covered in sections outlined below with details provided in corresponding Appendices:

- Section 2 - requirements for the use of CAT to support regulatory reporting activities, including recommendations related to Duplicative Reporting and Retirement of Existing Systems, Implementation Schedule, Error Rates and Correction Timetables, and Bulk Access to CAT data
- Section 3 – support for the Exemptive Relief, with concern for requirement to specify Customer Identifying Information on the initial CAT Order Report
- Section 4 – specific CAT Data Element requirements, with concern for the requirement to specify Open/Close Indicator for equities and time stamp on CAT Allocation Report
- Section 5 – comments on alternatives highlighted by the Commission in the April 27, 2016 filing of the CAT NMS Plan, particularly Primary Market Transactions and clock synchronization
- Section 6 – Production/Test Infrastructure and Customer Support recommendations
- Section 7 – comments on Governance, where there are potential impacts to implementation

The Appendices explore in detail the issues identified by FIF CAT WG and provide a more complete description of our recommendations to address the issues. Responses are also provided to particular SEC questions pertaining to topics important to FIF CAT WG.

2.0 Transition to CAT for Regulatory Reporting Activities

2.1 Duplicative Reporting/Retirement of Existing Systems

Elimination of duplicative reporting is the highest priority for the FIF CAT WG because the costs and burdens to implement CAT are significantly increased if duplicative reporting is necessary for an extended period of time. Following the proposed CAT NMS Plan timelines, "the Commission preliminarily believes that the period of duplicative reporting could last at least 2 years and the period of system retirement could extend for up to 2.5 years after Industry Members begin reporting data."[14] FIF CAT WG recommends the following modifications to the CAT NMS Plan to reduce the period of duplicative reporting and accelerate the retirement of existing systems:

1. **Establish a Retirement Error Rate in the CAT NMS Plan**: The Retirement Error Rate would be defined as the acceptable error rate for discontinuing reporting to a duplicative system. The Retirement Error Rate calculation should be based only on "comparable" data in CAT. For example, OATS equivalent data reported to CAT should meet the reporting and quality criteria required by FINRA specifically for OATS reporting. Given that CAT introduces new data elements outside the scope of existing systems, higher error rates associated with these data elements should not prevent discontinuation of duplicative reporting to existing systems. Additionally, the Retirement Error Rate should be based on error rates associated with corrected data.

[14] SEC Release No. 34-77724; File No. 4-698; Section IV.F.2 (pp. 473-476)

Establishing a Retirement Error Rate in the CAT NMS Plan creates objective criteria for discontinuing duplicative reporting and the eventual retirement of existing systems. We believe that SRO rule filings should reference the Retirement Error Rate and allow individual firms to discontinue duplicative reporting once the Retirement Error Rate is achieved. The Retirement Error Rate should also be calculated at the industry level, and with the Trial Period discussed below, set the timeline for full retirement of existing systems.

2. **Establish a Trial Period**: Rather than allowing the CAT NMS Plan to provide an open-ended timeframe for the retirement of existing systems, the CAT NMS Plan should be modified to include a Trial Period of no more than six months after which duplicative systems are retired or firms are exempted from duplicative reporting if they have met the Retirement Error Rate. This Trial Period could be shortened if the industry meets the Retirement Error Rate sooner. During the Trial Period the CAT NMS Plan should clarify that there is only one audit trail of record for firms.

3. **Accelerate SRO and SEC Milestones Associated with the Retirement of Existing Systems**: The SROs and SEC should provide the CAT Processor with their requirements prior to the creation of draft technical specifications. This will ensure that CAT is designed to provide all the functionality of existing systems with the initial implementation of CAT.

   Additionally, the process for SRO and SEC rulemaking should begin upon publication of the final technical specification of the CAT Processor. There is no need to wait for full implementation of the CAT to begin this process once the functionality of the Central Repository has been defined.

   Finally, Rule 613(f) "requires that each SRO develop and implement a surveillance system, or enhance existing surveillance systems, reasonably designed to make use of the consolidated information contained in the consolidated audit trail."[15] We do not believe that the SROs have adequately incorporated the 14-month milestone associated with this requirement into their milestones for the retirement of existing systems. If the SROs are prepared to use CAT data after 14 months, there should be no obstacles to retiring existing systems once the Retirement Error Rates are met. If Rule 613(f) is insufficient to obligate the SROs to use CAT data in place of existing systems, we recommend a new milestone be created such that by the end of the Trial Period, the SROs must use CAT data in place of existing systems.

We believe that the recommendations offered above provide incentives for both regulators and CAT Reporters to achieve the fastest adoption of CAT as the source of quality data for purposes of surveillance and analysis. FIF CAT WG respectfully suggests that this approach be seriously considered and ultimately adopted within the CAT NMS Plan. It supports the more aggressive adoption of CAT as the regulatory reporting system of record – a goal the Commission, the Participants and Industry members should all have in common - while providing relief to the industry from the burden and cost of duplicative reporting.

2.2 CAT Implementation Milestones

FIF CAT WG has the following feedback regarding the Milestones included in the CAT NMS Plan. These recommended adjustments to the Plan would ensure both delivery of a high-quality CAT system and a cost efficient and seamless industry production roll-out.

[15] Rule 613 Adopting Release (17 CFR 242.613) at p.250

Following are key recommendations for improving the CAT implementation to better address industry requirements and to minimize risk to the industry:

1. **FIF CAT WG strongly recommends that an implementation schedule be established only after publication of the Industry CAT Reporter Technical Specifications.** A detailed implementation plan should be defined after the Technical Specification has been published and can be more effectively assessed by the Plan Processor, Plan Participants and Industry Members. Through collaboration, a reasonable, achievable and less risky plan can be established to develop and thoroughly test the new system and industry interfaces, with delivery dates based on these assessments. (See Appendix 2.2.1)

2. **Adjust individual milestones for Industry CAT Reporter Technical Specifications and Test Phases to allow more time for iterative specification reviews and testing**. Without reflecting these "best practices" process changes in the Plan, we believe the CAT NMS Plan milestones present extremely high risk for schedule slippages, added industry cost to accommodate late changes and reduced quality in CAT deliverables. Sufficient time for analysis and testing, including a Trial Period will increase the quality of CAT data and reduce risk for the industry. We cannot support the CAT NMS Plan Implementation Milestones as proposed due to these concerns. This is discussed in more detail in Appendix 2.2.2.

3. **Consider Risk Mitigation Strategies**, including changes in the grouping and phase-in of Industry CAT Reporters, or, staging of functionality. Discussion follows in Appendix 2.2.2.6.

The issues associated with the CAT NMS Plan Implementation Milestones, the detailed recommendations to address these issues and an example of how these recommendations can be incorporated into a more realistic framework are discussed fully in Appendix 2.2.

As discussed earlier, FIF CAT WG proposes an industry-wide "Trial Period"[16], which would be initiated upon satisfactory completion of extensive testing of all CAT systems. The Trial Period would require CAT System functionality for Industry Member reporting to be promoted to the CAT production environment[17] and would support the full industry-wide environment needed to verify CAT reporting quality and regulators' duplicative reporting systems' readiness to use CAT. During this Trial Period, which should not exceed six months, firms would continue to report to existing regulatory reporting systems as well as CAT, and corrections would need to be applied to both reporting systems.

Summarizing the above points on Elimination of Duplicative Systems/Retirement Plan and Implementation Milestones, Figure 1 shows the key milestones (indicated in green) and their relative dependencies leading to the successful implementation of CAT. At least two "Groups" are expected to "Go-Live", assuming some reasonable grouping is defined for a phased approach to implementation.[18] The boxes in blue refer to events specifically being undertaken by the Plan Processor with the business units of the Plan Participants.

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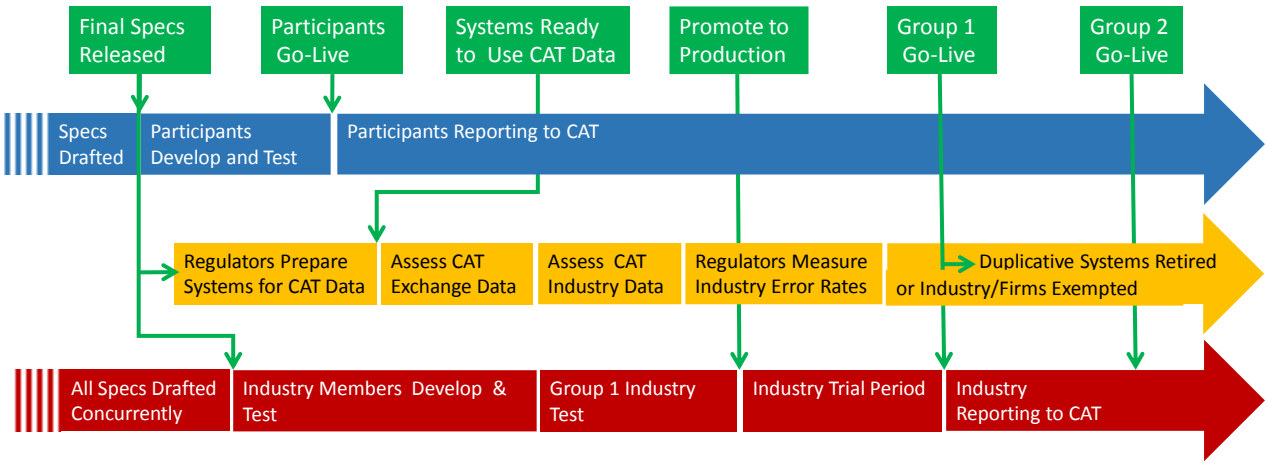
[16] The Trial Period should not exceed six months during which all Participants and the first group of Industry Reporters will operate in the production environment to determine the readiness of the owners of duplicative reporting systems to consume CAT data for regulatory purposes, and the ability of CAT Reporters and the Plan Processor to submit and maintain quality data.

[17] It is assumed functionality to support Plan Participants is already in full production.

[18] See Appendix Section 2.1.2.5, page 40 for FIF CAT WG recommendations related to grouping industry members.

The boxes in yellow refer to events specifically being undertaken by the Plan Processor with the Self-Regulatory units of the Plan Participants. The boxes in red refer to events being undertaken by the Plan Processor with other Industry Members.

Figure 1.
FIF Recommendations for Implementation and Elimination of Duplicative Reporting



As the Figure 1 illustrates, to ensure the success of the CAT deployment, FIF CAT WG recommends that all technical specifications be drafted concurrently. The SROs must prepare to use CAT data and begin to assess its quality early in the process, in order to be ready to exempt firms from duplicative reporting and retire duplicative systems as soon as possible.

2.3 Error Processing

FIF CAT WG understands and respects the regulatory requirement to have accurate data available to the regulators as soon as possible to fulfill market surveillance and market reconstruction responsibilities. However, we have concerns that the expectations for the CAT NMS Plan's calculation of error rates upon initial submission and reduced error correction timeframes may compromise the goal of accuracy and quality of CAT data, particularly in the absence of any specificity on error identification, error correction, test and validation tools and error correction tool suites to be made available to CAT Reporters.

2.3.1 Summary Recommendations Regarding Error Rates

Following are FIF CAT WG recommendations regarding CAT Error Rates. The underlying issues and detailed recommendations are discussed further in Appendix 2.3.

- The Maximum Error Rate at the industry level will be used in assessing an individual firm's reporting quality for purposes of compliance. It should be calculated daily using rolling averages to minimize anomalies and industry-wide problems.
- Post correction data, not initial submission data, should be used in calculating the Maximum Error Rate and the Retirement Error Rate.
- Error rates should be determined via measurements initially during the Industry Test, and verified during the Trial Period, when the CAT System and the CAT Reporter data quality rates can be measured and a projection made as to what rates are both achievable and will result in high quality

reporting. The Maximum Error Rate may be reassessed after the first year of reporting, and measurements should be based on a full year of production data.

2.3.2 Summary Recommendations Regarding Error Correction Timeframes

Following are FIF CAT WG recommendations regarding CAT Error Correction Timeframes. These recommendations and underlying issues are discussed further in Appendix 2.3.2.

- The current OATS 5-day error correction cycle should be retained until the CAT Reporters have been provided with a sufficiently rich test and error correction tool set, have become experienced with CAT reporting and it has been proven that the CAT system and CAT Reporters can achieve the shorter error correction timeframe as currently specified in the CAT NMS Plan.
- A detailed set of error reports should be made available daily, as well as monthly summaries, to facilitate identification of errors by Reporters and the CAT system, to support error correction and to strengthen CAT Reporters' overall reporting capabilities.
- Errors in customer information should be provided to CAT Reporters by Reporting Date at noon, coincident with reporting of transaction report errors.

2.4 CAT Reporter Access to CAT Data

The CAT NMS Plan specifies that CAT Reporters cannot access data submissions through bulk data exports, but can view their submissions online in a read-only, non-exportable format. FIF CAT WG believes strongly that CAT Reporters should have bulk access to their own data in CAT. The most important use of bulk data extract would be for error analysis and correction; however, this would also be helpful for internal surveillance operations. In the future, value-added services such as robust query tools could be offered to allow a CAT Reporter's regulatory/compliance inquiry team to perform their own research without the need for specialized IT services. Additional uses and recommendations are provided in Appendix 2.4.

3.0 CAT Exemptive Relief Requests

FIF CAT WG is a strong proponent of the objectives outlined in the Exemptive Relief Request which address (1) Options Market Maker quotes; (2) Customer-IDs; (3) CAT-Reporter-IDs; (4) linking of executions to specific subaccount allocations on Allocation Reports; (5) time stamp granularity for manual order events; and (6) Account Effective Date.

The rationale for FIF CAT WG's support of the Exemptive Relief Request and the adopted Exemptive Relief is summarized here and detailed in Appendix 3.0; however, the following highlights specific areas where additional modifications to the Plan are required in order to meet the stated objectives of the Exemptive Relief.

3.1 Customer Information Requirements on New Order Reports

The considerable cost savings[19] associated with the Customer Information Approach outlined in the Exemptive Relief are predicated on both customer identifying information and customer account information being provided as part of a customer definition process, while the Firm Designated ID would

[19] According to the FIF Cost Estimate for CAT Exemptive Relief – Customer ID, Reporter ID, Allocations, December 15, 2014, additional implementation cost of $195 million for the top 250 firms would be incurred if exemptive relief on CAT Customer ID were not granted.

be the only data element needed on the new order report to represent the customer.

However, as noted in footnote 172 of the CAT NMS Plan Proposal which is restated in part here, "The CAT NMS Plan also requires broker-dealers to report "Customer Account Information" upon the original receipt of origination of an order.[20] This is despite the fact that the cost savings outlined in the Exemptive Relief Request explicitly identified providing Customer Account Information as part of the customer data population process, as opposed to on the new order report.[21] We respectfully request the following:

- Ensure that the Firm Designated ID is the only customer identifying information required on the New Order Report. This may be accomplished through clarification/amendment of the CAT NMS Plan or expansion of the Exemptive Relief as required.
- Ensure that Customer Account Information[22] is provided as part of the customer definition process and not on New Order reports. This may be accomplished via amendment to the CAT NMS Plan and/or expansion of the Exemptive Relief previously granted.

We are not suggesting altering the requirement to provide the Central Repository with Customer Identifying or Account Information; we are merely recommending a better process for doing so that has been vetted with Bidders and the SROs in prior discussions and will yield the benefits outlined in the Exemptive Relief Request. Without this modification, much if not all of the benefit identified in the Exemptive Relief Request will be nullified.

Additionally, FIF CAT WG requests clarification that only data on active accounts will be reported as part of the customer definition process. Active accounts would be defined as those with activity in CAT reportable securities. We believe this is consistent with footnote 36 which states, "The Participants anticipate that Customer information that is initially reported to the CAT could be limited to only customer accounts that have, or are expected to have, CAT-reportable activity. For example, accounts that are considered open, but have not traded Eligible Securities in a given timeframe may not need to be pre-established in the CAT, but rather could be reported as part of daily updates after they have CAT-reportable activity." We suggest this should be explicitly addressed in the CAT NMS Plan.

3.2 Provision of Market Maker Quotes

As discussed in the following sections, FIF CAT WG supports the current CAT NMS Plan and Exemptive Relief which exempts options market makers from supplying quotes to the CAT processor, requiring only exchanges to supply options market maker quotes. In response to Question 385 which asks if similar to options market makers, equities market makers should also be exempt from market maker quote submission to the CAT processor, FIF CAT WG believes the Commission should consider extending relief to equities market makers that are providing quotes to equities exchanges in support of their market making obligations.

3.3 CAT Reporter ID

FIF CAT WG supports the Existing Identifier Approach outlined in the Exemptive Relief and seeks clarification that MPIDs currently used on OATS New Order and Route reports would be accepted under

[20] See CAT NMS Plan, supra note 3, at Section 1.1, Section 6.4(d)(ii)(C).
[21] See FIF Cost Estimate for CAT Exemptive Relief – Customer ID, Reporter ID, Allocations, December 15, 2014 (p. 1) which states" The Customer account information, required by Rule 613.c.7.viii.B to be specified on the CAT report of original receipt or origination of the order, would instead be provided on a new "Customer definition" CAT report."
[22] Account Information includes Account Type and Effective Date.

this approach. Orders may be sent from one broker-dealer to another before reaching their final routing destination. While firms use an SRO-identifier for those reports, a different identifier for the submitting firm may be used by the exchange where the order is ultimately sent. We respectfully request clarification that existing processes in place today related to the submission of MPIDs will be acceptable under the Existing Identifier Approach. We believe this is the intent of the Exemptive Relief.

With the modifications suggested above, FIF CAT WG believes the Exemptive Relief modifications are the best solution for both the Plan Processor and the industry. We applaud the SROs for submitting these requests to the Commission after listening to the industry concerns directly and through conversations with the DAG. All of the CAT processor bidders have stated that implementing the Exemptive Relief is technically viable and would not add to, and in some cases will reduce, the overall cost of implementing CAT.

Appendix 3 reinforces several of the key points originally made to the SROs and the SEC on why these adjustments are critical to the industry.

4.0 Data Submission to CAT

FIF CAT WG wishes to take this opportunity to provide its views on a variety of data-related issues, among the most onerous being the added requirements for timestamp on allocations reports and open/close indicator for equities. FIF CAT WG also offers numerous comments regarding protocols and data submission requirements. Here and in Appendix 4, the issues associated with these aspects of the Plan are highlighted, and where appropriate, recommendations are made.

Following is a summary of FIF CAT WG recommendations related to specific data elements, recording and reporting requirements.

- Open/Close Indicator on Equities is not captured today. To include this data element would require significant process change and involve parties other than CAT Reporters, such as OMS/EMS vendors as well as counterparties with proprietary OMS systems. If the SROs and the SEC believe there is value in obtaining this data for surveillance purposes, a rule proposal covering this request, which includes a thorough cost-benefit analysis, should be filed for public comment.
- Timestamp on Allocation Report should not be a required data element. The only consistent point for time capture by broker-dealers on the allocation flow is at allocation trade booking. The cost is quite large to provide this data element which will not provide the regulatory benefit that the SEC is seeking.
- The CAT NMS Plan should clarify the definition of a CAT “trading day”. We recommend that the end of this “trading day” should be 4PM (ET) for submission of data to CAT by 8AM (ET) of the following trading day.
- The CAT NMS Plan should include guidelines for the CAT Reporter interface to CAT that specifies support of the predominant interfaces in use today, namely OATS and FIX, assuming new fields are added to accommodate CAT requirements. In addition, CAT should offer support for a native interface to CAT, with complete technical specifications and normalization rules for each field.
- We recommend that customer information fields be categorized by the Plan Processor and the SROs based on degree of importance for market surveillance and market reconstruction, so that focus can be placed on ensuring accuracy of the most important fields for market surveillance (e.g., zip code is of lesser importance than social security number).

- Listing exchange symbology should be optional on the CAT interface. CAT Reporters should be permitted to use whatever symbology is dictated by the reporting event, which may differ over the course of the transaction life cycle. The CAT can maintain a cross reference table to enable proper identification of the security at each step in the process.
- The requirement for full customer information refreshes should be eliminated and replaced by a voluntary ability for a refresh in limited circumstances where there is a data corruption or other need for such an update.

5.0 Alternatives Raised by SEC

The SEC covered many topics in the Release with a discussion of various alternatives that are of particular interest to the FIF CAT WG, specifically: more granular timestamps with tighter tolerances, reporting of Primary Market Allocations, inclusion of OTC Equities, and expansion of OATS rather than building CAT. We have summarized our recommendations on two topics – Clock Synchronization and Primary Market Transactions – in this section, but cover these and the other alternatives in more detail in Appendix 5.0. In particular, Clock Synchronization is addressed more thoroughly due to the extensive discussion of this topic in the Plan commentary.

5.1 Clock Synchronization

FIF CAT WG supports the clock synchronization requirements included in the CAT NMS Plan, namely:

- Manual order entry – second level time stamp with clock offset of one second
- Fully electronic trading – millisecond level time stamp with clock offset of fifty milliseconds
- The "pattern or practices" approach for compliance with clock synchronization requirements

Based on the SEC requests for comments on reducing the burden of clock synchronization on CAT Reporters, FIF CAT WG recommends:

- Clock synchronization need only be actively managed (including logging of clock synchronization events) when capturing reportable events.

- Logging should only be required for clock synchronization configuration changes (e.g., frequency of clock samplings, adjustment size and frequency to clock when out of synch), clock synchronization exceptions and clock synchronization alerts.

- Broker-dealers who capture more granular time stamps should not be required to include the more granular time stamp on a CAT Report. Requiring sub-millisecond reporting for partial data will be expensive and not yield regulatory benefit as it will result in a false sense of accuracy on event sequencing, and at the same time will be unfair to firms that capture data at a more granular level than required.

FIF CAT WG recommends the adoption in the CAT NMS Plan of a clock synchronization management approach similar to that documented in a FINRA FAQ[23]. Also, we believe the CAT NMS Plan should include

[23] "The requirement of Rule 7430 is that firms maintain the synchronization of their business clocks. Therefore, every effort should be made to keep your clocks in synchronization; however, if your business clocks do go out of synch during a trading day, and you are unable to adjust them, maintain a record of the synchronization problem in your

the framework and details on the regulatory requirements for managing clock synchronization.[24]

FIF CAT WG recommends that the principle of a "level playing field" be applied in establishing the clock synchronization standard to be adopted in the CAT NMS Plan and by FINRA and other regulators, for purposes of regulatory reporting.

A more detailed discussion of clock synchronization, including these recommendations and underlying concerns, is provided in Appendix 5.1.

5.2 Primary Market Transactions

On the issue of including Primary Market Allocations in Phase 1 of CAT, we believe it is not advisable to take on this challenge at this time, given the tremendous undertaking of CAT as currently envisioned. To tackle a sector of the market that is so vastly different would divert key resources needed to focus in areas more aligned with CAT. The primary market and secondary market are inherently different: the primary markets are negotiated whereas the secondary markets are transaction-based; there are different rules and reporting requirements with two regulatory bodies (SEC and FINRA) instead of multiple SROs; they involve different lines of business and different business processes at broker-dealers, they are served by different vendors, and employ different systems with different technology personnel at broker-dealers. To construct an effective and efficient reporting regime will require significant analysis, data modelling and unique reporting requirements which are different from and well beyond the scope of Phase 1 of CAT. Because of the timing of Phase 1 of CAT and the significant challenge for the Plan Processor, the SROs, FINRA and the broker-dealers, we believe this endeavor cannot receive the proper attention it deserves and hence is not recommended for consideration as part of CAT at this time.

6.0 Production/Test Infrastructure and Customer Support

This section addresses FIF CAT WG's general concerns related to infrastructure, support functions and data security. We recommend the following requirements be clearly articulated in the CAT NMS Plan and not left to the discretion of Plan Processor:

- Support for 24x7 production and test environments, with web access to an incident reporting and tracking system.
- An adequate level of Help Desk staffing, especially during industry testing and the first two years of production, when Industry CAT Reporters are being on-boarded.
- A robust set of test and validation tools, as investment in these tools will result in a higher quality CAT system and audit trail, and reduce CAT Reporter costs.
- A consistent and comprehensive program for data security so that the requirements and level of

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books and records and notify FINRA that you experienced synchronization problems. If the problem is persistent, FINRA requires that you find a new source for synchronization or create new procedures for ensuring that your business clocks are in synch." OATS Clock Synchronization FAQ #S9

[24] Rule 613 requires clock synchronization to be in place by Effective Date plus 4 months. It is recommended that the regulatory requirements on clock synchronization management be included in the CAT NMS Plan so that the uniform processes and procedures can be put in place to meet the Rule 613 implementation deadline.

security expected to be implemented by the Plan Processor is clear.[25]

Additional details, including test environment recommendations and considerations regarding data confidentiality and security are presented in Appendix 6.0.

7.0 Plan Governance Impact on Implementation

7.1 Advisory Committee

The breadth and depth of systems, interfaces and products anticipated to become part of CAT mandates broad industry representation on the Advisory Committee to ensure many perspectives are fairly considered. Especially during development phases and early roll-out years, the CAT Advisory Committee must be active and collaborative to ensure the creation and maintenance of a high quality, responsive regulatory reporting system that meets the requirements of both the regulators and the CAT Reporters. FIF CAT WG recommends that the CAT NMS Plan consider defining the Advisory Committee to reflect a more participatory, active role in the formulation of decisions and directions being reviewed by the SROs.[26] See Appendix 7.1 for additional discussion of this topic.

7.2 Material Amendments

FIF CAT WG recommends a clear delineation between an "External Material Amendment" which represents a change to the CAT Reporter Interface (e.g., coding or configuration changes, or change to error definitions); and an "Internal Material Amendment", that is, it is internal to the Plan Processor. FIF CAT WG believes that for any External Material Amendment, an implementation plan with reasonable time for development and testing should be required, and the Advisory Committee should be consulted to assess general impact. For an Internal Material Amendment, the Advisory Committee should review the proposed change to ensure that the change will not materially affect CAT Reporters and/or CAT Submitters. See Appendix 7.2 for further definition of Material Amendment.

8.0 Conclusion

As we have consistently stated, FIF CAT WG is very supportive of Rule 613 and the development of a consolidated audit trail. We feel it will advance the state of regulatory oversight for the industry, and provide more efficient and effective surveillance which should result in increased investor confidence.

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[25] FIF CAT WG understands that the security and confidentiality implementation details will be contained in the processes and procedures developed by the Plan Processor.

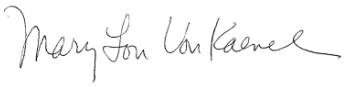
[26] This would be consistent with the purpose of the Advisory Committee as described in Rule 613:
"The Commission believes that the Advisory Committee could provide members of the SROs with a forum for informing the plan sponsors of any potential implementation or operational issues faced by them in connection with the consolidated audit trail. Plan sponsors also will be able to draw on the knowledge and experience of these members to help assure the Commission and market participants that any requirements imposed on SRO members will be accomplished in a manner that takes into account the costs to SRO members. The Commission also believes that an Advisory Committee could help foster industry consensus on how to approach and resolve possible issues that may be disputed, and approaches that may conflict, regarding operation of the consolidated audit trail."

However, FIF CAT WG has serious concerns with key portions of the CAT NMS Plan which, if not addressed, can result in:

- significant increased cost for the industry due to duplicative regulatory reporting for an extended period of time
- industry disruption due to an overly aggressive and unrealistic implementation schedule which results in lower quality levels for both the CAT and CAT Reporter systems, as well as increased costs due to extensive rework with changed schedules and higher error rates
- inability to meet overly aggressive and unrealistic error rates and error correction timeframes during the initial roll-out periods, especially if robust test and service tools are not available
- excessive costs and expenditure of scarce resources to meet specific data requirements that will disrupt existing processes and workflow, and produce no incremental value

FIF CAT WG wants the Consolidated Audit Trail to be a success and is committed to assisting the SEC and the SROs in improving the CAT NMS Plan, such that it will provide a strong foundation upon which to build a CAT that will provide benefit to all market participants. It is for these reasons FIF CAT WG has provided these comments and recommendations, and addressed numerous questions posed by the Commission related to critical issues. We thank you for the opportunity to do so, and trust that the practical approaches we have presented will be thoughtfully considered and incorporated in the final CAT NMS Plan.

Sincerely,



Mary Lou Von Kaenel
Managing Director
Financial Information Forum

cc: The Honorable Mary Jo White, Chair
The Honorable Michael S. Piwowar, Commissioner
The Honorable Kara M. Stein, Commissioner
Stephen Luparello, Director, Division of Trading and Markets
Gary Goldsholle, Deputy Director, Division of Trading and Markets
David S. Shillman, Associate Director, Division of Trading and Markets
Peter Santori, Chicago Stock Exchange, for CAT NMS Plan Participants: BATS Exchange, Inc., BATS Y-Exchange, Inc., BOX Options Exchange LLC, C2 Options Exchange, Incorporated, Chicago Board Options Exchange, Incorporated, Chicago Stock Exchange, Inc., EDGA Exchange, Inc., EDGX Exchange, Inc., Financial Industry Regulatory Authority, Inc., International Securities Exchange, LLC, Miami International Securities Exchange, LLC, NASDAQ OMX BX, Inc., NASDAQ OMX PHLX, LLC, The NASDAQ Stock Market LLC, National Stock Exchange, Inc., New York Stock Exchange LLC, NYSE Arca, Inc., NYSE MKT LLC

Table of Contents

Appendix 1. FIF Contributions to Development of CAT NMS Plan

Throughout the past 4 years, FIF CAT WG has consistently promoted a collaborative working partnership with the SROs to foster improved understanding of industry requirements and technology environments with the goal of a better informed CAT NMS Plan which meets the Rule 613 objectives as well as a cost-effective plan that is aligned with the industry infrastructure. To that end, FIF CAT WG has contributed a significant body of research, surveys and cost estimates to aid in the SROs' development of a comprehensive and complete CAT NMS Plan, as shown in the list below. Consistent with FIF's focus on implementation issues, the FIF CAT WG comments are specifically framed from an implementation perspective.

1. Letter to Ms. Elizabeth Murphy from Manisha Kimmel, FIF Managing Director, August 12, 2010, File Number S7-11-10, Consolidated Audit Trail
2. Letter to Ms. Elizabeth Murphy from Manisha Kimmel, FIF Managing Director, March 2, 2012, File Number S7-11-10, Consolidated Audit Trail
3. FIF Consolidated Audit Trail Working Group Response to Proposed RFP Concepts Document, January 18, 2013
4. FIF Consolidated Audit Trail Working Group Response to Consolidated Audit Trail Information to Bidders Document, January 31, 2013
5. Submission to DAG: March 15, 2013, FIF Representative Order Survey and Results
6. June 12, 2013, FIF Response to SRO Questions on Selected CAT NMS Plan Topics
7. Submission to DAG: November 5, 2013, (in conjunction with SIFMA and STA), FIF, SIFMA and STA Cost Estimate Survey of CAT Reporting of Options Market Maker Quotes
8. Letters to Ms. Elizabeth Murphy from Manisha Kimmel, FIF Managing Director, December 23, 2013, January 24, 2014, February 12, 2014, and September 18, 2014, Re: Release No. 34-70892, File Number 4-668, Proposed National Market System Plan Governing the Process of Selecting a Plan Processor and Developing a Plan for the Consolidated Audit Trail
9. Submission to DAG: February 11, 2014, Preliminary Large Trader (Rule 13h-1) CAT (Rule 613) Gap Analysis
10. Submission to DAG: August 5, 2014, Firm Designated ID Walk-thru
11. Submission to DAG: August 5, 2014, Allowing for Optimal Use of Order ID on Allocation Report – Exemptive Relief Request Discussion Document
12. Submission to SROs, September 15, 2014, Re: CAT Processor Proposed Optimal Solution Recommendations
13. Letter to BATS Exchange, et.al. (the SROs) from Manisha Kimmel, FIF Managing Director, November 19, 2014, Re: Consolidated Audit Trail National Market System Plan Submission (dated September 20, 2014)
14. Submission to DAG: Cost Estimates for CAT Exemptive Relief – Customer ID – Reporter ID – Allocations, December 15, 2014
15. Submission to DAG: February 17, 2015, FIF Clock Offset Survey Preliminary Report
16. Letter to Mr. Brent Fields from Manisha Kimmel, FIF Managing Director, March 13, 2015, Re: Release No. 34-74223, File Number 4-668, Notice of Amendment to the National Market System Plan Governing the Process of Selecting a Plan Processor and Developing a Plan for the Consolidated Audit Trail
17. Letter to BATS Exchange, et.al. (the SROs) from Mary Lou VonKaenel, FIF Managing Director, May 1, 2015, re: Amended and Restated Consolidated Audit Trail National Market System Plan
18. Submission to DAG: June 4, 2015, Bulk Data Extract Considerations for the DAG

19. FIF Member Presentation to SEC, June 24, 2015, re: FIF Recommendations regarding revisions to Amended CAT NMS Plan Implementation Schedule
20. Letter to BATS Exchange, et.al. (the SROs) from Mary Lou VonKaenel, FIF Managing Director, July 27, 2015, re: FIF Recommendations regarding revisions to Amended CAT NMS Plan Implementation Schedule
21. Letter to BATS Exchange, et.al. (the SROs) from Mary Lou VonKaenel, FIF Managing Director, October 14, 2015, CAT Error Processing
22. Letter to BATS Exchange, et.al. (the SROs) from Mary Lou VonKaenel, FIF Managing Director, February 10, 2016, re: Technical Amendment to CAT NMS Plan, December 23, 2015
23. Submission to DAG: CAT NMS Plan Security and Confidentiality Requirements, February 22, 2016
24. "Time on Allocation" FIF CAT WG Survey Results, July 12, 2016
25. Allocation Workflows

Appendix 2. Transition to CAT for Regulatory Reporting Activities

2.1. Elimination of Duplicative Reporting

FIF CAT WG cannot overstate the burden of duplicative reporting for any length of time. In addition to the monetary costs, an extended period of duplicative reporting will result in deterioration of reporting quality to both current reporting systems and CAT. Keeping two daily audit trails completely consistent would be an overwhelming task for the industry. Following is a detailed discussion of the FIF CAT WG's issues and recommendations.

2.1.1. CAT NMS Plan Retirement Plan Issues

2.1.1.1 Cost of Duplicative Reporting

A major objective of the industry is to define a CAT NMS Plan and Implementation Milestones that achieve the most aggressive timeframe for the elimination of duplicative reporting systems, the most onerous and highest priority being OATS. The industry has estimated that the annual cost for duplicative reporting is $2.6B.[27] The SEC disputes that estimate but has independently calculated that the industry cost for duplicative reporting is $1.7B/year.[28] Either estimate is a significant expense; equally important, industry members incur a huge administrative and maintenance burden to keep separate reporting systems current and accurate. It is likely that the same critical reporting resources within a firm would be charged with the dual reporting responsibilities; the result may well be deteriorating quality of reporting in all systems. Furthermore, employing additional staff to support either CAT or the duplicative systems would take time and would lead to added cost. Less experienced resources in this effort would also likely have a negative impact on data quality.

2.1.1.2 Priority for Elimination of Duplicative Reporting Systems

FIF CAT WG has prioritized the following for relief from duplicative regulatory reporting rules or systems:[29]

1. Critical Priority – OATS
2. High Priority - Large Trader Reporting, EBS, CBOE 8.0 – Executed Order Portion only
3. Medium Priority but "easy" to retire - PHLX 1022, FESC/NYSE 123(e) and (f)

FIF CAT WG recommends that all of the above duplicative regulatory reporting systems adopt the elimination of duplicative reporting approach outlined in this document. At a minimum, we respectfully request that other SROs also utilize the approach proposed by FINRA in the Plan whereby qualifying firms will be exempted from OATS duplicative reporting. [30] This is supported by the approach recommended by FIF CAT WG; that is, as an interim step toward full retirement of duplicative systems, upon CAT "go-live", owners of duplicative systems would automatically grant the industry (or individual firms) exemptions from reporting to their reporting systems based on meeting their respective Retirement Error Rates.

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[27] SEC Release No. 34-77724; File No. 4-698; Section IV.F.2 (p. 468)

[28] SEC Release No. 34-77724; File No. 4-698; Section IV.F.2 (p. 477)

[29] "FIF Consolidated Audit Trail Working Group CAT Processor Proposed Optimal Solution Recommendation", September 15, 2014

[30] "If it is practicable to integrate the data in a way that ensures no interruption in FINRA's surveillance capabilities, FINRA will consider exempting firms from the OATS Rules provided they report data to the Central Repository pursuant to the CAT NMS Plan and any implementing rules.", CAT NMS Plan, Appendix C, Section 9

2.1.1.3 Reporting Error Rate for Purposes of Retirement and Elimination of Duplicative Reporting

FINRA has stated that before any exemptions could be considered, that "FINRA can verify that the data into the Central Repository is of sufficient quality for surveillance purposes and that all reporting requirements meet the established steady state Error Rates set forth in Section A.3(b)".[31] FIF CAT WG does not agree with the specific requirement referenced by FINRA with respect to the Error Rate, but instead suggests a differentiation between a steady-state Maximum Error Rate and a Retirement Error Rate. Only the data needed in the consolidated audit trail by a duplicative system should be included in the calculation of the Retirement Error Rate for that system. Using OATS as an example, **quality of other non-OATS data recorded in the Central Repository is irrelevant to the evaluation of OATS exemption from duplicative reporting or retirement**. New data types for which the industry has no reporting experience (options reporting, Market Maker reporting of equities, allocations) are irrelevant to the evaluation of OATS exemptions from duplicative reporting or retirement.

Furthermore, FIF CAT WG believes that it is more appropriate that the **quality of post error correction data** be the benchmark for consideration for exemption from duplicative reporting and for system retirement because the data quality will be better and the majority of surveillance activities will likely use post error correction data.

2.1.1.4 CAT NMS Plan Retirement Milestones

The CAT NMS Plan contains conflicting milestones regarding the retirement of duplicative regulatory reporting rules or systems. The Plan specifies that "…within fourteen (14) months after the Effective Date, each Participant shall implement a new or enhanced surveillance system(s) in accordance with Section 6.10…"[32] that is "reasonably designed to make use of the consolidated information contained in the Central Repository". The Plan also specifies that each Participant should complete an analysis of its rules and systems to determine which require information that is duplicative of the information available to the Participants through the Central Repository. This is to be accomplished within 12 to 18 months (depending if a regulatory reporting system is duplicative or only partially duplicative) after large Industry Members are required to begin reporting to the CAT. This timetable suggests that the regulators will be given 36 to 42 months after Effective Date ("T") to complete their analysis, and provides no further timetable for implementation that will result in retirement of duplicative reporting systems.

We question how the Participants can implement new or enhanced surveillance systems without completing an analysis of available CAT data versus regulatory reporting system requirements prior to implementation. If the surveillance systems are implemented by T+14 months as required by the Plan, we believe the SROs should be required to effect a more aggressive plan to minimize duplicative reporting through reporting exemptions, and clear the path to complete retirement of duplicative systems, or minimally to facilitate member firms' transition to CAT reporting to fully satisfy reporting obligations.

Preliminary analysis can be completed now, based on the CAT NMS Plan technical requirements, and final analysis completed with the publication of the CAT Technical Specifications[33]. This would allow the

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[31] SEC Release No. 34-77724; File No. 4-698; Appendix C, Section 9

[32] SEC Release No. 34-77724; File No. 4-698; Section 6.7.iv

[33] "Each Participant has begun reviewing its existing rulebooks and is waiting for publication of the final reporting requirements to the Central Repository. Upon publication of the Technical Specifications, each Participant should complete its analysis within eighteen (18) months after Industry Members (other than Small Industry Members) are

Participants to identify any CAT data shortcomings during the iterative specification review process, to ensure that these requirements are included in Phase 1 of the CAT, and there will be no further exemption from duplicative reporting or retirement delays because required data elements were omitted from Phase 1. It is not appropriate that the CAT NMS Plan imposes a very aggressive implementation schedule on broker-dealers to implement CAT reporting, yet includes an unambitious timeframe for Participants to determine how to use CAT in their regulatory reporting systems. FIF CAT WG believes that the milestones included in the CAT NMS Plan for analysis of CAT data for use by duplicative or partially duplicative regulatory reporting systems do not adequately take into account the burden placed on CAT Reporters for duplicative reporting. We would expect the milestone to be "designed to make use of CAT data" by the regulators for surveillance and market reconstruction within 14 months from the effective date as required by Rule 613, to be reflected in more aggressive milestones and schedules for exemptions from duplicative reporting and retirement. The CAT NMS Plan suggests that Participants might be using duplicative legacy systems four years after effective date. To understate the case, CAT will not be considered to be a success if that is allowed to happen.

2.1.2 Recommendations for Elimination of Duplicative Reporting

2.1.2.1 Exemption from Duplicative Reporting leading to Retirement of Duplicative Systems

FIF CAT WG believes the elimination of duplicative reporting leading to the rapid retirement of duplicative systems can be accomplished with the following framework.

This approach starts upon completion of the CAT industry initial test period. The currently planned industry test concludes after the Plan Processor's and Operating Committee's acceptance criteria have been met (e.g., verifying all functionality and interfaces, system stability, performance stress testing, and certification of a secure environment and certification of CAT Reporters to connect to CAT). The CAT System functionality in support of Industry Member reporting can be promoted to the CAT production environment (which already contains CAT System support of Participant Reporting and Regulator access to CAT data) to start a Trial Period.[34] **This Trial Period would provide the full industry-wide environment needed to verify CAT reporting quality and regulators' duplicative reporting systems' readiness to use CAT**. This will require Plan Participants and Industry Members to report to CAT to establish the linkages within the order lifecycle and provide a complete audit trail. During this Trial Period, firms would continue to report to existing regulatory reporting systems as well as CAT, and error corrections would need to be performed on both reporting systems. However, **during this Trial Period, the only regulatory reporting sources of record would be the current regulatory reporting systems (e.g., OATS).** Even though CAT reporting would occur, there would be no penalties, archiving requirements or regulatory inquiries associated with CAT reporting before CAT "go-live" for reporting by Industry Members.[35]

When the duplicative systems have completed their quality assurance and CAT reporting at the industry level is of sufficient quality for use by the regulatory systems (i.e., the industry as a whole, or a significant

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required to begin reporting data to the Central Repository…" SEC Release No. 34-77724; File No. 4-698; Appendix C, Section 9

[34] Note that the CAT test environment must continue to be available to the CAT Reporters on an ongoing basis and during the Trial Period (which operates in the production environment) to verify reporting corrections and any coding changes needed to correct systemic reporting errors and facilitate development in response to new requirements

[35] In accordance with the CAT NMS Plan Milestones, Plan Participants' "go-live" date is assumed to have been completed prior to Industry Members' "go-live".

number of firms have achieved the "Retirement Error Rate" applicable to one of more of the identified critical or high-priority duplicative systems), the CAT system will be launched and will "go-live" for Industry Members. **At CAT "go-live", all CAT Reporters who have met the Retirement Error Rates of the targeted duplicative or partially duplicative systems will automatically be granted exemptions from duplicative reporting to those targeted systems which are prepared to use CAT data as a reporting source (e.g. OATS).** The reporting system of record will switch to CAT for those firms. Penalties, archive requirements and regulatory inquiries start applying to CAT and will no longer be applicable to the specific duplicative reporting systems. (Note that at CAT launch ("go-live"), owners of duplicative systems may need to merge data reported to CAT with data reported directly to their respective reporting systems by CAT Reporters not yet required to submit to CAT, in order to conduct a "complete" and "high quality" surveillance program.)

Unknown at this time is which duplicative regulatory reporting systems will be ready to rely on CAT as the data source when Industry Members start reporting to CAT. FIF CAT WG has listed those duplicative regulatory reporting systems which are the highest priority for elimination from duplicative reporting/retirement from an industry perspective, and would expect all of those systems to be ready by CAT "go-live" to use CAT as its data source (as suggested by the Effective Date +14 months milestone discussed in Appendix Section 2.1.1.4). However, we recognize that each duplicative system must independently assess its readiness and the quality of comparable data in the Central Repository. This approach can apply to all duplicative systems or to an individual duplicative system (e.g., OATS).

FIF CAT WG recommends limiting the Trial Period to approximately six months. If it is projected that the time period for the entire industry to reach the Retirement Error Rate will be prolonged, CAT could be launched with automatic exemptions granted to those firms that have met the Retirement Error Rate. This will reward firms that are aggressive in meeting the Retirement Error Rate by allowing a firm-by-firm exemption from duplicative reporting to targeted systems.

2.1.2.2 Specific Recommendations for Exemption from Duplicative Reporting and Retirement of Duplicative Systems

The following list summarizes FIF CAT WG's principal recommendations to eliminate duplicative reporting and expedite retirement.

1. The CAT NMS Plan should require the analysis for all high priority duplicative regulatory reporting systems/rules[36] (e.g., OATS, EBS, Large Trader) to be completed coincident with approval of the Plan. The owners of these reporting systems should clearly identify "requirements", i.e., document all functions and data elements needed to allow retirement of each of the duplicative systems (versus putting the burden of discovery on the Plan Processor, as stated in the CAT NMS Plan[37]). Furthermore, this analysis should be made available for review and comment by the Plan Processor and industry. As an example, FINRA performed a gap analysis identifying 33 data elements missing but required[38] for OATS retirement.[39] This gap analysis is already out-of-date (see #3 below).

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[36] FIF CAT WG CAT Processor Proposed Optimal Solution Recommendations, September 15, 2015

[37] CAT NMS Plan, Appendix D, Section 3, Reporting and Linkage Requirements. "Reportable Events must contain data elements sufficient to ensure the same regulatory coverage currently provided by existing regulatory reporting systems that have been identified as candidates for retirement".

[38] In a May 6, 2015 DAG meeting, FINRA emphasized that all of these 33 elements may not need to be implemented specifically in CAT (e.g., a linkage that is required in OATS may be provided already in CAT in another way).

[39] CAT NMS Plan, Appendix C, Section C.9, OATS

2. The CAT NMS Plan should require that the (valid) identified requirements of the duplicative systems included in the above analysis be incorporated into the initial CAT Technical Specification and implemented within Phase 1 of the CAT. This will allow the regulatory bodies to begin transitioning to the CAT data source concurrent with the development of the CAT system.

3. Of great concern to the industry is the fact FINRA has continued to expand the OATS reporting requirements to incorporate new fields for purposes of Tick Size Pilot reporting, ATS Order Book reporting and other initiatives. **It is imperative that new fields not previously identified are incorporated in the initial phase of CAT**. Furthermore, as CAT is under development, **we would expect a moratorium on changes to reporting systems**, like OATS, as all new data requirements should be included in CAT rather than in existing systems.

4. FIF CAT WG supports the requirement, as defined by Rule 613[40], that all Participants must implement new or enhanced surveillance systems using CAT data within fourteen (14) months after the Effective Date. We recommend that this requirement be extended to encompass SEC regulatory reporting rules/systems, including EBS and Large Trader Reporting, so that all identified high-priority duplicative regulatory reporting systems will be capable of sourcing data from CAT data by Effective Date + 14 months. FIF CAT WG recognizes that EBS requests can go back many years and include additional asset classes that will not be incorporated into CAT initially (e.g. fixed income), so that EBS may not be able to be formally retired for many years. However, it can be mandated that sourcing from CAT data is required of the regulators once data reporting and data quality criteria for that targeted data set are met by any firm.

5. As the whole industry, or as individual firms meet the Retirement Error Rate, exemptions from reporting to those specific duplicative systems should be automatically granted until rule filings for retirement of those systems can be completed and approved by the SEC.

6. The Retirement Error Rate for "go-live" should be established based on reporting results attained during the "Trial Period", so that the reporting goals are achievable by the industry. In addition, the Retirement Error Rate should be based only on "comparable" data in CAT. All other data captured by CAT (Customer Information, options, etc.) would be irrelevant in the determination of data quality needed by FINRA to consider exemption from OATS reporting and retirement of the OATS system. FIF CAT WG applauds FINRA for stating "… FINRA will *consider* [emphasis added] exempting firms from the OATS Rule provided they report to CAT"[41]. However, FIF CAT WG believes commitments, not considerations, are needed in the CAT NMS Plan and all regulators owning duplicative systems should be held to these commitments.

7. FIF CAT WG recommends that one of the acceptance criteria for CAT "go-live" is that the quality of CAT data is sufficiently high to meet the regulators' standards for use in regulatory activities, one of the major steps in the retirement process. This puts the burden and incentive on all during the Trial Period including the Plan Processor, the regulators and the industry to achieve quality goals in an expeditious manner and hasten the retirement process - a goal that should be shared by all.

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[40] 17 CFR 242.613, a.3.iv

[41] CAT NMS Plan, Appendix C, Section C.9, OATS

8. FIF CAT WG recommends that during the "Trial Period" and prior to "go-live", there are no penalties for CAT Reporting, no archive requirements for CAT reporting, and no regulatory inquiries based on CAT reporting.

9. An alternative industry grouping (instead of Large and Small Industry Members) is recommended to facilitate faster transition to CAT; specifically:
   - OATS and non-OATS Reporters – this allows OATS to be retired at least 12 months ahead of the current CAT NMS Plan, as there will be no small industry members currently reporting to OATS that will not be included in the first stage of industry implementation.
   - Voluntary reporting by Small Industry members during the first year of CAT Reporting should be considered, if the OATS/non-OATS recommendation is not adopted.

10. FIF CAT WG recommends that the Participants and the Plan Processor investigate technology solutions such as tools, interfaces, translators, and other functionality to assist the owners of the duplicative and partially duplicative reporting systems in their work to transition to use of CAT as a data source. This would significantly reduce the burden and cost of each of the duplicative systems to transition to CAT data. It would also reduce the errors with misinterpreting CAT data when mapping to the existing systems/rules. An example of a translation tool that could facilitate transitioning from OATS to CAT would be a "CAT to OATS" translator. This could serve two purposes:
    - Once CAT Reporters are no longer reporting to OATS, FINRA could use the translated CAT data and merge with existing OATS data (that would contain data from OATS Reporters who have not yet started reporting to CAT) to form a complete OATS "view" for its surveillance system.
    - A "CAT to OATS" translator could also be used as an alternative to duplicative reporting. A CAT report could be translated to OATS and submitted to OATS on behalf of the CAT Reporter, thereby eliminating any duplicative reporting to OATS until exemptions are granted (for duplicative reporting).

2.1.3 Answers to SEC Questions re: Retirement Plans

Question 79. Do Commenters believe that full implementation of the CAT would allow for the retirement of OATS? Please explain. Are any identified gaps with respect to OATS' data elements not addressed in the CAT NMS Plan? If yes, what are they?

Question 260 - The Commission reviewed gap analyses that examine whether the CAT Data would contain all important data elements in current data sources and concluded that certain information is not included (e.g., OATS data fields that allow off-exchange transactions to be matched to their corresponding trade reports at trade reporting facilities and certain EBS elements). Please identify any such data elements that are missing under the Plan.

Question 261. The Commission also seeks comment on the significance of the gaps identified in the analyses. If there are particular fields that are identified in the gap analyses that should not be incorporated into CAT, please identify them and explain.

Answer to 79, 260 and 261 – It is the responsibility of each owner of a duplicative or partially duplicative regulatory reporting system to identify the requirements that must be included in the CAT to allow retirement or partial retirement of duplicative or partially duplicative reporting systems. Redundant, retired, outdated, or unused fields should not be identified as "required" by the owners. Identification of these requirements has not been publicized for industry review, except the OATS and EBS Gap Analyses

published in May and June 2015. The OATS Gap Analysis is out-of-date, not reflecting changes that have been incorporated into OATS since 2015 including additional fields to accommodate Tick Size Pilot and ATS Order Book Reporting. Gaps between OATS and CAT may widen further if changes to OATS continue to be made without corresponding changes to the CAT Plan for Phase 1.

FIF CAT WG suggests the following regarding retirement of duplicative reporting systems:

- The SEC should require a "freeze" on extensions to duplicative regulatory reporting systems that impact CAT during the CAT development cycle, else CAT will never be able to produce "equivalent" audit trails, and duplicative reporting systems can never be retired. Also, firms are planning to use their highly skilled OATS developers on CAT implementation. Those skilled programmers/analysts would be distracted from CAT implementation if OATS reporting continues to require modification.
- Other regulatory systems (i.e., exchanges) may indirectly impact CAT reporting requirements, e.g. recent NYSE changes to the Account Type Indicator will require EBS changes, which in turn impacts CAT. SROs should be required to minimize, or eliminate these data dependencies, or include a concurrent corresponding requirement to CAT for any such change.
- Gap analyses for the high priority duplicative reporting systems should be required to be completed now, prior to approval of the CAT NMS Plan, and any identified gap must be included in Phase 1 of CAT, so that the duplicative reporting systems can be quickly retired once CAT is producing an audit report of sufficient quality.

Question 187. What framework and criteria should regulators adopt when determining whether to retire potentially redundant regulatory data reporting systems? Please explain when and how such retirement should take place.
Answer – As stated earlier, only the quality of comparable data in the CAT audit trail should be a determining factor in duplicative regulatory reporting systems' retirement plans. And, a firm's ability to meet the quality level determined during the Trial Period of equivalent data in the CAT audit trail should allow that firm to be exempted from reporting obligations to duplicative regulatory reporting systems, prior to the official retirement of that system. All duplicative or partially duplicative regulatory reporting systems should be obliged to first source data from CAT once the "comparable" data is determined to be of sufficient quality, prior to the "official" retirement of the duplicative system.

Question 262 - The Commission expects that, pursuant to the requirements of the Plan, any missing elements that are material to regulators would be incorporated into CAT Data prior to the retirement of the systems that currently provide those data elements to regulators. Do you agree? Why or why not? Do you agree that CAT Data would include the audit trail data elements that currently exist in audit trail data sources? Why or why not?
Answer – FIF CAT WG recognizes that the Consolidated Audit Trail must contain the data that is material to regulators prior to the retirement of any duplicative or partially duplicative regulatory reporting system. We recommend that gap analyses can, and should, be completed before the approval of the CAT NMS Plan, and then updated on completion of the Technical Specifications. Any identified gaps (within reason) of the high priority duplicative regulatory reporting systems (identified in Appendix 2.1.1.2) should be included in Phase 1 of CAT. This should facilitate rapid retirement plans for these duplicative systems.

Question 319. Do Commenters believe that duplicative reporting systems will be retired and, if so, when? What systems do Commenters expect to be retired? Are there any systems that cannot be retired? What are the costs associated with retiring duplicative reporting systems? What are the benefits of retiring duplicative reporting systems? Would there be cost savings as a result of retiring any duplicative reporting

systems? How does the timeline for retiring duplicative reporting systems affect the costs and benefits? Please explain.

Question 321. The Commission's analysis discusses the Plan's timetable for retirement of duplicative reporting systems (i.e., a maximum of 2.5 years). Is the timetable for retirement of these systems in the Plan realistic and/or reasonable? Are there ways that the timetable for duplicative reporting system retirement could be accelerated? If so, how?

Question 322. Do Commenters believe that the period of duplicative reporting that would precede the retirement of certain current, anticipated to be retired, regulatory reporting systems would impose significant cost burdens on industry? Are the Commission's estimates of those costs accurate? Are there dimensions of these costs that the Commission has not recognized? If so, what are they and what are their magnitudes?

Question 372. Do Commenters believe that the period of duplicative reporting that would precede the retirement of certain current, anticipated to be retired, regulatory reporting systems would significantly affect efficiency? Why or why not?

Answers to 319, 321, 322, 372 – FIF CAT WG has identified the highest priority regulatory reporting systems for elimination of duplicative reporting and retirement as soon as possible after initial rollout of CAT. As stated many times throughout this document, the rapid removal of duplicative reporting is FIF CAT WG's most important concern with the CAT NMS Plan.

SEC has calculated the industry cost for duplicative reporting as $1.7B/year (industry estimate is $2.6B/year) – either estimate represents a significant expense. It is impossible to overemphasize the complexity of dual reporting, conflicting reporting (e.g., fields with the same name but different interpretations in CAT and OATS; different reporting rules), varied corrections to the same errors across two different systems, and contention for the same reporting resources applied across two or more systems. This will seriously impact the efficiency and effectiveness of reporting and error corrections during the period of duplicative reporting. The longer the period of duplicative reporting, the more serious the degradation of reporting efficiency and effectiveness.

As the SEC points out in the filing document, and is very disappointing to the industry, neither Rule 613 nor the CAT NMS Plan require the retirement of duplicative reporting systems. According to the CAT NMS Plan with which the Commission concurs, the earliest time line for retiring any duplicative system would be at least Effective Date + 48 to 54 months. The CAT NMS Plan only requires analysis to be complete by Effective Date + 36 months. None of this reflects a plan where the SEC and the Participants, including FINRA, are united and motivated to retire duplicative systems as early as possible, nor does it reflect any concern for industry cost and burden for duplicative reporting over an extended period of time.

FIF CAT WG has identified specific changes to the CAT NMS Plan which would accelerate the elimination of duplicative reporting and retirement of duplicative systems. The recommendations discussed in detail in Section 2.1.2 of this Appendix are further depicted in Table 1, which compares the steps described in CAT NMS Plan necessary to retire duplicative systems, with FIF CAT WG's recommendations on how those milestones can be adjusted to effect a rapid elimination/retirement of duplicative reporting systems.

Table 1. FIF CAT WG Recommendations to Modify CAT NMS Plan to Eliminate Duplicative Reporting and Existing Rules and Systems (SEC Rule 613(a)(1)(ix))[42]

CAT NMS Plan		FIF CAT WG Recommendations	
CAT NMS Plan Milestone	**CAT NMS Plan Projected Completion Date**	**FIF CAT WG Recommendation on CAT NMS Plan Completion Date**	**Discussion of Milestone**
Identification of Duplicative Rules and Systems			
Each Participant will initiate an analysis of its rules and systems to determine which require information that is duplicative of the information available to the Participants through the Central Repository. Examples of Participants' rules to be reviewed include: • The Participants' rules that implement the exchange-wide Consolidated Options Audit Trail System (e.g., CBOE Rule 6.24, etc.) • FINRA rules that implement the Order Audit Trail System (OATS) including the relevant rules of the NASDAQ Stock Market, NASDAQ OMX BX, NASDAQ OMX PHLX, New York Stock Exchange, NYSE MKT, and NYSE ARCA • Option exchange rules that require the reporting of transactions in the equity underlier for options products listed on the options exchange (e.g., PHLX Rule 1022, portions of CBOE Rule 8.9, etc.)	Each Participant has begun reviewing its existing rulebooks and is waiting for the publication of the final reporting requirements to the Central Repository. Each Participant **should complete its analysis within twelve (12) months after Industry Members (other than Small Industry Members) are required to begin reporting data** to the Central Repository or, if such Participant determines sufficient data is not available to complete such analysis by such date, a subsequent date needs to be determined by such Participant based on the availability of such data.	**Complete analysis of duplicative rules/systems upon approval of CAT NMS Plan**. Each Participant will communicate requirements for eliminating duplicative rules/systems to selected Plan Processor. Note: The SEC should also communicate Large Trader Reporting requirements within the same timeframe.	To ensure that CAT is capable of eliminating duplicative rules/systems, the duplicative rules/system requirements must be known by the Plan Processor for inclusion into the technical specifications. Verify Phase 1 CAT contains elements needed for retirement after release of first draft of CAT Participant and CAT Reporter Technical Specifications. Any changes required can be included in second draft of Technical specifications.

[42] Adapted from CAT NMS Plan, Appendix C (pp. 94-97)

Identification of Partially Duplicative Rules and Systems			
Each Participant will initiate an analysis of its rules and systems to determine which rules and/ or systems require information that is partially duplicative of the information available to the Participants through the Central Repository. The analysis should include a determination as to (1) whether the duplicative information available in the Central Repository should continue to be collected by the Participant; (2) whether the duplicative information made available in the Central Repository can be used by the Participant without degrading the effectiveness of the Participant's rules or systems; and (3) whether the non-duplicative information should continue to be collected by the Participant or, alternatively, should be added to information collected by the Central Repository. Examples of Participants' rules to be reviewed include: • Options exchange rules that require the reporting of large options positions (e.g., CBOE Rule 4.13, etc.) • NYSE Rule 410B which requires the reporting of transactions effected in NYSE listed securities by NYSE members which are not reported to the consolidated reporting systems • Portions of CBOE Rule 8.9 concerning position reporting details	Each Participant has begun reviewing its existing rulebooks and is waiting for publication of the final reporting requirements to the Central Repository. Upon publication of the Technical Specifications, **each Participant should complete its analysis within eighteen (18) months after Industry Members (other than Small Industry Members) are required to begin reporting data to the Central Repository** or, if such Participant determines sufficient data is not available to complete such analysis by such date, a subsequent date needs to be determined by such Participant based on the availability of such data.	**Complete analysis of partially duplicative rules/systems on approval of CAT NMS Plan**. Each Participant will communicate requirements for eliminating partially duplicative rules/systems to selected Plan Processor.	To ensure that CAT is capable of eliminating partially duplicative rules/systems, the partially duplicative rules/system requirements must be known by the Plan Processor for inclusion into the Technical specifications. Verify Phase 1 CAT contains elements needed for retirement after release of first draft of CAT Participant and CAT Reporter Technical Specifications. Any changes required can be included in second draft of Technical specifications.
Identification of Non-Duplicative Rules or System related to Monitoring Quotes, Orders and Executions			
Each Participant will initiate an analysis of its rules and systems to determine which of the Participant's rules and systems related to monitoring quotes, orders, and executions provide information that is not rendered duplicative by the consolidated audit trail. Each Participant must analyze (1) whether collection of such information should continue to be separately collected or should instead be incorporated into the consolidated audit trail; (2) if still	**Each Participant should complete its analysis within eighteen (18) months after Industry Members (other than Small Industry Members) are required to begin reporting data** to the Central Repository or, if such Participant determines sufficient data is not available to complete such analysis by such date, a subsequent date needs to be determined by such Participant	**Complete analysis of non-duplicative rules/systems on approval of CAT NMS Plan**. Each Participant will communicate requirements for any information which should be incorporated into the consolidated audit trail, and a recommended timetable for inclusion.	To ensure that CAT is capable of incorporating requirements of non-duplicative systems, the requirements must be known the Plan Processor for consideration for inclusion into the Phase 1 (or later) technical specifications. Verify Phase 1 CAT contains requested elements (or base architecture for future

appropriate, whether such information should continue to be separately collected or should instead be incorporated into the consolidated audit trail.; and (3) if no longer appropriate, how the collection of such information could be efficiently terminated, the steps the Participants propose to take to seek Commission approval for the elimination of such rules and systems (or components thereof), and a timetable for such elimination, including a description of the phasing-in of the consolidated audit trail and phasing-out of such existing rules and systems (or components thereof).	based on the availability of such data.		requirements) needed for retirement after release of first draft of CAT Participant and CAT Reporter Technical Specifications. Any changes required can be included in second draft of Technical Specifications.
Identification of Participant Rule and System Changes Due to Elimination or Modification of SEC Rules			
To the extent the SEC eliminates SEC rules that require information that is duplicative of information available through the Central Repository, each Participant will analyze its rules and systems to determine whether any modifications are necessary (e.g., delete references to outdated SEC rules, etc.) to support data requests made pursuant to such SEC rules. Examples of rules the SEC might eliminate or modify as a result of the implementation of CAT include: • SEC Rule 17a-25 which requires brokers and dealers to submit electronically to the SEC information on Customers' and firms' securities trading • SEC Rule 17h-1 concerning the identification of large traders and the required reporting obligations of large traders	**Each Participant should complete its analysis within three (3) months after the SEC approves the deletion or modification of an SEC rule related to the information available through the Central Repository.** The Participants will coordinate with the SEC regarding modification of the CAT NMS Plan to include information sufficient to eliminate or modify those Exchange Act rules or systems that the SEC deems appropriate. With respect to SEC Rule 17a-25, such coordination will include, among other things, consideration of EBS data elements and asset classes that would need to be included in the Plan, as well as the timing of when all Industry Members will be subject to the Plan. Based on preliminary industry analyses, broker-dealer large trader reporting requirements under SEC Rule 17h-1 could be eliminated via the CAT. The same appears true with respect to broker-dealer recordkeeping. Large trader reporting responsibilities on Form 13H and self-identification would not appear to be covered by the CAT.	**The SEC and Participants should work concurrently to analyze changes to 17a-25 and 17h-1 now in order to provide the selected Plan Processor with requirements**. **Complete analysis of SEC rules and impact on Participant rules/systems on approval of CAT NMS Plan**. Each Participant will communicate any requirements to selected Plan Processor that are required due to elimination of SEC rules. The release of final CAT technical specifications should initiate the rule-making process for both the SEC and Participants.	Changes to EBS and Large Trader have happened concurrently in the past. There is no reason for changes to happen sequentially with respect to CAT. Given the temporary nature of Large Trader Reporting (LTR) Exemptive relief, it is imperative that CAT include LTR functionality and rule-making reflect CAT as the source of LTR reporting. To ensure that CAT is capable of eliminating SEC rules that require duplicative information, the SEC rule requirements must be known by the Plan Processor for inclusion into the technical specifications. Verify Phase 1 CAT contains elements needed for retirement after release of first draft of CAT Participant and CAT Reporter Technical Specifications. Any changes required can be included in second draft of Technical specifications

Participant Rule Changes to Modify or Eliminate Participant Rules			
Each Participant will prepare appropriate rule change filings to implement the rule modifications or deletions that can be made based on the Participant's analysis of duplicative or partially duplicative rules. The rule change filing should describe the process for phasing out the requirements under the relevant rule.	**Each Participant will file to the SEC the relevant rule change filing to eliminate or modify its rules within six (6) months** of the Participant's determination that such modification or deletion is appropriate.	**Each Participant should file relevant rule changes once technical specifications are released.** Iterative drafts of the technical specification should give Participants ample opportunity to prepare draft filings.	Once the functionality of CAT has been defined there is nothing preventing SROs from drafting and submitting filings to eliminate or modify its rules. Timing could be contingent on CAT "go-live."
Implement New or Enhanced Surveillance Systems			
Each Participant shall implement a new or enhanced surveillance system(s) that is designed to make use of the consolidated information contained in the Central Repository.	"…**within fourteen (14) months after the Effective Date, each Participant shall implement a new or enhanced surveillance system(**s) in accordance with Section 6.10…"[43] that is "reasonably designed to make use of the consolidated information contained in the Central Repository".	This requirement should extend also to the SEC and Large Trader Reporting system.	Large Trader Reporting System is rated as a high-priority system for retirement.
Elimination (including any Phase-Out) of Relevant Existing Rules and Systems			
After each Participant completes the above analysis of its rules and systems, **each Participant will analyze the most appropriate and expeditious timeline and manne**r for eliminating such rules and systems.	**Upon the SEC's approval of relevant rule changes, each Participant will implement such timeline.** One consideration in the development of these timelines will be when the quality of CAT Data will be sufficient to meet the surveillance needs of the Participant (i.e., to sufficiently replace current reporting data) before existing rules and systems can be eliminated.	**Upon completion of CAT Trial Period**, which includes meeting Retirement Error Rates for quality reporting, duplicative reporting should be eliminated to high-priority duplicative regulatory reporting systems. Launch of CAT should be directly linked to "exemptions from reporting" or retirement of existing duplicative systems.	Limiting the period of duplicative reporting is a key driver of cost savings associated with the CAT NMS Plan. Linking the launch of CAT to the retirement of existing/rules systems aligns incentives across the industry and Participants.

Question 320. Do service bureaus handle EBS reporting for their clients? To what extent would EBS reporting contribute to duplicative reporting costs or system retirement costs and savings?
Answer – EBS is one of the high priority systems identified by FIF CAT WG as contributing to the cost and burden of duplicative reporting with CAT. Responses to Electronic Blue Sheets (EBS) inquiries are often handled by clearing firms or service bureaus as well as the broker-dealer firms themselves. We believe that upon the launch of CAT, regulators should utilize the Central Repository as its first source of data for inquiries. If the data does not reside in the Central Repository, a firm must follow its current procedures in responding to EBS inquiries, supplying the historical data or data not currently captured by CAT. While specific costs relating to each duplicative regulatory reporting system were not identified or collected by

[43] CAT NMS Plan, Section 6.7.iv

FIF CAT WG, we do believe that costs associated with responding to EBS will be reduced over time as regulators would no longer need to make EBS inquiries for data that already resides in CAT.

Question 323. What milestones should CAT be required to reach before duplicative reporting systems can be retired?
Answer – The milestones that should be met before duplicative reporting systems can be retired are: the CAT system must be functionally complete and stable, the duplicative reporting systems must be ready to accept CAT as a reporting source, and the quality of the CAT reports must meet the Retirement Error Rate.

FIF CAT WG recommends use of "exemptions from reporting" to duplicative reporting systems once the above milestones are reached, to avoid the necessary regulatory process delays associated with the formal retirement of duplicative systems.

2.2 Implementation Milestones

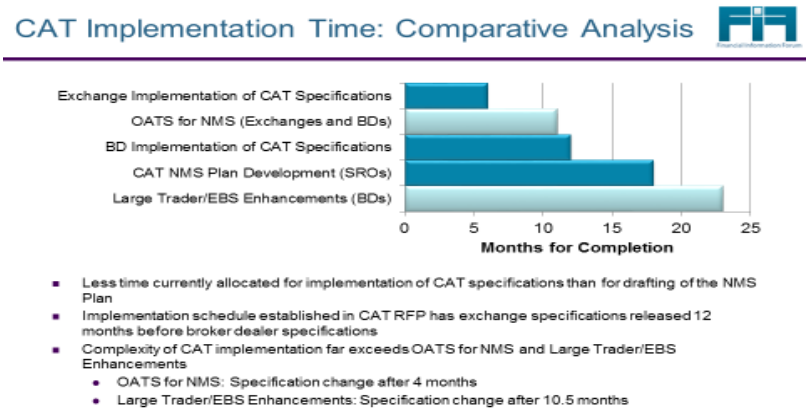
2.2.1 Establishing Implementation Milestones

FIF CAT WG believes that the CAT NMS Plan implementation milestones, as written, represent an overly aggressive and risky plan, and has identified specific underlying issues for consideration. FIF has often suggested that an approved Technical Specification is required before the industry can determine reasonable and accurate schedules for implementation of new or modified regulations.[44] In order to establish a detailed CAT implementation plan with confidence, it is necessary that an approved CAT Technical Specification be available to the industry so that accurate estimates and milestones can be defined for implementing the functionality contained in the CAT Technical Specification. This is especially important with CAT because the CAT NMS Plan includes no interface detail and has left key technical decisions to be made by the selected Plan Processor. Publication of the Technical Specification will be the first time the industry sees the functionality and interfaces to be provided by the Plan Processor.

The Participants and the Industry can leverage their shared history of implementing major regulatory initiatives to build a CAT plan that avoids the pitfalls and mistakes of the past. Figure 2 below presents the disparity in the time actually required for certain industry initiatives to reach completion versus the time permitted for CAT implementation under the proposed schedule.

[44] FIF's position is consistent with recommendation #3 made on April 19, 2016 by the Trading Venues Regulation Subcommittee to the SEC Equity Market Structure Advisory Committee.
https://www.sec.gov/spotlight/emsac/emsac-trading-venues-subcommittee-recommendations-041916.pdf

Figure 2. CAT NMS Plan Implementation Relative to Previous Industry Initiatives



CAT represents one of the largest, most ambitious regulatory undertakings. Yet its implementation plan reflects a more aggressive schedule than the industry achieved on either OATS for NMS or Large Trader. It has taken four years to define the CAT NMS Plan, which is devoid of technical detail, and yet the CAT NMS Plan is requiring that a Plan Processor must establish a new company, hire staff, define procedures, establish data centers, define Technical Specifications, build the CAT System and processes and have more than 1000 broker-dealers reporting to the CAT within 24 months. Rushing to achieve artificial milestones established without knowledge of the development effort involved, or even the full functionality to be delivered, will only result in poorly built systems, inferior quality of data reporting, missed and delayed schedules and cost overruns, for the Plan Processor, the regulators and the broker-dealer community.

2.2.2 Detailed Issues and Recommendations on Implementation Milestones and Processes

There are four areas of the CAT NMS Plan Implementation Milestones which represent specific concerns for FIF CAT WG:

- Technical Specifications
- Development and Test Schedules
- Small Industry Member Reporting
- Criteria and Dependency Management

These areas are discussed in greater detail in each of the following sections. These recommendations are designed to support the FIF CAT WG's commitment to the rapid adoption of CAT as the reporting system of record. As will be seen, many of these recommendations suggest **acceleration of the milestones**, moving up the dates.

2.2.2.1 Technical Specification Issues

FIF CAT WG has identified the following problems with the CAT NMS Plan Implementation Milestones regarding the specification phase:

1. As proposed, CAT Reporter specifications will be developed after Participant specifications and concurrent with start of Participant reporting. This will expose CAT Reporter interfaces to the constraints imposed by the Participant interfaces, even if inadequate and problematic, because the Participant interfaces will have already been implemented and "in production". Although there will be unique functionality in the CAT available only to Participants or to Reporters, the assumption is

that the Participant and CAT Reporter interfaces share many common elements and functionalities. The FIF CAT WG believes that the **Participant and CAT Reporter specifications should be developed concurrently** so that any required changes can be reflected across both interfaces prior to implementation of either interface.

2. Insufficient time is provided in the CAT NMS Plan Implementation Schedule[45] **to allow for two iterative reviews of the order data and customer information specifications** before implementation. Because CAT is a new, complex system being developed with new interfaces that will cover asset classes new to the regulatory reporting process, and because there will be no previous exposure to the industry of these interfaces, the FIF CAT WG believes it is very important to plan for two iterative reviews of the Technical Specifications. Numerous changes should be anticipated with the first publication of these Technical Specifications and a re-publication, and consequently a second iterative review period, should be planned. This recommendation is predicated on industry experience with technical specifications published by Participants. On more than one occasion, "final" versions of Participant-issued technical specifications have been amended to address issues raised by industry participants who had no opportunity to review draft versions in advance of the "final".

3. The CAT NMS Plan indicates the Customer Information specification is to be produced five months prior to production start of Large Industry member CAT reporting (and concurrent with start of industry testing). **Five months is an insufficient time period to allow development and staged testing (see Test section) of a complex new function.** It is highly improbable that the industry will be able to meet that delivery schedule. The FIF CAT WG believes the customer information specification needs to be produced earlier in the cycle to allow more time for the CAT Reporter to develop and test this new functionality. We recommend that the customer information specification be produced concurrent with the order data specification.

4. The Quote API specification cycle is too short and does not commit to an iterative draft review cycle. It is recognized that this specification is reasonably straightforward and will not likely require a re-publish cycle. However, it is most important that the industry has an opportunity to review and provide comments to this interface document, to ensure that any serious problems can be quickly corrected prior to commencement of development work. Consequently, we recommend moving the Quote API specification Milestone forward, perhaps to be co-incident with the Participant Technical Specifications, due to the dependencies between the two interfaces.

5. The Implementation Schedule does not indicate if Allocation Reporting is covered in a new separate specification or incorporated into the order data specification. If there will be an Allocation Specification, then FIF would recommend publishing this specification concurrent with the order data and customer information specifications.

2.2.2.2 Technical Specification Recommendations

FIF CAT WG recommends that the Industry **CAT Reporter specification phase start earlier** in the Implementation Schedule to allow for concurrent development of Participant and CAT Reporter specifications. The current Implementation Schedule calls for Participant Technical Specifications to begin

[45] CAT NMS Plan, April 27, 2016, Appendix C, Section 10

on Effective Date + 2 months, Industry Member Technical Specification for Order Processing to begin on Effective Date + 9 months and Industry Member Technical Specifications for Customer Information to begin on Effective Date + 18 months. **FIF recommends that all three[46] specifications begin development on Effective Date + 2 months, but allow for at least a 6-month (but recommend longer) specification cycle, permitting two iterative drafts with subsequent review cycles to be produced before the final Technical Specifications are published**. The Allocation Report also needs to be added to the specification milestones.

FIF CAT WG recommends expanding the milestone for development of the Quote API specification to allow a three-month development/publish cycle, which would allow an iterative review for the industry. Because it is anticipated that the Quote API specification will be a minor change to the existing Quote API, FIF believes that one iterative review is sufficient.

As has been proven repeatedly in the industry, problems identified early in the development stages, especially during the specification phase, are much less costly, less time consuming to correct and contribute to a better quality system deliverable.

2.2.2.3 Development and Test Issues

There are a number of issues with the development and test milestones in the CAT NMS Plan implementation plan:

1. The CAT NMS Plan **does not allocate sufficient time for the industry to thoroughly test its software** which will interface with the Plan Processor. The schedule specifies that the CAT test environment will be available for a six-month period for Large Industry Members starting six months prior to the start of CAT reporting. Six months is not adequate time for the industry to verify new interfaces and processes against a new CAT system, for which extensive functional, system and industry wide testing will be required. To further complicate the situation, under the current CAT NMS Plan there will also be "new" CAT Reporters in the first group, who have previously been exempted from reporting obligations (e.g., OATS) or not required to report (e.g., options market makers). For any of these CAT Reporters who choose to implement CAT reporting "in house" (i.e., "insourcers"), six months will not be sufficient time for testing.

2. **This short six-month test cycle is especially problematic for third party providers and service bureaus.** These firms need additional time for testing in the CAT test environment to allow these Data Submitters to first develop and test their services and then enable their customers to test with the services.

3. The CAT Implementation Milestones specify that the CAT connectivity requirements will be published concurrent with the start of CAT test. This does not allow any time for the Industry Members to implement the requirements before start of test, further reducing the testing window.

4. There is nothing defined in the CAT NMS Plan that requires the Plan Processor to define a structured and comprehensive CAT test plan and test phases to facilitate Industry Member testing. This is especially critical for linkage testing, which requires coordination across multiple CAT

[46] Potentially four specs may be developed simultaneously if the Allocation Report is not integrated into the transaction specs.

Reporters and/or availability of production data for thorough testing. This is one of the most complex pieces of logic for both the CAT system and CAT Reporters/Submitters. Testing in this phase could take multiple months, but it is critical to the data quality and stability of the overall system. Coordinated industry and Plan Processor testing is also required to validate system and Disaster Recovery scenarios.

5. The efficiency and completeness of the industry's development and test of the CAT system and interfaces will be very dependent on the development and test tools and infrastructure support provided by the Plan Processor. There is no specificity in the CAT NMS Plan regarding development and test tools that will reduce CAT Reporter and Data Submitter costs or ensure better quality test results during initial testing and on-going regression testing when changes occur in either the Plan Processor or CAT Reporter/Data Submitter systems. Having the Plan Processor invest in such tools would not only shorten the development/test periods required, but would also ensure that the interfaces and data reported would be of the high quality demanded by the regulators.

6. Security certification of the test environment, and connections into the development and test environments, must be performed prior to the start of any industry test with CAT, so as not to expose CAT system code base and industry CAT data to hackers.

2.2.2.4 Development and Test Recommendations

FIF CAT WG recommends the following changes to the development milestones established in the CAT NMS Plan with a focus on the test environment:

1. **Accelerate the availability of the CAT test environment to earlier in the implementation cycle**, allowing, at a minimum, 12 months of access to the CAT test environment for the first group of Industry Reporters. At least some subset of functionality must be available in the CAT test environment for access by the industry at the start of this 12-month cycle, (as we recognize that the Plan Processor's own development and test cycle may still be in progress), and additional functionality may be added as it becomes available. The exact test period required is dependent on the final Technical Specification.

2. Require that all security controls are in place, and validated, for the CAT test environments prior to the connection of the first CAT Reporter or Data Submitter to the CAT test environment. This is especially important for two reasons: an environment can be compromised early in the testing phase for exploitation later when the data content may be more valuable; and, any CAT Reporter or Data Submitter may introduce its production data into the test environment for test purposes, expecting the environment has been proven secure.

3. Add a formal certification test period to the implementation milestones during the last 3 months of CAT testing. Certifying new Industry member connectivity and interfaces to the Plan Processor should avoid serious problems during the first few days of production start-up of CAT reporting.

4. Publish the CAT connectivity requirements at least three months prior to the start of CAT testing.

5. **A "Trial Period" included in the Implementation Plan** would involve industry-wide participation and the opportunity to test that linkages have been properly established. It will also allow verification of regulatory reporting systems' readiness to accept CAT data as a source and ensure that CAT reports meet Retirement Error Rates.

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2.2.2.5 Small Industry Member Reporting Issues and Recommendations

Third party vendors, service bureaus and correspondent clearing firms with both large and small industry member clients must support two regulatory reporting procedures until all industry members start reporting to CAT and the regulators which own duplicative reporting systems provide exemptions for reporting, or until such time that the duplicative reporting systems can be retired. Even with the most optimistic projections of exemptions from reporting obligations to duplicative reporting systems, there is a built-in lag of twelve months between start of reporting for Large Industry Members and Small Industry Members where duplicative reporting must be supported by these third party Data Submitters. In addition, large industry members that transact business with small industry members will have incomplete reporting linkages during the 12-month gap between the start of large and small industry member reporting.

FIF CAT WG suggests that the division of Industry Members between large and small firms is not the optimum grouping of users. We believe a more reasonable approach to grouping industry members would be to segregate those who are current OATS reporters, from those that are not. This grouping (sized by the SEC as 799 firms[47]) provides an advantage in that it will help reduce risk to the implementation plan, as it ensures that only experienced regulatory reporting users are in the initial reporting group of CAT Reporters. This will ease the customer support required of CAT in the initial reporting period. It will allow the service bureaus (who are likely to be the ultimate submitters of CAT data on behalf of non-OATS reporters) to get their existing clients fully operational on the new CAT platform without on-boarding inexperienced new regulatory reporting clients for the first time during the initial implementation stage.

If the SEC does not change the Large and Small Industry member grouping as we suggest, FIF CAT WG recommends that the CAT NMS Plan support the **voluntary** reporting by small industry members concurrent with large industry member reporting any time during the 12-month period between large and small industry reporting. This would allow third party vendors, service bureaus and correspondent clearing firms to optionally provide a service to their small industry member clients to start CAT reporting prior to the current requirement of Effective Date + 36 months. This is unlikely to present a large burden for the small industry member clients serviced by these firms because the bulk of the work to transition to CAT will be handled by their service bureaus. To encourage small industry members to support the earlier reporting to CAT, they must be assured they will not incur duplicate fees or compliance penalties as a result of moving to the CAT in advance of the required implementation date. With this approach, regulators would have access to a more complete consolidated audit trail because more industry firms would be reporting on an earlier schedule.

2.2.2.6 Risk Mitigation Strategies including Acceptance Criteria

As stated earlier, FIF CAT WG believes that the current CAT NMS Plan Implementation Milestones represents a very aggressive and risky approach to the development and introduction of such a large and complex system as the Consolidated Audit Trail. There are many techniques, some of which are discussed below, that can be employed throughout an implementation cycle to mitigate risk for both the Plan Processor and all CAT Reporters and Data Submitters, including Participants. FIF CAT WG recommends that the CAT NMS Plan include such risk mitigation strategies to ensure they are incorporated into the Plan Processor's schedule. Otherwise, the selected bidder, driven by the approved CAT NMS Plan, will not have the flexibility early enough in the implementation process to choose more conservative approaches or to

[47] SEC Release No. 34-77724; File No. 4-698; Footnote 397

remain flexible in its implementation approach. Nor does the governance structure described in the CAT NMS Plan facilitate rapid responses to issues that may arise during an aggressive implementation cycle.

There is no definition of acceptance criteria within the implementation plan to ensure that one milestone completes with sufficient quality to make certain that succeeding milestones are not hampered with poor quality and not completed on-time. FIF CAT WG recommends that the CAT NMS Plan mandate that acceptance criteria for incremental milestones be established by the Plan Processor to define the deliverables for each milestone, including the level of quality required. An example of acceptance criteria would be "98% of high priority problems identified during the Technical Specification review are addressed in the Final Specification published for approval". This also allows an objective and independent structure for Operating Committee oversight on Plan Processor and industry progress. FIF CAT WG recommends that the CAT implementation Milestones should be flexible to allow changes in milestones so that corrective actions can be taken when the acceptance criteria have not been met, including the adjustments to the CAT NMS Plan, or Rule 613, if necessary.

Other risk mitigating strategies are suggested for consideration:

1. Consider the merge of large and small industry member development cycles and start of reporting. It potentially could reduce overall Plan Processor workload and hold the completion date of all reporting, simplifying elimination of duplicative reporting for regulators and allowing earlier retirement of duplicative regulatory reporting systems.

2. Another approach for risk mitigation would be to stage functionality, reducing the burden on the Plan Processor and CAT Reporters/Submitters in the Phase 1 delivery. The initial delivery of functionality should include customer information and order-related reports (excluding allocations) for NMS securities and OTC equities. Customer Information does represent significant new regulatory functionality, but we are sensitive to the fact that it is fundamental to the CAT structure and advancements in the regulatory infrastructure. This functional grouping is also supportive of the industry priority of early and swift elimination of duplicative reporting and retirement of OATS. Following this initial function set delivery, three additional function sets that could be staged are: options, allocations and Market Maker reporting for equities. It is anticipated that these three separate and distinct areas of new regulatory reporting functionality will present more challenges throughout the implementation cycle.

2.2.3 Alternative Implementation Milestones

As stated earlier, FIF CAT WG recommends that an implementation schedule be established after the Technical Specification is published. We also recommend that "best practices" be incorporated into the implementation schedule, especially for specification development and industry testing. We have incorporated these recommendations into proposed implementation milestones provided in Table 2. End dates for these recommended milestones cannot be given at this time, because without a final Technical Specification, we cannot determine the length of time that would be required for implementation. However, it demonstrates that the Plan Processor milestone dates need to be moved **forward** significantly, to provide sufficient time for consolidating dependent specifications, specification review and industry testing within the framework of the CAT NMS Plan.

Table 2. FIF CAT WG Proposed Alternative Milestones

CAT NMS Plan		FIF CAT WG Recommendations	
Task	**Start**	**Task**	**Start**
Analysis of duplicative systems	Start of Industry Member reporting + 12 to 18 mo.	Document all functional requirements and data elements identified that allow retirement of high priority duplicative, partially duplicative and non-duplicative regulatory reporting systems/rules	Now to Plan Approval
Selection of Plan Processor (PP)	Plan Approval + 2 mo.	Selection of Plan Processor (PP)	Now to Plan Approval
Specification Phase			
PP begins development of Participant Spec with iterative drafts as required	10 mo. prior to Start of Participant Reporting	PP produces Participant Spec	10 mo. prior to Start of Participant Reporting
PP publishes Participant Spec	6 mo. prior to Start of Participant Reporting	PP publishes Participant Spec	6 mo. prior to Start of Participant Reporting
PP begins drafting of Industry Member Order Technical Spec	**12 mo. prior to Start of *Industry* Member reporting**	Concurrent with Participant Spec development, PP produces Industry Member Technical Order Specs, Customer Information Specs and Allocation Report Specs - required due to cross dependencies At least **2 iterative reviews** required Time required to produce specs and get approval is unknown 6-month minimum time for drafting and review of specification PP publishes Industry Member Allocation Spec (Not addressed in proposed Plan)	10 mo. prior to Start of Participant Reporting
PP publishes Industry Member Order Technical Spec	15 mo. prior to Start of Industry Member reporting		
PP publishes Industry Member Customer Info Spec	6 mo. prior to Start of Industry Member reporting		
Participants produces Quote Protocol API Spec	6 mo. prior to Start of Industry Member reporting	Participants produce Quote Protocol API spec coincident with Participant Technical Specs due to cross-dependencies with Participant Spec 1 iterative review sufficient	10 mo. prior to Start of Participant Reporting
Start of Participant Reporting and Surveillance			
Participants start reporting to CAT	Plan Approval + 12 mo.	Participants start reporting to CAT	Plan Approval + 12 mo.
Participants use CAT data for surveillance systems	Plan Approval + 14 mo.	Participants implement surveillance system using CAT data	Plan Approval + 14 mo.
Development and Test Phase			
Publish connectivity requirements for CAT test environment	6 mo. prior to Start of Industry Member reporting	Publish connectivity requirements for CAT test environment (production and DR connectivity requirements to follow)	15 mo. prior to Start of Industry Member reporting
		Industry members develop/internal test of Phase 1 CAT (Not addressed in CAT NMS Plan)	15 mo. prior to Start of Industry Member reporting
PP begins connectivity testing and accepting order data from Industry Members for testing	6 mo. prior to Start of Industry Member reporting	Security controls validated Plan Processor test environment available for CAT Reporter testing	12 mo. prior to Start of Industry Member reporting
Industry Members begin production site connectivity and acceptance testing with CAT	3 mo. prior to Start of Industry Member reporting	Industry Members begin production site connectivity and acceptance testing with CAT (Certification Testing)	3 mo. Prior to Start of Industry Member "Trial Period" reporting
CAT NMS Plan – Plan Processor plans specific testing dates for CAT Reporters.	3 mo. prior to Start of Industry Member reporting	CAT NMS Plan – Plan Processor provides a fully functional production environment for the "Trial Period".	Start of Industry Member reporting to the production site for the Trial Period – 6 mo. prior to implementation date.

Production Trial Period – Start of Industry Member Reporting			
Industry Members start reporting Customer Information data to CAT	1 mo. prior to Start of Industry Member reporting	Industry Members start reporting Customer Information data to CAT	Start of Industry Member reporting to the production environment
Industry Members start reporting order data to CAT	Start of Industry Member reporting	Industry Members start reporting order and allocation data to CAT; **start of "Trial Period"**	
		Participants with duplicative/ partially duplicative reporting systems assess their surveillance systems and CAT Reporter's data for use in regulatory reporting.	Start of Industry Member reporting for up to six months
CAT "Go-Live"			
		CAT "go-live" is defined as duplicative regulatory reporting systems ready to accept CAT data as source; Industry/Firms meet reporting quality criteria; automatic exemptions granted from duplicative reporting;	

2.2.4 Answers to SEC Questions re: Implementation Milestones and Processes

Question 51. Do Commenters believe that the list of items to be included in the Technical Specifications, as set forth in Section 6.9(b) of the CAT NMS Plan, is appropriate and reasonable? Do Commenters believe that detailed descriptions of any of the listed items should be included in the CAT NMS Plan rather than in the Technical Specifications? Do Commenters believe that the list addresses all of the areas that should be included in the Technical Specifications? Are there other aspects of the CAT that require Technical Specifications? If so, please identify and explain why the additional Technical Specifications are needed.
Answer - The Technical Specifications should contain a complete and accurate description of all CAT Reporter interfaces and protocols to the CAT. Some examples of functions/interfaces not listed in the CAT NMS Plan for the Technical Specification content are: test tools and error correction tools, data validation tools, web interface, daily and monthly reports available for conformance to reporting requirements, administrative procedures and tools for defining CAT Reporters to CAT and users to the web interface, data authorization levels, and disaster recovery requirements.

The CAT NMS Plan does not contain the specificity and level of technical detail that would allow detailed technical and cost analysis, and implementation planning. The CAT NMS Plan requires comment and commitment to very specific Implementation Milestones, but without documenting specific designs or interfaces or approaches. These details will only be supplied with Technical Specifications, making it imperative that there be a checkpoint in the Implementation Milestones to reassess the schedule, based on the Technical Specification.

Question 53. How should Technical Specifications be communicated to the industry? Why?
Answer – A process similar to the OATS publication process occasionally followed today is recommended, which uses the industry groups for communications/review of proposed changes. FIF CAT WG recommends that the Plan Processor use a collaborative approach with the industry, taking advantage of input provided by industry groups prior to final Technical Specification publication.

The initial Technical Specification, due to the size and impact of the CAT system, requires an extended period of review prior to final publication (i.e., 6 months at a minimum). At least two iterative reviews with the industry should be required due to the expected commentary and necessary updates required to the

Specification prior to final publication. Publication of succeeding Technical Specifications after initial roll-out should always allow a six-month period of review and comment from the industry, and we would also recommend two iterative reviews of the draft specification.

Question 54 - What are the incentives for the Operating Committee to review the Plan Processor's interpretation of Technical Specifications and verify that the interpretation is consistent with the regulatory objectives of the Plan? What are the best practices to ensure sufficient review by the Operating Committee? What provisions of the Plan are in place to ensure that the Operating Committee follows these practices? What provisions, if any, could be strengthened? Please explain and provide supporting examples and evidence, if available.
Answer – The Operating Committee is comprised of Participants, who are regulators. They will be incented to ensure that Technical Specifications meet their own regulatory requirements; but it is important to note that interpretations of the technical specifications could have a significant impact on broker-dealers. It is essential that the industry perspective be included in this review/verification because the best way to ensure that the regulatory objectives of the Plan can be met is to involve all the stakeholders – this includes the Commission, the Participants, and the broker-dealer community.

Question 78 - Do Commenters believe that the CAT NMS Plan allows for sufficient pre-implementation testing support for CAT Reporters, including providing CAT Reporter feedback and accuracy reports? If not, what requirements should be added to the CAT NMS Plan?
Answer – The CAT NMS Plan should mandate the development by the Plan Processor of pre-implementation testing tools to assist CAT Reporters in the development and testing effort. This would reduce overall industry costs, ensure better quality data being submitted initially to CAT (and thereby aid in meeting the Maximum Error Rate and Retirement Error Rate), and reduce overall time to complete testing. Examples of test tools include:

- Tools that simulate the validation tests that will be performed on the submitted CAT reports; this would help not only during initial Phase 1 testing, but with every Material Change or new CAT release, as well as when firms update their own reporting systems
- Certification tests that validate "readiness state" would also assist both CAT Reporters and Plan Processor with a smooth roll-out process
- Tests which validate that connectivity meets the stated requirements
- Function and regression test suites available to CAT Reporters
- Error reports that pinpoint the error and offer suggestions on how to fix the error

Adequate help/customer service support is also essential in the overall test process. The stated 2500 calls/month are completely inadequate during the initial test phase and first year of roll-out of Phase 1. The SEC estimates that there will be approximately 171 "Insourcers" and 1629 "Outsourcers" as CAT Reporters. Even the "Outsourcers", who are ultimately responsible for CAT report submissions, will likely need to interface with the CAT on connectivity, testing, data submission and error correction. Assuming 1000 firms are required to report in the first phase of CAT Reporting, it translates to a CAT NMS Plan "supported" call volume/CAT Reporter of 2.6 calls/month. That will likely be exceeded in a day during the initial test and production phases. Without adequate help/service support with reasonable response times during the test phase, CAT Reporters will not be able to complete testing on schedule and the data quality will be comprised. Initial roll-out will be similarly affected.

Question 81. Do Commenters believe that the proposed CAT NMS Plan sets forth acceptable milestones to measure the progress of developing and implementing the CAT? Why or why not?

Question 82. The CAT NMS Plan sets forth significant phases of development and implementation and a projected timetable for each stage. Are these projections appropriate and reasonable? If not, why not, and what is a more appropriate and reasonable timeline?
Answers to 81, 82– No, the FIF CAT WG does not find the implementation milestones included in the CAT NMS Plan to be acceptable, appropriate or reasonable.

Tables 3(a) – 3(c) provide FIF CAT WG recommendations regarding the CAT NMS Plan Objective Milestones to Assess Progress (SEC Rule 613(a)(1)(x)).[48] CAT NMS Plan Appendix C - 10(a), Publication and Implementation of the Methods for Providing Information to the Customer-ID Database and CAT NMS Plan Appendix C-10(b) Submission of Order and MM Quote Data to Central Repository are shown in the same table (Table 3(a)-(b)) below because FIF CAT WG is recommending combining many of the milestones.

Table 3(a)-(b). FIF CAT WG Recommendations Regarding Plan Milestones to Assess Progress

CAT NMS Plan		**FIF CAT WG Recommendations**	
Milestone	**Projected Completion Date in CAT NMS Plan**	**FIF CAT WG Recommendation**	**Discussion of Milestone**
Selection of Plan Processor			
Participants jointly select the Initial Plan Processor pursuant to the process set forth in Article V of the CAT NMS Plan	**2 months after Effective Date**	**Can occur anytime between now and Effective Date**	We believe the Participants have sufficient information and have had sufficient time to deliberate so that the Plan Processor can be chosen now. Selection of the Plan Processor should not be dependent on CAT NMS Plan approval.
Specification Phase for Participants and Industry Members			
Plan **Processor begins developing Technical Specifications(s) for Participant** submission of order and MM quote data.	**10 months before Participants** are required to begin reporting data to the Central Repository	Plan Processor begins developing Combined Industry Member Technical Specifications (orders, quotes, allocations, customer information) jointly with Participant Specification **two months after Effective Date or on Plan Processor selection, whichever** comes first. CAT NMS Plan is missing milestones for Allocation Report specifications and start of developing Customer Account Information Technical Specs.	Due to cross dependencies between Participant and Industry Member CAT interfaces and cross dependencies between order, quote and customer information, all specifications should be developed jointly.
Plan Processor **begins developing Technical Specification(s) for Industry Members submission of order data**	**15 months before Industry Members** (other than Small Industry Members) are required to begin reporting data to the Central Repository		
		Participant exchanges publish draft options MM Quote Time specification coincident with publication of draft Participant Specification CAT NMS Plan does not include this milestone	Options MM quoting specification should be published coincident with Participant Specification because of the cross dependencies between the CAT reporting requirement and the Options MM quote reporting requirement

[48] CAT NMS Plan, Appendix C (pp. 99-105)

Plan Processor publishes **iterative drafts of (Participant) Technical Specification(s)**	As needed before publishing of the final document	No change recommended in CAT NMS Plan milestone	
Plan Processor **publishes iterative drafts of (Industry Member) Technical Specification(s) (for order data)**	As needed before publishing of the final document	At least two iterative draft reviews required for Industry Member Technical Specifications. **Time to complete reviews, update specifications, and secure approvals cannot be estimated at this time.** CAT NMS Plan does not include publishing draft specifications for Allocation Reports and Customer Information	At least two iterative reviews will be necessary on Technical Specifications due to Rule complexity and lack of specificity prior to publication of Technical Specification
Participant exchanges publish **iterative draft for options MM quoting,** publish specifications for adding Quote Sent time to Quoting APIs	Not included in CAT NMS Plan	Participant exchanges publish one iterative draft review of options MM Quote Time specification. CAT NMS Plan does not include this milestone	One iterative draft review should be published for the options MM quoting specification
Plan **Processor publishes Technical Specification(s) for Participant submission** of order and MM Quote data	**6 months before Participants are required to begin reporting** data to the Central Repository	No change recommended in CAT NMS Plan milestone	Final Participant Specification can be published ahead of Industry Member Technical Spec because many elements of Industry Member Technical Spec will not apply to Participant Spec
Participant exchanges that support options MM quoting **publish (final) specifications for adding Quote Sent time to Quoting APIs**	**6 months before Industry Members** (other than Small Industry Members) **are required to begin reporting data** to the Central Repository	**Publish final options MM quoting specification following one iterative review of draft spec**	An initial specification should be published by Participant exchanges that support options MM Quote Time with one iterative review prior to final publishing of the options MM quoting spec
Plan Processor **publishes Technical Specification(s) for Industry Member submission of order data**	**1 year before Industry Members** (other than Small Industry Members) **are required to begin reporting data** to the Central Repository	Final Combined Industry Member Technical Specifications (orders, quotes, customer information) published. **Time to complete reviews, update specifications, and secure approvals cannot be estimated at this time.**	Due to cross dependencies between order, quote and customer information, all specifications should be developed jointly
Plan Processor **publishes Technical Specification(s) for Industry Member submission of Allocation Reports**	Not Included in CAT NMS Plan		
Plan Processor **publishes** the **Customer Information Technical Specifications** for Industry Members to report Customer Account Information to the Central Repository	**6 months before Industry Members (other than Small Industry Members) are required to begin reporting data** to the Central Repository		
Plan Processor **publishes the connectivity requirements** for Industry Members to connect to the Central Repository.	**6 months before Industry Members (other than Small Industry Members) are required to begin reporting**	**Connectivity Requirements published 3 months prior to start of test for reporting** customer information to CAT	Connectivity Requirements are needed at least 3 months prior to connection to test environment for validation of customer information reporting to CAT to

	data to the Central Repository		allow sufficient time for purchase/installation/configuration of network connections including security testing
Plan Processor **publishes the procedures** for the Central Repository.	**6 months before Industry Members (other than Small Industry Members) are required to begin reporting data** to the Central Repository	FIF CAT WG cannot make a recommendation at this time because we do not understand what is encompassed by "procedures"	
Development and Testing			
Plan Processor begins connectivity testing and accepting order and MM Quote data from Participants for testing purposes	**3 months before Participants are required to begin reporting** data to the Central Repository	No changes recommended to milestone	
Plan Processor plans specific testing dates for Participant testing of order and MM Quote submission	**Beginning 3 months before Participants are required to begin reporting** data to the Central Repository	No changes recommended to milestone	
Development of Industry Member CAT support	Not included in CAT NMS Plan	**3 months prior to start of industry test for start of development** of Industry Member support for CAT. The actual time needed must be determined after publish of Technical Spec	Development should start a few months prior to industry test due to complexity of rule, and to allow service bureaus to have enough time to develop /test their systems and then test with their clients
Industry Members (other than Small Industry Members) begin connectivity and acceptance testing with the Central Repository	**3 months before Industry Members (other than Small Industry Members) are required to begin reporting data t**o the Central Repository	No changes recommended in milestone for Certification test	Certification test defined as verification of CAT Reporter connection capability to CAT and basic reporting interfaces
Plan Processor begins connectivity testing and accepting order data from Industry Members (other than Small Industry Members) for testing purposes	**6 months before Industry Members** (other than Small Industry Members) are required to begin reporting data to the Central Repository	**A minimum of 12 months before Industry Members** are required to begin reporting data to the Central Repository	A minimum of 12 months is required for industry test with CAT
Plan **Processor plans specific testing dates for Industry Members (o**ther than Small Industry Members) testing of order submission	**Beginning 3 months before Industry Members** (other than Small Industry Members) are required to begin reporting data to the Central Repository	**Specific Plan Processor testing dates for Industry members should commence at least 6 months** before Industry Member start of reporting	
Start of Industry Member Reporting			
Participant exchanges that support options MM quoting **begin accepting Quote Sent time on Quotes**	**1 month before Industry Members** (other than Small Industry Members) are required to begin reporting data to the Central Repository	No changes recommended in milestone	
Industry Members (other than Small Industry Members) **begin reporting**	**1 month before Industry Members (other than Small Industry Members) are**	Industry Members begin reporting customer/ institutional/ firm account	To allow the maximum time for testing, a staged roll-out into production is not recommended.

customer / institutional / firm account information to the Central Repository for processing	**required** to begin reporting data to the Central Repository	information **coincident with start of order reporting**	
Industry Members (other than Small Industry Members) **begin reporting order and allocation data to the Central Repository for processing**	"**within two (2) years after the Effective Date, each Participant shall, t**hrough its Compliance Rule, require its Industry Members (other than Small Industry Members) to report to the Central Repository Industry Member Data;"	**Start of reporting should be set based on schedule established following publication of Technical Specification**	Due to the complexity of the Rule and lack of specificity in the CAT NMS Plan, it is not possible to accurately establish a schedule until Technical Specifications are published

Table 3(c). Linkage of Lifecycle of Order Events

Milestone	Projected Completion Date	FIF CAT WG Recommendation	Discussion
Participants			
Using order and MM Quote data submitted during planned testing, Plan Processor creates linkages of the lifecycle of order events based on the received data	3 months before Participants are required to begin reporting data to the Central Repository	No change recommended to CAT NMS Plan	
Participants must synchronize Business Clocks in accordance with Section 6.8 of the CAT NMS Plan	4 months after effectiveness of the CAT NMS Plan	No change recommended to CAT NMS Plan	
Industry Members			
Using order and MM Quote data submitted during planned testing, Plan Processor creates linkages of the lifecycle of order events based on the received data	6 months before Industry Members (other than Small Industry Members) are required to begin reporting data to the Central Repository	12 months before Industry Members are required to begin reporting data to Central Repository	Industry Members require at least 12 months for testing due to complexity of rule, and to allow service bureaus to have enough time to test their systems and then test with their clients
Industry Members must synchronize Business Clocks in accordance with	4 months after effectiveness of the CAT NMS Plan	No change recommended to CAT NMS Plan	

FIF CAT WG does not recommend any changes to the CAT NMS Plan milestones documented in Appendix C-10(d) or Appendix C-10(e); nor are any changes recommended for milestones associated with the second group of Industry Reporters.

Question 184. Do Commenters believe the phased approach for CAT implementation, whereby SROs would begin reporting CAT Data one year prior to other CAT Reporters and two years prior to small CAT Reporters, would affect the quality of the CAT Data and the number of available CAT Data items in the audit trail?

Answer – Generally, a phased approach to an implementation plan should reduce the overall risk associated with the plan. Having Participants be the first group of CAT Reporters is reasonable. It is a smaller set of users and smaller function set for the Plan Processor to deliver in this first roll-out of functionality. The division of Industry Members between large and small firms is not the optimum group of users, as this grouping does not provide an obvious advantage to help reduce risk to the implementation plan. Another grouping that has some benefits is current tiered separation of OATS reporters versus non-

OATS reporters. This grouping ensures that only experienced regulatory reporting users are in the initial reporting group of CAT Reporters, which eases the customer support required of CAT in the initial reporting period. It may also improve the linkages that can be resolved within the first year of CAT reporting.

FIF CAT WG does not have the data available to estimate the difference in CAT reporting that would occur with these various grouping alternatives. Linkage effectiveness should be one criteria used in establishing any phasing of CAT reporting.

Another phased approach would be based on functionality – equities, options and allocations are three possible function grouping to consider.

Question 444. Process to Develop the CAT. Bidders proposed, and the Plan describes, several processes for development of the CAT: the agile or iterative development model, the waterfall model, and hybrid models. The CAT NMS Plan does not mandate a particular development process because any of the options could be utilized to manage the development of CAT. The CAT NMS Plan notes that the agile model is more flexible and more susceptible to the early delivery of software for testing and feedback, but that the agile model makes it more difficult to accurately estimate the effort and time required for development. The waterfall model would also facilitate longer-term planning and coordination among multiple vendors or project streams. The Commission requests comment on the strengths and weaknesses of each development process. The Commission further requests comment on whether the CAT NMS Plan should mandate a particular process and the impact on the relative costs and benefits of the mandating a particular process.
Answer – The specific development method to be used by the bidder should not be prescribed by the CAT NMS Plan. Generally, a bidder is expert in one or more development methodologies and should be allowed to choose the methodology most appropriate for the specific development effort. The different development methodologies can each be equally effective in an implementation plan, depending on many factors and trade-offs. The CAT NMS Plan, however, should prescribe criteria that must be met during the development and test cycles (e.g., quality levels, timeliness, etc.)

Question 445. Industry Testing. The CAT NMS Plan requires a dedicated test environment that is functionally equivalent to the production environment and available 24 hours a day, six days a week. The CAT NMS Plan discusses alternative approaches for industry testing. Using the production environment for scheduled testing events on weekends or on specific dates would allow for realistic testing because multiple users are likely to test at the same time. However, CAT Reporters would not be able to test when it might be more convenient or less costly for them to test. The Commission requests comment on whether the Plan should mandate particular industry testing processes and the benefits and costs of these alternatives compared to the requirements of the CAT NMS Plan. How would either of these alternatives lead to more accurate data than the Plan? Would the alternatives otherwise affect the benefits of the CAT NMS Plan? How would either of these alternatives affect the costs of the CAT NMS Plan for CAT Reporters, Participants, and the Central Repository? Please provide estimates, if available.
Answer – CAT should provide a sufficiently robust test environment such that normal industry testing can be conducted during weekdays. Weekend testing should be accommodated but not required. The CAT test environment should be available 7 days a week to accommodate the various firms' testing schedules, including use of off-shore staffing. Given the accelerated error correction time frame dictated by the CAT NMS Plan, availability of a 24x7 test environment is very important especially when systemic issues need to be corrected and CAT reports validated. Unusual test requirements (e.g., DR testing, industry stress testing,

etc.) may require specially scheduled (occasional) weekend testing.

Question 446 - Quality Assurance (QA). The CAT NMS Plan mentions several alternative approaches to quality assurance, but does not select a particular approach. In particular, the CAT NMS Plan states that the Participants considered many approaches, including continuous integration, test automation, and industry standards such as ISO 20000 / ITIL. Although the Plan does not mandate a particular approach, certain requirements were detailed in the RFP. In addition, the CAT NMS Plan discusses the trade-offs associated with the QA staffing level. The Commission requests comment on whether the CAT NMS Plan should mandate a particular QA approach. Why or why not? If so, which approach should the Plan mandate? How can the QA approach affect the costs and benefits of the CAT NMS Plan? For example, how does the QA approach affect the accuracy and accessibility of the CAT Data? What are the relative strengths and weaknesses of the different quality assurance approaches?
Answer – A specific QA methodology should not be mandated within the CAT NMS Plan; however, it should meet the QA requirements that apply to a Regulation SCI entity. As with development processes, the CAT NMS Plan should not mandate methodologies but should include objective measurable criteria which it expects the Plan Processor to meet. E.g., prior to go-live, all Severity 1 problems must be fixed, 95% of Severity 2 problems must be fixed, etc. Tools to assist in Quality Assurance testing (e.g., test automation, test scripts, regression test buckets) would be of value and could be made available to CAT Reporters, to assist in ensuring a methodical and complete test.

The Operating Committee should consider the methodologies and tools it will use to enable the Committee to objectively measure the completeness, accuracy and quality of the Plan Processor deliverables, especially at the critical point of "go-live".

2.3. Error Processing

2.3.1 Error Rates Issues and Recommendations

It is impossible at this time to judge if 5% is a fair initial Maximum Error Rate, as there is no history of reporting quality rates for options, market making, customer information or allocations. There is little or no information provided in the CAT NMS Plan regarding the types of errors that will be identified, and if and how those errors can be corrected[49]. There are new CAT Reporters, who have little or no regulatory reporting experience. The interfaces and protocols that will be used by CAT Reporters are not defined today – we have no way to judge the ease or complexity of these interfaces. There is also no information on any test tools or the correction tool kit that will be provided by the Plan Processor to assist CAT Reporters in correcting any errors. CAT will be a new system with its own issues and problems; CAT's linkage logic – a critical and complex element in determining reporting accuracy – is new and unknown. All of these reasons would normally indicate a higher than normal initial error rate for the CAT system itself, as well as reporting by Reporters and that a longer than normal correction cycle would be needed. It is unreasonable to hold CAT Reporters to an error rate that has been arbitrarily determined, without knowing answers to these unknowns.

FIF CAT WG recommends the definition of two different error rates:

- The Maximum Error Rate should be used in judging the overall quality of reporting to CAT. For all the reasons listed above, the Maximum Error Rate cannot be determined at this time.

[49] There are instances today where errors cannot be corrected in OATS, e.g., true duplicates (exact same record transmitted to OATS more than once), non-reportable symbol (symbols not eligible for OATS reporting)

- The Retirement Error Rate is the quality of the specific data captured in CAT which will be used by the duplicative reporting system as its reporting source. This Retirement Error Rate, which could be unique for each duplicative reporting system, should be the defining factor in determining retirement of a duplicative system (or exemption from reporting to a duplicative system). The reporting quality to an existing duplicative reporting system is known today by the owners of those systems. However, there are other factors that may impact that rate when capturing comparable data in CAT (e.g., CAT system linkage logic and what errors will be identified by CAT). Therefore, the Retirement Error Rate should be "similar" (but may not be "exact") to an existing quality level to be eligible for retirement/exemption from reporting.

We recommend that the Maximum Error Rate and Retirement Error Rate be measured initially during the test period, and verified during the Trial Period through a collaborative and transparent process with industry input, based on what is achievable.

FIF CAT WG recommends the following regarding the Maximum Error Rate and the Retirement Error Rate:

1. Both the Maximum Error Rate and Retirement Error Rate should be calculated using data after it has been corrected ("post error corrected data"). The vast majority of surveillance and reconstruction activity occurs on post error corrected data. Using post error corrected data as the measurement tool ensures that CAT Reporters' and regulators' interests are aligned in the on-going maintenance of an accurate audit trail.
2. Based on the CAT NMS Plan statement that the Maximum Error Rate is "subject to quality assurance testing performed prior to launch"[50], we recommend that the CAT NMS Plan should require the post error corrected data quality of CAT reports to be measured initially during the test period and verified during the Trial Period, such that the overall Maximum Error Rate for all CAT reports can be established prior to go-live, with a transparent process so that the industry can provide input to the analysis.
3. One criteria for "go-live" should be that the quality of "comparable" data in CAT reports (equivalent to each of the duplicative systems being considered for retirement) meet the quality standards dictated by the regulators which own duplicative reporting systems (i.e., Retirement Error Rate), so that when CAT goes live, exemptions can be automatically granted to eliminate duplicative reporting while the regulatory retirement process proceeds in parallel. For example, the quality of the post error corrected OATS data should meet FINRA's quality level requirement for the "comparable" post error corrected OATS data collected in the Central Repository; the quality of options reporting in CAT should have no bearing on the question of exemptions from OATS reporting or OATS retirement.
4. Because of the inability to completely mirror the industry marketplace in a test environment, some short period (less than 6 months) of "industry wide verification" in a production environment (i.e., "Trial Period") will provide the opportunity to assess the actual error rate considering complete linkages and various complex trading scenarios.
5. The Maximum Error Rate, which is calculated daily, should be based on a rolling average, to minimize anomalies and industry-wide problems. It is our understanding that Compliance Thresholds, which "…will compare a CAT Reporter's error rate to the aggregate Error Rate over a period of time to be defined by the Operating Committee…"[51] can accommodate firms' individual daily fluctuations.

[50] CAT NMS Plan, Appendix C, A.3.b

[51] CAT NMS Plan, Appendix C, A.3.b

6. FIF CAT WG supports a goal of "de minimis" post correction error rate over time; however, we cannot predict, due to the unknowns listed above, when the CAT system and the quality of the industry reporting and error correction, will be able to achieve that goal. FIF CAT WG recommends continued focus on detailed error reporting statistics to CAT Reporters, both during the industry test period and after start of CAT reporting, so that CAT Reporters can collectively learn how to correctly report to the CAT. It is also important that the Plan Processor constantly analyze the reporting statistics to determine weaknesses in reporting and determine how the Plan Processor (through changes to the CAT system, improved test and error correction tools, better reporting tools to CAT Reporters, better training and instructions/FAQs to CAT Reporters) can collaboratively work with the industry to improve CAT reporting.
7. It is difficult to assess what the post-error correction rate should be after the first year of reporting, given the uncertainties of what the first year Maximum Error Rate will be and unknowns listed above. FIF CAT WG recommends a similar approach be used for changing the Maximum Error Rate after the first year of reporting, i.e., the Plan Processor will have collected one year of reporting data and identified the trends in reporting quality over the period; this data should dictate what is achievable and the Maximum Error Rate be set accordingly. This should be a transparent process involving the industry during this analysis.

Future expansion of CAT coverage to include new security classes (i.e. fixed income securities, mutual funds, etc.) should not automatically apply the same Maximum Error Rate that is in place for data included in Phase 1 of CAT.

Compliance Thresholds may provide a useful tool for regulators to measure and monitor firm compliance, but the CAT NMS Plan should contain the specific metrics that are included in this critical measurement for firms. Currently, only two metrics are cited: the Maximum Error Rate, measured over an unspecified period, against the overall group rate, and clock synchronization compliance[52]. "The SROs have only discussed two: clock synch compliance and individual firm error rate as compared to the industry group."[53]

2.3.2 Error Correction Timeframe Issues and Recommendations

FIF CAT WG has the following recommendations on error correction timeframes:

- We recommend that the current OATS error correction timeframe of 5 days be kept in place for the first year of CAT Reporting for each group of CAT Reporters. Future adjustments of this cycle can be considered at the later stages upon collection of statistics and measurements of reporting quality and timeliness. This allows a period during which the CAT system and its support infrastructure can be proven stable, and a body of supporting documentation (FAQs, reporting guidelines, instructional material) can be developed and absorbed by the CAT Reporters. It also allows analysis of detailed CAT reporting to better understand, and improve, the initial reporting by CAT Reporters, the error identification by the CAT system, and the error correction by the CAT Reporters. The test and validation tools can be improved so they become more effective and efficient at assisting with CAT reporting.

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[52] CAT NMS Plan, Footnote 113, "Compliance Thresholds will include, among other items, compliance with clock synchronization requirements; Footnote 102, "Compliance Thresholds will compare a CAT Reporter's error rate to the aggregate Error Rate over a period of time to be defined by the Operating Committee".

[53] FIF Letter to SROs, May 1, 2015 re: Amended and Restated CAT NMS Plan; SROs Verbal Response to FIF Questions on Amended CAT NMS Plan, May 6, 2015 DAG meeting

- FIF CAT WG recommends that the Plan Processor identify errors with customer information data by T+1 at noon, to coincide with the deadline indicated in the CAT NMS Plan for the Plan Processor to identify errors in transaction reports. This will allow better analysis of any linked errors, and also provide more time during the normal trading day to contact the client for updated client information to correct any errors.

- We believe that the 5-day timeframe for error correction should begin from the time the reject or error message was received, not from the time of submission. In addition, if the CAT system is unavailable due to outages, the Plan Processor, upon system recovery, should be required to allow the full amount of time to CAT Reporters for initial submission of reports or corrections of errors. In these cases, CAT reports should not be classified as "late reports".

FIF CAT WG has consistently voiced its concerns that the CAT NMS Plan's stated error rates and error correction timeframes are excessively aggressive, given the industry's experience with OATS. FIF CAT WG is concerned that the Plan does not allow a reasonable CAT system introduction whereby both the Plan Processor and CAT Reporters can learn and adapt to the new system in a collaborative environment, with a focus on rapid improvement and performance rather than on penalties and failure. Although there is a current body of evidence and experience with the processing of equity order reporting (which supports a 5-day error correction timeframe), there is little or no experience with regulatory reporting of customer information and options data, for example.

The current OATS error correction timeframe permits an error correction cycle 2 days longer than the proposed CAT error correction timeframe. The CAT NMS Plan does not include any description of reporting, testing or validation tools that will be made available to the CAT Reporter that might justify an improved reporting and error correction experience. Furthermore, the CAT NMS Plan specifically excludes CAT Reporter access to its reported data using a bulk data extract format, a feature that would facilitate error validation and correction.

The CAT NMS Plan stipulates that the Plan Processor must communicate CAT customer data errors to CAT Reporters by 5 PM on T+1, where T=Trading Day. This may require staffing adjustments by the CAT Reporters in order to make compliance, operations and IT staff available after 5PM to analyze and correct the errors. In cases where communication with a client may be necessary to make corrections, that will likely not be possible until the next day, at the earliest. Practically speaking, an 8 AM T+2 checkpoint is equivalent to a 5PM T+1 checkpoint from a CAT Reporter's perspective. Also, communicating errors on CAT transactions and customer information errors to CAT Reporters on different timeframes (T+1 by noon and T+1 by 5 PM respectively) is a disadvantage for CAT Reporters because there may be linkages between transaction and customer information errors. The error correction window is already too narrow; the schedule for corrections included in the Plan further shortens the timeframe for correcting linked transaction and customer information errors.

We believe that a less aggressive, measured approach towards reduction in the error correction timeframe over time will produce better quality results, with less overall cost to the industry than the proposed approach.

2.3.3 Error Reporting Detailed Recommendations

FIF CAT WG supports the inclusion in the CAT NMS Plan of the daily reporting of error statistics and monthly report cards. These daily reports should be as detailed as possible, allowing firms to better understand the issues with their CAT reporting so problems can be quickly corrected. The reports should also provide insight for the Plan Processor into the CAT system's processing and enable the Plan Processor to quickly pinpoint any CAT system problems that are contributing to CAT Reporter issues. Systemic problems, affecting many CAT Reporters, may be best addressed through either system changes, improved documentation/FAQs, pre-validation tools, and/or improved customer support.

We recommend very granular error reporting, statistics and analysis for determining trends and identifying the root cause of reporting problems, whether they are CAT Reporters' issues or due to systemic issues with the CAT platform. For example: additional categories defined for the purpose of trend analysis (e.g., by asset class, business model, desk type or number of desks, distribution of event types or destination, or parameters within the CAT report) will help identify where reporting problems tend to arise. FIF CAT WG recommends that the current OATS categories of errors be used as a base for CAT reporting. These categories are:

- Rejects (most important error category as the report cannot be used until corrected)
- Unmatched executions
- Unmatched exchange routes
- Inter firm received unmatched
- Inter firm sent unmatched
- Out of sequence
- Late reports (least important error category because, although late, the data is included in the audit trail)

This should enable the Plan Processor to better determine if there are patterns of errors that can be easily or quickly corrected. Reporting of this trend analysis data to CAT Reporters would assist them in better understanding and improving their reporting.

2.3.4 Answers to SEC Questions re: Error Processing

Question 171. Do Commenters believe the CAT NMS Plan's initial Maximum Error Rate of 5% for CAT Data reported to the Central Repository is appropriate in light of OATS' current error rate of less than 1%? Why or why not?

Answer – FIF CAT WG cannot say if 5% is an appropriate initial Maximum Error Rate because of so many unknowns at this time, e.g., which errors will be detected by CAT, the undefined CAT system and system interfaces, the "new" (non-OATS) CAT Reporters and their lack of regulatory reporting experience, reporting of new asset classes (options) and new data types (customer information) and new events (allocations). FIF CAT WG recommends measuring the post-error correction rates during industry test of the CAT system and setting the Maximum Error Rate based on more complete information obtained during the Trial Period.

Question 172. Please provide examples of error rates that are generally accepted with respect to other regulatory data reporting systems. At what error rate should data be considered materially unreliable? Please explain.

Answer – Other than OATS, FIF CAT WG is not aware of other regulatory reporting systems that systematically and on a daily basis analyze the input data and provides error reports and error statistics to

the Reporters. The regulators are in the best position to cite error rates of current duplicative systems and what errors rates would be considered materially unreliable. It should be noted, however, that FINRA has been able to effectively surveil the marketplace over the last 18 years, with the error rate starting at 25%. It should also be noted that the current OATS error rate of less than 1% is misleading, because there are OATS limitations that prevent corrections on a small subset of errors; e.g., true duplicates (exact record transmitted to OATS more than once), non-reportable symbol (symbols not eligible for OATS reporting).

Question 173. Do Commenters believe the CAT NMS Plan's initial maximum Error Rate of 5% would negatively affect the quality of CAT Data? Why or why not? In explaining why or why not, please address each quality (accuracy, completeness, timeliness and accessibility) separately.
Answer – The question to be asked is – what error rate is technically feasible at the time that CAT is ready to be promoted to production. If that error rate is deemed not acceptable to the regulators, then CAT promotion to production should be postponed until an acceptable error rate can be achieved. A zero error rate would indicate perfect quality but the cost and time to achieve that goal needs to be balanced against the regulatory benefit and more immediate usefulness of an audit trail with a reasonable error rate. FIF CAT WG does not have the data to perform that analysis. We will point out that OATS reporting had a high error rate for many years, yet FINRA was able to fulfill its regulatory obligations.

Question 174. Do Commenters believe that it was reasonable for the Participants to compare the contemplated Error Rates of CAT Reporters to the error rates of OATS reporters in the time periods immediately following three significant OATS releases in the last ten years? Why or why not?
Answer - OATS provides a sufficient comparison base for equities data only. There is no reporting regime comparable to OATS for options, allocation, Customer information or market making reporting and for other (eventual) new asset classes. These new types of data may exhibit very different reporting characteristics and error rates and should be studied first, as in a pilot, before setting an error rate. FIF CAT WG believes that the initial Maximum Error Rate for post error corrected data should be established based on measurements taken during the industry test period, and verified during the Trial Period, prior to go-live. Furthermore, we reiterate that as new security classes are added to CAT, one cannot automatically apply the same Maximum Error Rate that is in place for data already included in Phase 1 of CAT.

Question 175. If not 5%, what initial maximum Error Rate do Commenters believe Participants and Industry Members should be subject to and why?
Answer – As stated earlier, FIF CAT WG believes that the initial Maximum Error Rate for post error corrected data should be established based on measurements taken during the industry test period, and verified during the Trial Period, prior to go-live. We are not aware of any available modeling data that could predict an error rate given the information available today on the CAT system, interfaces, instructional material and test support structure for CAT Reporters. It is very important that whatever initial Maximum Error Rate is set, that it is an achievable error rate for the industry CAT Reporters.

Question 176. What impact, if any, do Commenters believe a 5% initial maximum Error Rate would have on Industry Members' costs of compliance? Please describe the costs of correcting audit trail data. Given the costs of correcting audit trail data, do Commenters believe that establishing a lower maximum Error Rate could be less costly to Industry Members? Why or why not? How much less costly?
Answer – To provide perspective, it is never the intention of a CAT Reporter to introduce errors into its regulatory reporting. Rather, considerations including quality, completeness and accuracy of specifications, along with extensive use cases, elongated test cycles with extensive test tools and support structures, specific test cycles with other firms to allow extensive linkage testing, and industry verification test to CAT

reporting in a production environment, would all contribute to allowing a lower initial Maximum Error Rate to be achievable by CAT Reporters. None of these factors are included in the CAT NMS Plan at this point. It is acknowledged that some or all of these factors may increase the initial cost of implementation, or extend the implementation time. However, they may (or should) result in a lower error rate, and thereby reduce the overall yearly reporting cost for a CAT Reporter, as well as lower the cost of the Central Repository for error processing and correction. These are the trade-offs that need to be considered when attempting to reduce error rates.

Firms have different approaches for correcting regulatory reporting data. Some firms correct their errors through a cancel/correct process through the front office. Other firms may choose to selectively correct errors in regulatory reporting through the tool sets provided by the regulatory reporting system. It is very difficult to predict the cost of correcting CAT data without understanding the categories of errors that will be discovered by the Central Repository; nor is anything known of the test tool set and error correction tool set that will be provided by the Plan Processor.

FIF CAT WG is recommending that the Maximum Error Rate is based on post error corrected data. Most surveillance activities are based on post error corrected data.

Question 177. What impact, if any, do Commenters believe a 5% initial maximum Error Rate would have on the timing of the retirement of any redundant audit trail systems and any related costs? Please explain. Should the actual Error Rate for CAT Data affect the timing of the retirement of any redundant audit trail systems? If so, why? If not, why not?
Answer – The only error rate that should be a determining factor in the timing of the retirement of duplicative reporting systems, is the error rate of its comparable data in the CAT audit trail after resubmission of corrected events (i.e. Retirement Error Rate). E.g., for OATS, only the comparable data captured by OATS today for equities should be used as the measurement for determining if the CAT data is of sufficient quality to allow OATS retirement and exemption from duplicative reporting to OATS. The focus on measuring only that which is currently included in OATS would exclude from those calculations any market making activity, products other than equity securities, CAT reporters that are currently excluded from OATS, allocations reports and customer data.

As a test or verification that the CAT data is sufficient for regulatory purposes, regulators could quickly start examining data from CAT at the same time they are requesting data to be provided from Reporters (e.g. EBS inquiries) – and compare the two data sources for accuracy and completeness.

Question 178. Do Commenters believe the CAT NMS Plan's target maximum Error Rate of 1% for CAT Data reported to the Central Repository pursuant to the CAT NMS Plan's phased approach is the appropriate target maximum Error Rate in light of current industry standards? If not, why not? If not 1%, what target maximum Error Rate do Commenters believe Participants and Industry Members should be subject to and why?
Answer - As stated earlier, it is difficult to assess if a 1% maximum error rate after 12 months of reporting should be considered appropriate or too aggressive. Although FIF CAT WG would prefer a more gradual drop in the error rates, FIF CAT WG is recommending that a measured approach be used. After the first year of reporting, the Plan Processor will have captured one year of statistics on the quality level of reporting, including trends over the year. Based on this data, the Operating Committee, with input from the industry on the analysis, should establish an achievable Maximum Error Rate for the second and third year of reporting.

Question 179. Do Commenters believe there are any increased risks as a result of allowing CAT Data subject to an initial maximum Error Rate of 5% to be reported to the CAT? How difficult would it be for the Central Repository to process and analyze CAT Data based on data reported subject to an initial maximum Error Rate of 5%? Specifically, what are the increased risks, if any, of CAT Data reported subject to an Error Rate of 5% in respect of combining or linking data within the Central Repository or across other sources of trade and order data currently available to regulators?
Question 180 - Do Commenters believe there are any increased risks as a result of allowing CAT Data subject to a target maximum Error Rate of 1% to be reported to the CAT? How difficult would it be for the Central Repository to process and analyze CAT Data based on data reported subject to a target maximum Error Rate of 1%? Specifically, what are the increased risks, if any, of CAT Data reported subject to an Error Rate of 1% in respect of combining or linking data within the Central Repository or across other sources of trade and order data currently available to regulators?
Answers to 179, 180 – It is difficult to assess the Central Repository risk associated with any particular Maximum Error Rate. FINRA is in the best position to provide this assessment having compiled more than 18 years of OATS reporting data. Throughout that period, FINRA was able to successfully surveil the marketplace and link/combine data, even with some very poor error rates.

All errors should not be treated with the same severity. Some errors can be quickly identified and auto-corrected by CAT, with no or little impact to regulators. Some errors may not be auto-corrected by CAT but would not materially impact regulators in any way (e.g., incorrect street address on Customer information while still resolving to the correct beneficial customer). Some errors, e.g. late reporting, are immediately resolved through the process of reporting late. Other errors could be more problematic – e.g., linkage errors. Without knowing the matching algorithms and logic to be used by the Plan Processor, it is difficult to assess the impact a linkage error may have on the Plan Processor's ability to match succeeding records. There can be corroborating reports that can assist in resolving linkage errors. A list of OATS error categories is provided in Appendix Section 2.3.3, listed in a proposed priority (severity) order. It is recommended that CAT use this categorization as the base for its error categories.

Question 181. The CAT NMS Plan provides that the Participants would review and reset, at least on an annual basis, the maximum Error Rate. Do Commenters believe that this establishes an appropriately rigorous schedule for the Participants to evaluate whether the maximum Error Rate could potentially be set to a lower rate? Are there other factors that should affect when/how the maximum Error Rate is set?
Answer – An annual reassessment of error rates is reasonable; however, the methodology used for this reassessment should be based on measurement of the previous year's reporting error rates and the trends these rates suggest. The objective should be an error rate which meets regulators' surveillance objectives and is achievable by the CAT Reporters, at a reasonable cost. Any suggested change in the Maximum Error Rate should involve the industry in a collaborative analysis. Additionally, complexity of CAT reporting for the broker-dealer should be taken into account: exchange CAT reporting is very different from the multi-step reporting performed by broker-dealers.

Question 182. The CAT NMS Plan provides as a goal a four-year phased approach schedule to lower the maximum Error Rate segmented by Participants, large broker-dealers and small broker-dealers. Do Commenters believe a phased schedule is appropriate and reasonable? Do Commenters believe establishing segments is appropriate and reasonable, and if so are these the appropriate Error Rate groupings? What alternative groupings, if any, do Commenters believe are the appropriate Error Rate groupings?

Answer – The four year phased approach to lower the Maximum Error Rate proposes pre-determined error rates but does not consider the change in reporting groups, type of reporting for each group, history of regulatory reporting, etc. FIF CAT WG recommends a more analytical approach, incorporating actual measurements of error rates during the previous year's reporting and the impacts of system changes to correct flaws or as new instruments are added (e.g. fixed income).

Question 185. Do Commenters believe the CAT NMS Plan provides adequate enforcement provisions to ensure CAT Reporters submit data to the Central Repository no higher than the maximum Error Rate? If not, what additional enforcement provisions should the CAT NMS Plan provide?
Answer – FIF CAT WG recommends a positive reinforcement approach that provides firms an exemption from duplicative reporting systems if their error rate for "comparable" data in CAT is equal or less than the required Retirement Error Rate as dictated by the owner of the duplicative reporting system.

Question 186. Do Commenters believe that there should be a lower initial maximum Error Rate and/or a more accelerated or slower reduction of the target maximum Error Rate? Would an accelerated reduction of the target maximum Error Rate facilitate the earlier retirement of any redundant audit trail system? What should the initial maximum Error Rate and/or what should be the schedule for reducing the target maximum Error Rate?
Answer – As stated earlier, the Maximum Error Rate and the Retirement Error Rate required by owners of duplicative reporting systems for retirement (and exemption from duplicative reporting) consideration should be set through measurement of error rates during industry test and verified in the Trial Period recommended by FIF CAT WG. The rates should be set to meet objectives and achievability by CAT Reporters based on trends.

Question 189. Do Commenters believe that some errors are of greater concern than others? If so, what types of errors are more or less problematic? Should the type of error be considered when calculating Error Rates? If so, how should the Plan Processor take into account different types of errors when calculating Error Rates? How should the Participants take into account different types of errors when setting Error Rates?
Answer – Yes, we would believe that there is a distinction in the regulatory impact of different types of errors. The severity ranking of OATS error categories have been provided with Question 179. The regulators are in the best position to categorize which data elements are the most and least important to conduct market surveillance and market reconstruction. Consequences for poor quality data reporting should be proportional to their importance to regulators in their market oversight function.

Another method that can be used to determine the importance of quality of data elements in the audit trail is single vs. multiple sources of the same data. If two or more CAT Reporters will be supplying the audit trail with identical data (e.g., Exchange and Equities Market Maker reports of the same transaction), then the regulators would be able to effectively surveil the markets if only one of the two sources had good quality data. These types of errors should be noted statistically, but potentially should be excluded from regulatory assessments.

Question 194. Do Commenters believe the CAT NMS Plan's T+5 schedule for regulatory access to corrected and linked Order and Customer data is the appropriate schedule in light of current industry standards? If not, why not? Do Commenters believe that the SROs' determination of current industry standards is reasonable or appropriate? Do Commenters believe that it is appropriate to base the timing for regulatory access on industry standards? Why or why not?

Question 195. If the T+5 schedule is not appropriate, when do Commenters believe regulatory access to corrected and linked Order and Customer data should be provided and why? Do Commenters believe the SROs' should include in the CAT NMS Plan detailed provisions with milestones in achieving a more accelerated regulatory access schedule to corrected and linked Order and Customer data?
Question 196. Do Commenters believe the Plan's proposed error correction timeframe—i.e., communication of errors on T+1, corrected data resubmitted by CAT Reporters by T+3, and corrected data available to regulators by T+5—is feasible and appropriate in light of current industry standards? If not, why not, and how long do Commenters believe these error correction timeframes should be and why? Are shorter timeframes feasible and appropriate in light of current industry standards? Why or why not?
Answers to 194, 195, 196 – FIF CAT WG has consistently taken the position that a T+5 error correction cycle, which only provides two days for error correction, is not a reasonable time period. The industry has no experience, nor has it demonstrated an ability to meet this type of aggressive correction window. Experience with OATS (which can be argued is "industry standard") has proven difficult enough for firms to research and correct OATS reporting errors for complex business transactions. To shrink the error repair window from five (5) business days to less than two (2) business days constitutes a significant burden to the CAT Reporters and it is not evident at this point that this target can be reasonably met.

The CAT data validation and matching process has yet to be defined so the errors to be identified by CAT can only be speculated based on the current OATS error definitions. It also suggests that similar schedules for currently un-reported data (derivatives, market making, allocations, and client data) requires additional study and cannot be determined at this time.

The CAT NMS Plan will cut the window by 3 days, but has not detailed any improvements to the test or error correction process that would support shortening the cycle. The introduction of new data types (Customer information, options, Market Making for equities, allocations), new CAT system, new interfaces, first-time reporters for regulatory reporting should point toward extending the correction time frame, not shortening it. There is no data to verify that a more accelerated regulatory access schedule is realistic, nor any technology advantage being planned by the CAT which could justify such improved access schedule.

As stated in earlier responses, the industry has no benchmark, let alone an "industry standard" on error correction on the new data types (options, etc.). There can be no justification for a shortened error correction cycle for errors relating to these new data types.

For the OATS-like data reported to CAT, FIF CAT WG recommends the following error correction timetable at the start of CAT reporting:

- 8:00 AM ET T+1 — Initial Data Submission by CAT Reporters to CAT
- 12:00 PM ET T+1 — Initial Validation, Life Cycle Linkage, Communication of errors by CAT to CAT Reporters, including Customer Information
- 8:00 AM ET T+6 — Resubmission of Errors Due by CAT Reporters to CAT
- 8:00 AM ET T+7 — Reprocessing of Error Corrections by CAT to CAT Reporters
- 8:00 AM ET T+8 — Data Ready for Regulators

In case of an issue logged with the CAT help desk, the error corrections time line may need to be extended, if CAT processor actions or guidance is required. The time of the extension should depend on the time of the response. Another suggestion may be to exclude un-corrected items from the reportable statistics due to delayed response from the CAT help desk.

As with OATS today, subsequent events related to a New Order, Cancel/Replace, Combined Order/ Execution or Combined Order/Route Reports (that do not have a Time in Force Code of 'GTC', 'GTD' or 'GTM") can be reported within 5 days of the original order submission without being rejected for context.

FIF CAT WG supports the goal to receive prompt notification of errors and to swiftly correct those errors in order to produce an accurate audit trail of business transactions; however, at a minimum, the current OATS Error Handling timelines should be retained.

Question 197. To what extent do Commenters believe the CAT NMS Plan's T+5 regulatory access schedule to corrected and linked Order and Customer data would affect the accuracy, completeness, accessibility and/or timeliness of CAT Data collected and maintained under the CAT? How?
Question 198. To what extent do Commenters believe the Plan's three-day window of error correction would affect the accuracy, completeness, accessibility and/or timeliness of CAT Data collected and maintained under the CAT? How?
Answers to 197, 198 – Because FIF CAT WG does not believe that the CAT NMS Plan regulatory access schedule is reasonable or achievable, without changes to that schedule, it is our opinion that the quality and accuracy of the corrected data in the CAT will be compromised because firms will not have sufficient time to research and correct the identified errors. Given that all regulators will have access to the submitted data, the vast majority of which will be correct on T+1, and supporting data can be used to "investigate around" data records identified as in error, it is our opinion that the regulators can do significant surveillance analysis starting on T+1. The consolidation of the audit trail, the addition of new asset classes and customer information should put the regulators in a much improved position on T+1 over what is possible from today's data.

There is no data, supporting tools, methodology or support structure has been shared that would justify the shortened window, or to demonstrate that the industry can manage on the CAT NMS Plan 3-day correction cycle. We are therefore concerned that data quality of error correction will be sacrificed.

Question 266. The Plan specifies an error correction process after initial reports are received and indicates that practically all errors identifiable by the validations used in the error correction process would be corrected by 8:00 a.m. Eastern Time on day T+5, stating that errors are expected to be "de minimis" after the error correction period. Do Commenters believe that this is a reasonable conclusion? Please explain.
Answer – The CAT NMS Plan does not contain any rationale that supports the "de minimis" expectation post error correction phase. OATS does not achieve "de minimis" today. Details are not provided in the CAT NMS Plan that would demonstrate how the Plan Processor can identify, and allow CAT Reporters, to correct errors that OATS could not correct. And because there is no experience surrounding the reporting and error correction cycles of new data types, expecting "de minimis" after error correction for these data types does not seem reasonable or justified. Expecting "de minimis" errors after the error correction timeframe as specified in the CAT NMS Plan is not reasonable, because as stated above, the shortened error correction timeframes as compared with the OATS cycle today, will not provide sufficient time for firms to completely and thoroughly correct errors, leaving the audit trail compromised.

2.4 CAT Reporter Access to Bulk CAT Data

2.4.1 CAT Reporter Access to Bulk CAT Data - Issues

The CAT NMS Plan specifies that CAT Reporters cannot access data submissions through bulk data exports to facilitate error identification and correction, but can view their submissions online in a read-only, non-

exportable format. Yet, inconsistently, Data Submitters will be able to export bulk file rejections for repair and error correction purposes.[54] The CAT NMS Plan also states that "Participants discussed the data security and cost considerations of this request (sic – CAT Reporter access to their data) and determined that it was not a cost-effective requirement for the CAT".[55] We do not understand the technical or business rationale for this statement; we believe that it would be highly beneficial for CAT Reporters to have access to their own data and that this request should be re-examined. All CAT Reporters and Data Submitters must be identified to the Plan Processor just to submit data to the CAT; and the Plan Processor must have the capability to decide which data a Participant or Regulator can view. The CAT NMS Plan already provides view-only of a CAT Reporter's or Data Submitter's submitted data for error correction purposes, which means the security controls must be put in place to allow the Plan Processor to determine which data stored in the CAT database a requestor has authority to view. And, if the CAT NMS Plan is providing the functionality of "view-only" capability of submitted data via the CAT website, the Plan Processor must actually introduce special controls/restrictions to explicitly prohibit the data from being extracted in a downloadable format. It is imperative that this capability be considered in the design of CAT Reporter access, to ensure this functionality can be accommodated, even if not available to CAT Reporters in the first Phase (although it is in the early stages of usage, this feature would be most beneficial for error analysis/correction). Many bidders, in response to questions submitted by the FIF CAT WG [56] indicated that CAT Reporter access to their own data was either in their design or was little or no delta cost to add.

Due to security concerns, retrieval of PII data could be authorized to a limited set of CAT Reporter personnel who have responsibility for entering/correcting customer information, and we would expect the same to apply to retrieval of PII data by regulators.

CAT Reporter and Data Submitter access to their data submitted to CAT is important for a number of reasons (see Appendix Section 2.4.2); and, the functionality that can be provided within the CAT NMS Plan can be multi-layered and can be phased in with the rollout of the CAT. However, to completely exclude access in the CAT NMS Plan to any reasonable access to the CAT data will deprive the CAT Reporter of a significant tool to assist in error identification and correction.

2.4.2 CAT Reporter Access to Bulk CAT Data – Recommendations

FIF CAT WG strongly recommends the addition of CAT Reporter bulk data access to its own data in CAT. The justification for this request is itemized below:

- The most important use of bulk data extract would be for error analysis and correction. The ability to see the data sets of original CAT report submissions (both transactional and customer information data), errors/rejects identified by Plan Processor, corrections submitted by CAT Reporters and post-processing changes made by Plan Processor would greatly increase the efficiency and quality of the CAT Reporter error correction process.
- Additionally, data extracted from the CAT data base by the Plan Processor and provided to the CAT Reporters should be in a downloadable format for easy correction/modification by a CAT Reporter and allow easy upload to provide corrections to the Plan Processor.
- Assuming that CAT reports need to be saved to meet regulatory requirements, capturing a copy of the CAT submissions when entered on the CAT web-site would be very useful, especially for small industry

[54] CAT NMS Plan, Appendix D, Section 10.1, CAT Reporter Support
[55] CAT NMS Plan, Appendix C, Section 11 (b)
[56] September 5 – 8, 2014, written responses by bidders to questions submitted by FIF CAT WG

members who might exclusively use the web-site for submissions. Access to the captured submissions could eliminate the need for the building of a data capture tool (or definition of manual processes) by the CAT Reporter. It is assumed that CAT Reporters submitting CAT reports via file transfer already have the file containing CAT submitted reports which can be used for Books and Records purposes.

- Viewing by the CAT Reporter of the corrected data (by either the CAT Reporter or the Plan Processor) would allow the CAT Reporter to verify the accuracy of corrected data.
- Bulk data extract can also be very useful for internal surveillance operations, to track and verify that internal trade processing is compliant.
- Bulk data extract functionality would allow CAT Reporters to track and verify CAT report submissions made by third party providers on their behalf, providing a cost-effective solution to fulfilling their regulatory oversight responsibilities.
- Bulk data extract would enable CAT Reporters, who are undergoing CAT regulatory examinations, to better respond to examinations.
- Access via a query tool would be very useful, allowing selected retrieval of only the data needed. This is especially important when the data set would be very large. Query access allowing selected retrieval of data may reduce CAT resource overhead in the transmission of very large data sets.

With the availability of bulk data extract functionality, it is envisioned that "value added services" could be provided by the Plan Processor or third party vendors that would have significant value to CAT Reporters. These services could include:

- Targeted surveillance functionality allowing each firm to monitor and surveil its trading activities for regulatory compliance
- Reconciliation services between the Plan Processor and CAT Reporter
- Reporting services - e.g., 605/606 statistics, sophisticated CAT report analyses and statistics
- Query tools to allow CAT Reporters to extract statistics for regulatory reporting requirements
- Robust query tool allowing a CAT Reporter regulatory/compliance inquiry team to perform their own research and not need specialized IT services. It is assumed that this type of tool set will be developed for SEC and Participant surveillance. A subset of that tool set, appropriate for CAT Reporter surveillance purposes accessing only CAT Reporter owned data, could be made available for CAT Reporter use.
- Tracking of linkages from order originations to executions (without revealing confidential firm information), or at a minimum to the adjoining route.

Appendix 3. Exemptive Relief Requests

3.1 Exchange Only Reporting of Options Market Maker Quotes

FIF CAT WG supports the provision of Rule 613 to collect option quote information for purposes of market surveillance and reconstruction. The most efficient way to achieve that goal is for the data requested to be provided exclusively by the exchanges. Requiring options market makers to also submit quotes would result in considerable implementation and ongoing costs to both options market makers and the CAT processor[57] without corresponding benefits. The Exemptive Relief granted relieves options market makers from reporting options market maker quotes. However, options market makers must include the quote sent time on exchange submissions as this is the one data element that is only available from options market makers.

[57] FIF, SIFMA and STA Cost Survey Report on CAT Reporting of Options Quotes by Market Makers, November 5, 2013

3.1.1 Qualitative Benefits of Exchange-Only Reporting of Options Quotes

Market maker submission of options market maker quotes would be one of the single largest contributors of volume in the Central Repository, estimated at 18 billion records/day[58]. Eliminating this duplicative reporting significantly reduces the daily volume of data that must be consumed and maintained in the Central Repository, as well as the cost and oversight burden to options market makers in sending that data. It also reduces complexity associated with CAT processing eliminating the need for additional reconciliation.

3.1.2 Cost Estimate of Market Maker Reporting of Options Quotes

The results of the cost estimate survey[59] conducted by the industry associations (FIF, SIFMA[60], STA[61]) show a large direct cost to be borne by the options market makers for Consolidated Audit Trail (CAT) reporting for quote reporting. Over a five-year period, the eighteen survey participants would spend $118.0M to meet the current Rule 613 requirement of market maker reporting options quotes to the CAT, and it is estimated that the cost to all options market makers to meet these obligations would be $307.6M to $382.0M. This would be burdensome, especially to smaller options market makers considering that options market makers are already undergoing cost and consolidation pressures.

The survey demonstrates that the costs disproportionately impact the smaller market maker; specifically, the costs required to support this regulation for the smaller market maker is 33% of the cost to the primary market maker, yet the average volume for the smaller market maker is 6% to 7% of the primary market maker. The disproportionate cost of complying with this regulation is likely to have a negative impact on competition and the ability of new and existing market makers to profitably participate in this segment of the industry. Indirect costs, such as impact on competition and opportunity costs, were not sized as part of this survey, but should be considered when evaluating the impact of this Rule 613 requirement on options market makers.

Another cost not included in this direct cost estimate is the cost required to implement this functionality within the CAT processor. The CAT RFP estimated that market maker reporting of options quotes would represent 30% of the total volume of CAT reports to be captured by the CAT.[62] The infrastructure scaling for this extra capacity across processors, storage, network bandwidth, systems performance, operations management in the production, disaster recovery, development and test CAT systems represents a

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[58] Consolidated Audit Trail National Market System Plan, Request for Proposal, February 26, 2013, V1.0, Sections 2.5.1, Data Type and Sources

[59] FIF, SIFMA and STA Cost Survey Report on CAT Reporting of Options Quotes by Market Makers, November 5, 2013

[60] SIFMA brings together the shared interests of hundreds of securities firms, banks and asset managers. SIFMA's mission is to support a strong financial industry, investor opportunity, capital formation, job creation and economic growth, while building trust and confidence in the financial markets. SIFMA, with offices in New York and Washington, D.C., is the U.S. regional member of the Global Financial Markets Association. For more information, visit www.sifma.org.

[61] STA is comprised of 24 local affiliates covering the entire US and Canada. The STA national board of governors is comprised of past presidents and industry specific leaders. Their membership represents over 4,000 individuals from varying business models – buy-side, sell-side, hedge funds, exchange traders and market makers- dealing in equity and derivative trading.

[62] Consolidated Audit Trail, National Market System Plan, Request for Proposal, February 26, 2013, V 1.0, Sections 2.5.1 and 2.5.2

significant delta cost to the CAT Processor that the industry would need to fund.

FIF CAT WG appreciates that the Commission has examined the details of this issue and has preliminarily concluded that "the Rule 613 approach would increase certain costs associated with the implementation and operation of CAT as compared to the Plan as filed without providing any additional material information."[63]

3.1.3 Answers to SEC Questions re: Options Market Maker Reporting of Options Quotes

Question 168. The Commission granted an exemption from Rule 613 in order to allow the alternative of permitting Options Exchanges to report Options Market Maker quotes to the Central Repository in lieu of requiring such reporting by both the Options Exchange and the Options Market Maker as is required by Rule 613, to be included in the CAT NMS Plan and subject to notice and comment. Do Commenters believe that permitting exchanges to report quote information sent to them by Options Market Makers, including the Quote Sent Time, to the Central Repository would affect the completeness or quality of CAT Data? If so, what information would be missing?
Answer – Permitting exchanges to report quote information to the CAT would not affect the completeness or quality of the data in the CAT. It is not possible to interact with quotations until they reach an options exchange, as such exchange dissemination of quote information is the best source of quote data. Options Market Maker reporting of options quotes would be a complete duplication of data already submitted to the Processor. The one data element that is not duplicative – time stamp on Options Market Make quotes sent to the exchanges – has been added as a required element in the CAT NMS Plan.

Question 169. Under Rule 613, Options Market Makers would report their quotes to the Central Repository and time stamps would be attached to such quotes. Under the exemption, Options Market Makers would include the Quote Sent Time when sending quote information to the Options Exchanges. What, if any, are the risks of permitting the Options Exchanges to report information Options Market Makers otherwise would be required to report?
Answer – FIF CAT WG does not foresee any risks in having exchanges report Options Market Maker quotes to the CAT, especially because it is not possible for market participants to interact with quotes until they are displayed on an exchange.

Question 170. Do Commenters believe that the cost savings from permitting Options Exchanges to report information Options Market Makers would otherwise have to report makes this a preferable approach than Rule 613?
Answer – Yes. From the information obtained in the FIF/SIFMA/STA Cost Survey Report on CAT Reporting of Options Quotes by Market Makers, the 5 year costs to options market makers is estimated to be within the range of $307.6M to $382.0M to implement and maintain CAT reporting of options quotes. With the addition of time stamps on the options market makers reporting of quotes to exchanges, the consolidated audit trail would have no loss of data over the Rule 613 approach. And yet, all data quality attributes – accuracy, timeliness, security and confidentiality, and completeness – remain the same.

Question 334. How significant to the total industry costs of the CAT NMS Plan are clock synchronization requirements, the requirement that Options Market Makers send quote times to the exchanges, the requirement that the Central Repository maintain six years of CAT Data, and the inclusion of OTC Equity

[63] SEC Release No. 34-77724; File No. 4-698 (p.588)

Securities in the initial phase of the implementation of the CAT NMS Plan? Why?
Answer – Specifically addressing the costs associated with the requirement that Options Market Makers send quote times to the exchanges, the FIF/SIFMA/ STA Cost Survey Report on CAT Reporting of Options Quotes by Market Makers estimated that the 5 year cost to options market makers for adding a time stamp to the quote times sent to the exchanges was between the range of $39.9M to $76.8M. This is not a trivial cost for providing one data element to the consolidated audit trail. The industry would prefer supplying this one data element, if it held significant regulatory benefit, over the alternative of full CAT reporting of options quotes by options market makers.

Question 384. Should the CAT NMS Plan require Options Market Makers to report their quotes to the Central Repository? Please explain. Do Commenters believe that the costs of the Rule 613 approach would be disproportionately borne by smaller broker-dealers? Why or why not? Please provide data supporting your position.
Answer – No, the CAT NMS Plan should not require Options Market Makers to report their quotes to the Central Repository. As discussed previously, the FIF/SIFMA/STA Cost Survey Report on CAT Reporting of Options Quotes by Market Makers demonstrated "…that the costs disproportionately impact the smaller market maker – the costs required to support this regulation for the smaller market maker is 33% of the cost to the primary market maker, yet the average volume for the smaller market maker is 6% to 7% of the primary market maker. The disproportionate cost of complying with this regulation is likely to have a negative impact on competition and the ability of new and existing market makers to profitably participate in this segment of the industry. Indirect costs, such as impact on competition and opportunity costs, were not sized as part of this survey, but should be considered when evaluating the impact of this Rule 613 requirement on the options market maker."

Other points made by the cost survey include:

- "Options market maker reporting of options quotes would be duplicative of exchange reporting to the CAT for which the exchange's book is viewed by the market as the official source of options quotes. The only additional data that might be provided by the options market maker reporting options quotes to CAT is the market maker's original sent time of the quote message."
- "However, rather than requiring options market makers to submit options quotes in order to obtain a single unique data element, an alternate solution … of adding the quote sent timestamp to the current quote message sent to the exchange was also requested as part of this survey. This alternate proposal, while less costly than market maker reporting of options quotes, represents additional cost to the options market maker community ($8.5M for the survey participants and estimated between $36.9M to $76.8M for all options market makers). Again, the burden to the smaller options market maker (mean = $.8M) was significantly higher than the primary market maker (mean = $.4M) for adding timestamps, disproportionately impacting the smaller market maker community. The cost of adding quote sent time across all survey participants was between 13% and 44% of submitting options market maker quotes."

Question 385. Should the Plan treat equity market makers the same as Options Market Makers for purposes of quotation reporting – i.e., equity market makers report only Quote Sent Time and exchanges to which the quote is routed report the other information? Why or why not? What are the relative costs and benefits of this alternative? Please provide cost estimates.
Answer – As discussed earlier, Equities and Options Market Maker business flows are not the same when dealing with quotations; often equities quotes are paired with orders and therefore, would not have separate CAT reporting requirements for only quotes. However, for the segment of the equities market

that deals just with equities quotes, then that segment could derive the same benefits as the Options Market Maker receives from this Exemptive Relief. FIF CAT WG would recommend consideration of extending the Exemptive Relief to that segment of the equities market that deals only with equities quotes.

Question 386. Should the Plan require an alternative approach to reporting market maker quotes on exchanges where both equity and Options Market Makers would not need to report their quotation updates, and instead the exchanges would report Quote Sent Times in their reports of receiving these quotation updates? Why or why not? How would such an alternative affect the costs of building and operating the Central Repository? How would such an alternative affect market-maker costs of implementing and continuing CAT reporting?
Answer – As already explained in the answers to the above questions, FIF CAT WG strongly supports the Exemptive Relief which allows exchange only reporting of Options Market Makers quotes, with the addition of quote sent times in the exchanges reports. The cost/benefit analysis considering the savings to both Options Market Makers and the Central Repository (due to elimination of the duplicative reporting of options quotes) with no loss of CAT data or regulatory benefit justify this approach. FIF CAT WG believes that this is the best alternative.

3.2 Customer Information Approach

With the inclusion of the modifications described previously (to allow customer identifying and customer account information to be supplied on a CAT customer definition report instead of order origination reports), FIF CAT WG believes the Customer Information Approach described in the Exemptive Relief offers an alternative that is superior to the use of a CAT Customer ID accessible to all market participants, as defined in Rule 613. Instead, the Customer Information Approach recommends use of a firm's current identifier (firm-designated identifier) on the applicable CAT report as the means to identify the customer to the CAT. The CAT Processor would maintain linkages between firm-designated identifiers and unique CAT-Customer IDs that have been assigned by the CAT Processor, such that customer-related inquiries by authorized CAT Users (regulators) will return unique CAT Customer IDs along with the detailed customer information when required.

3.2.1 Issues with CAT Customer ID

FIF CAT WG understands the regulators' requirement for customer information in order to build a consolidated audit trail; however, the Rule 613 CAT Customer ID approach represents a departure from today's business processes. Most firms currently segregate customer information, particularly sensitive PII information, from other processes and functions across the order lifecycle. Separate and distinct systems and staff manage the customer definition and on-boarding business processes; that is, customer profile information is not known to, nor is it passed to, Order Management Systems (OMS). Workflows and controls have intentionally been designed in this manner to increase the security and confidentiality of customer information managed across the broker-dealer community. Throughout the order lifecycle, customers are identified not by their name or unique PII information, but through firm-designated identifiers, which can take many forms. These include top account number, master account number, counterparty account number, retail customer account number, investment advisory master account number, processing account numbers (e.g., average price processing account number). Each of the firms, systems and applications that are involved in processing of an order may know the same customer by a different firm-designated identifier. This allows independence and separation among these systems, as an order moves through each step in the transaction lifecycle, without carrying sensitive customer identifying information.

Because the CAT Customer ID approach would require a CAT Reporter to receive a newly defined CAT Customer ID from the CAT Processor in order to submit the customer's first transaction to the Central Repository, the new order process could be delayed, or worse, rejected if the customer definition process between the CAT Reporter and CAT has not completed by the reporting deadline. It is unreasonable to expect brokers to hold up trading with clients in order to wait for the issuance of a CAT Customer ID, so this scenario is likely to occur frequently.

The CAT Customer ID approach would require linkages to be established between Customer Information Systems, where the customer profiles are kept, and Order Management Systems (OMS). To comply with the Rule as originally adopted, customer identifying information would need to be provided with every original receipt or origination of an order.[64] Not only does this unnecessarily expose PII information on every order report, it also adds to the message traffic by increasing the information required to be specified on order origination. The Exemptive Relief Request explains, and shows examples of a new CAT customer definition report in which a customer is defined to the CAT, with customer identifying information and all necessary account information using a "Firm Designated ID", which can be used by the CAT Processor to link subsequent CAT order reports (with firm-designated ids) to CAT customer profiles (and a CAT assigned Customer ID).

As discussed in our recommendation earlier, specifying customer identifying and customer account information should not be required on original receipt of an order; but rather should be part of the Customer Information population process so that only the Firm Designated ID is required on the original receipt of an order ("New Order Report").

3.2.2 Qualitative Benefits of Exemptive Relief Request for CAT Customer ID, if modified

FIF CAT WG believes that the Customer Information Approach would have the following benefits if the Exemptive Relief/ CAT NMS Plan is modified to allow customer identifying and customer account information to be supplied on a CAT customer definition report instead of order origination reports.

- The firms' current customer and account definition processes can be maintained without loss of any regulatory benefit of uniquely identifying every customer associated with every reportable CAT event. Implementation of a new CAT Customer ID process to be utilized by all market participants can be avoided.
- Simplifies processing for CAT Reporters, by following the firm's current on-boarding process for new customers. As new customers are defined to a firm, or a current customer's profile is modified, those changes can be reported to the CAT by the Customer Information System. New linkages would not need to be defined to pass new or modified customer profile information to order management systems.
- Improves overall security of the customer account information and the CAT. Sensitive customer PII data would not need to be passed to Order Management Systems or stored with the firm's CAT Reporting systems, but would remain with Customer Information Repositories which would issue the "Customer definition" CAT Report.
- Reduces CAT message traffic since the customer information data would only need to be provided once to the CAT, not on every order report.

[1]17 CFR 242.613, c.7.viii.A

- Eliminates the complications of correctly specifying identifying information for accounts owned by multiple customers when an order is being placed.
- The repositories for the firms' CAT systems would not need to be expanded to store and manage a new CAT Customer ID and customer information (required for CAT reports of original orders).
- Customer Information Approach is a common technical solution – provide a central processing solution, normalize the data and make that available to CAT Users, without imposing a burden on the CAT Reporters.
- The size of every CAT Order Report would be significantly reduced because customer information would only need to be transmitted once to CAT, on original customer definition report, and not on every New Order Report.
- The Customer Information Approach has improved timeliness – the broker-dealer does not need to wait for return of a CAT defined Customer ID before submitting order events for new customers.

3.2.3 Cost Estimate for CAT Customer ID

Based on input from a subset of firms[65] that are in the top 3 Tiers of the SRO CAT Cost & Funding model, which is comprised of approximately 250 firms, FIF CAT WG estimated that the additional effort to implement the CAT Customer ID approach as defined in Rule 613 would cost the industry at least $195 million. This included expanding the firms' Customer Information reference databases; workflow and system changes to ensure an account has a CAT Customer ID before accepting orders; maintenance/management of CAT Customer IDs including updates to a CAT Customer ID, if necessary; and, workflow and systems changes to pass customer identifying information from Customer Information Systems to Order Management Systems. This is a conservative estimate because it represents only 13% of all CAT Reporters (approximately 250 of a total of 1,800 CAT reporting broker-dealers). It is important to note that these cost savings were predicated on Firm Designated ID being the only customer-identifying data element on the new order report.

3.2.4 Answers to SEC Questions re: Customer Information Approach

The answers provided in this section make the assumption that the recommended modifications to the Customer Information Approach are put in place. Some of these questions may be answered in prior sections; however, to ensure completeness, the questions related to Customer Information Approach are briefly answered below.

Question 135. The Commission granted an exemption from Rule 613 in order to allow the Customer Information Approach to be included in the CAT NMS Plan and subject to notice and comment. The Customer Information Approach would require each broker-dealer to assign a unique Firm Designated ID to each trading account and to submit an initial set of information identifying the Customer to the Central Repository, in lieu of Rule 613's requirement that a CAT Reporter must report a Customer-ID for each Customer upon the original receipt or origination of an order. Do Commenters believe that allowing broker-dealers to report a Firm Designated ID to the Central Repository is more efficient and cost-effective than the Rule 613 approach of requiring broker-dealers to report a unique Customer-ID upon original receipt or origination of an order? Would allowing CAT Reporters to report a Firm Designated ID to the Central Repository merely transfer the costs from individual broker-dealers to the Central Repository? Or do Commenters believe that the Rule 613 approach is preferable? Why or why not?

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[65] FIF Cost Estimate for CAT Exemptive Relief – Customer ID, Reporter ID, Allocations, December 15, 2014

Answer - The Customer Information Approach is more cost efficient and effective than the Rule 613 approach because it does not require fundamental changes to the industry's customer on-boarding and definition processes. It also does not require major interface changes throughout the industry where customer identifying information and CAT Customer IDs would need to be passed to Order Management Systems, including third party providers and service bureaus.

All bidders agreed that the Customer Information Approach was a reasonable design, and did not indicate that it would increase their costs. In either approach the CAT Processor will incur costs in order to create the CAT Customer ID; the Customer Information Approach simply eliminates the costs for the CAT Processor associated with dissemination/reconciliation of the CAT Customer ID across market participants.

Question 136. If broker-dealers are permitted to report a Firm Designated ID, do Commenters believe the proposed CAT NMS Plan includes sufficiently detailed requirements to determine whether the Plan Processor could use the Firm Designated ID to identify a Customer?
Answer - Given that a CAT Processor has yet to be selected, we believe the CAT NMS Plan is limited in providing additional detail. Based on the information available, the CAT NMS Plan sufficiently describes the requirements for Firm Designated ID, and in combination with supporting material provided by the SROs, all bidders have expressed confidence in their ability to implement this design.

We do believe that review of the CAT Technical Specifications will be essential in order to ensure that the data elements and their corresponding definitions are appropriate.

Question 137. Do Commenters believe the CAT NMS Plan's proposal to permit reporting a Firm Designated ID would affect the accuracy of CAT Data collected and maintained under the CAT compared to the Rule 613 approach that requires a unique Customer-ID? If so, how? Would permitting reporting a Firm Designated ID result in more complete CAT Data? If so, please explain.
Answer – The Customer Information Approach provides the same level of accuracy of CAT data as would have been collected under the Rule 613 approach.

Question 138. Do Commenters believe the CAT NMS Plan's proposal to permit reporting a Firm Designated ID would affect the accessibility of CAT Data collected and maintained under the CAT compared to the Rule 613 approach? If so, how? Would permitting reporting a Firm Designated ID result in CAT Data being more accessible? If so, please explain.
Answer – The Customer Information Approach provides the same accessibility of CAT Data collected as compared to the Rule 613 approach.

Question 139. Do Commenters believe allowing broker-dealers to report a Firm Designated ID to the Central Repository would affect the timeliness of data collected and maintained under the CAT compared to the Rule 613 approach? Would permitting reporting a Firm Designated ID result in more timely CAT Data? If so, please explain.
Answer – The Customer Information Approach increases the timeliness of data collected under the CAT as compared to Rule 613 approach because it allows customer definitions to occur earlier and independent of order origination.

Question 140. Do Commenters believe there are any increased risks related to allowing a broker-dealer to report a Firm Designated ID rather than a unique Customer-ID to the Central Repository? How difficult would it be for the Central Repository to utilize a Firm Designated ID for each account?

Answer – FIF CAT WG does not foresee any risks associated with the Firm Designated ID approach; and in fact the reverse is true, where use of a single CAT Customer ID that is broadly distributed, could increase the risk of customer information leakage.

The customer definition process of supplying customer identifying information and all relevant identifiers becomes a simple relational data mapping exercise for the CAT Processor. Given the other data complexities facing the CAT Processor regarding trade linkages, the Firm Designated ID mapping to the CAT Customer ID and complete associated information is very straightforward. And, there is reduced security risk of handling and transmitting PII data when broker-dealers supply customer identifying information only on customer definition rather than on every new order report.

Question 141. Do Commenters believe that the CAT NMS Plan has provided sufficient information to determine whether the Central Repository could use a Firm Designated ID to efficiently, reliably and accurately link orders and Reportable Events to a Customer?
Answer – Yes, all of the bidders have expressed their ability to implement the Customer Information Approach including the recommended modifications outlined by FIF CAT WG.

Question 142. Do Commenters believe that the CAT NMS Plan includes sufficient safeguards or policies to assure that the same Firm Designated ID would not be used for multiple Customers?
Answer – Yes, the Firm Designated ID is required to be unique within a firm, and provides mapping to a unique customer within any given day (i.e., firms cannot re-assign a Firm Designated ID within any given business). We would anticipate data validation at the CAT Processor to ensure uniqueness.

Question 143. The CAT NMS Plan does not require that a broker-dealer provide an LEI to the Plan Processor as part of the identifying information used to assign a Customer-ID at the Central Repository. The CAT NMS Plan provides that a broker-dealer must report its LEI, if available, but allows a broker-dealer to report another comparable common entity identifier, if an LEI is not available. Do Commenters believe that the CAT NMS Plan should mandate that broker-dealers provide an LEI as part of the information used by the Plan Processor to uniquely identify Customers? Why or why not?
Answer – While FIF CAT WG is supportive of LEI use in identifying customers, we do not recommend that the LEI be mandated for use by broker-dealers as required for Customer identification. We believe that would disadvantage small broker-dealers who have no business requirement at this time to secure an LEI.

Question 144. Do Commenters believe that reporting the Firm Designated ID, rather than a unique Customer-ID, would affect the security and confidentiality of CAT Data? If so, how? Would permitting reporting a Firm Designated ID result in a different level of security and confidentiality of CAT Data? If so, please explain.
Answer – The Customer Information Approach provides a more secure design than the Rule 613 approach because it would only require submission and handling of customer identifying information, including PII, once on customer definition, and not on every order origination. It would also limit the handling of customer identifying information and PII to those systems and applications within a CAT Reporter's enterprise that today handle that information and not require the propagation of this sensitive information to other systems solely for the purpose of CAT reporting.

Question 145. The CAT NMS Plan provides that an initial set of Customer Account Information and Customer Identifying Information would be reported to the Central Repository by broker-dealers upon the commencement of reporting audit trail data to the Central Repository by that broker-dealer, and that such

Customer Identifying Information would be updated as set forth in the CAT NMS Plan. Do Commenters believe that the approach for reporting an initial set of Customer Account Information and Customer Identifying Information and updates to such information thereafter as set forth in the CAT NMS Plan would affect the quality, accuracy, completeness, accessibility or timeliness of the data? If so, what additional requirements or details should be provided in the CAT NMS Plan?
Answer – As mentioned earlier in response to Question 139, the timeliness of CAT data is improved with the CAT Information Approach because the customer definition information is provider earlier, and independent of, the originating order. The other attributes of quality, accuracy, completeness, and accessibility are unchanged between the two approaches.

Question 146. Do Commenters believe that allowing broker-dealers to report an initial set of Customer Account Information and Customer Identifying Information and updates to such information thereafter is more efficient and cost-effective than the Rule 613 approach for identifying Customers under Rule 613? Or do Commenters believe that the Rule 613 approach is preferable? Why or why not?
Answer – The Customer Information Approach is more efficient and cost effective than the Rule 613 approach because it facilitates the bulk upload of customer definitions and modifications to customer data, which in general is a more efficient process for handling large amounts of data. And with the customer definition process, customer identifying information need only be specified with customer definition or modification, not on every originating order, reducing the size of messages sent to the CAT.

Question 147. Do Commenters believe there are any increased risks as a result of allowing a broker-dealer to report an initial set of Customer Account Information and Customer Identifying Information and updates to such information thereafter to be reported to the Central Repository? How difficult would it be for the Central Repository to ingest the Customer Account Information and Customer Identifying information, and any updates thereafter?
Answer – FIF CAT WG does not foresee any increased risk with providing an initial set of Customer Account Information and Customer Identifying Information and updates thereafter. Bulk upload of information to a database application is a common information technology approach and an efficient mechanism for loading large quantities of static data. The approach presents less risk than providing Customer account details and PII data with each originating order.

Question 148. Do Commenters believe that the CAT NMS Plan provides sufficient information to determine whether the Central Repository could use the initial set of Customer Account Information and Customer Identifying Information and updates to such information thereafter to efficiently, reliably and accurately link orders and Reportable Events to a Customer?
Answer – Yes, the CAT NMS Plan, along with supplemental materials provided by the SROs, provide sufficient information to allow the Central Repository to link events to a Customer. Again, all bidders have stated that they believe this approach is practical and doable.

Question 149. Do Commenters believe that reporting an initial set of Customer Account Information and Customer Identifying Information and updates to such information thereafter would affect the security and confidentiality of CAT Data? If so, how? Would reporting an initial set of Customer Account Information and Customer Identifying Information and updates to such information result in a different level of security and confidentiality? If so, please explain.
Answer – As explained in answer to Question 144, the Customer Information Approach, which includes this customer definition process, increases security by reduced handling of Customer Identifying Information and PII.

Question 389. Should the CAT NMS Plan require an alternative to the Customer Information Approach? If so, what alternative should the Commission require and what are the relative costs and benefits of the alternative? Please explain.
Answer – FIF CAT WG supports the Customer Information Approach with the recommended modifications outlined above. This approach has been discussed and vetted over the past few years through industry forums, in discussions with the SRO and industry members in the DAG, and in seminars with the bidders. It represents a significant cost savings to the industry over the Rule 613 Approach, and it has been declared technically feasible and doable by the bidders. It provides enhanced security and confidentiality of handling customer PII data over the Rule 613 approach. However, as noted in our issues, the CAT NMS Plan includes conflicting statements regarding the Customer Information Approach. The CAT NMS Plan must withdraw the requirement for specifying customer identifying information on order origination, or all benefits derived from the Customer Information Approach will be nullified. At this point in the development of the CAT NMS Plan, FIF CAT WG does not believe that the CAT NMS Plan should require an alternative to the Customer Information Approach, other than correction of the issue mentioned above.

3.3 Existing Identifier Approach for CAT Reporter ID

The exemptive relief request for Existing Identifier Approach for CAT Reporter asks to use the industry's current identifiers as the means to identify the CAT Reporter to the CAT. The CAT Processor would maintain the repository and linkages between current identifiers and unique CAT-assigned Reporter ID, such that all inquiries by CAT Users will properly link to a unique CAT Reporter ID and associated CAT Reporter information.

This section largely addresses Questions 128-134 posed by the Commission related to the improved efficiency, cost effectiveness, accuracy, accessibility, timeliness and security of the "Existing Identifier Approach" to managing the CAT Reporter ID.

3.3.1 Issues with CAT Reporter ID

Rule 613 CAT Reporter ID Approach would require changing current business processes. The SROs and FINRA would need to decide on one of two approaches:

- Replace the existing SRO and FINRA separate identification processes with a common identification process that would be used across all Participants, and propagated to and maintained by each CAT Reporter. Migration plans would be required across the industry to manage the transition to new identifiers.
- Maintain the existing SRO and FINRA separate identification processes but add the requirement of also maintaining a unique CAT Reporter ID that would need to be propagated to and maintained by each CAT Reporter. Each Participant would need to define their own separate rules and processes for managing the two identifiers.

The implications of a new CAT Reporter ID include changes to exchange matching engines due to new CAT Reporter identifiers, changes required to FIX to accommodate the new CAT Reporter identifier, changes required to exchange order entry specifications to accommodate the new CAT Reporter identifiers and expansion of any Information Repository(s) to accept and store the CAT Reporter IDs. In addition, new procedures would be required when a change is required of a CAT Reporter ID.

3.3.2 Qualitative Benefits of Existing Identifier Approach for CAT Reporter ID

This approach has the following benefits:

- The industry's current business processes and identifiers can be maintained, without loss of any regulatory benefit of uniquely identifying each CAT Reporter associated with every reportable event. A new CAT Reporter ID process can be avoided throughout the industry by localizing the impact to only the CAT Processor.
- The current SRO and FINRA assigned identifiers, in use today by the SROs and FINRA and all participating broker-dealers, would be supplied when defining any new CAT Reporter, and represent the token(s) to be used by CAT Reporters on subsequent CAT reports. The CAT Processor would assign a CAT Reporter ID and manage the translation between the current SRO and FINRA-assigned tokens and the CAT assigned Reporter ID. The CAT Processor would resolve all tokens for CAT Users to the uniquely assigned CAT Reporter ID (and associated CAT Reporter information).
- The SROs, FINRA and broker-dealer information repositories would not need to be expanded to store and manage a new CAT Reporter ID.
- Definition of new business processes and coordination of a single identifier to be used across all SROs and FINRA for broker-dealer identification would not be needed. The CAT Processor would manage the unique CAT Reporter ID and supply that identifier to the CAT User.
- Because only the CAT Processor would be sensitive to assignments of CAT Reporter IDs, it eliminates CAT Reporters having to deal with possible error cases on assignment or modification of CAT Reporter IDs.
- As with the Customer Identifier Approach, the CAT Reporter ID uses a common information technology solution – provide a central processing solution, solve it once, normalize the data and make that data available to the CAT User, without burden to the CAT Reporter.
- There is a significant regulatory benefit with use of MPIDs over the CAT Reporter-ID. MPIDs generally identify sub-units within a business. The Existing Identifier Approach will allow regulators to surveil transactions on a more granular level.

Furthermore, it is noted that "the Commission preliminarily believes that the Reporter ID approach specified in the CAT NMS Plan would improve the accuracy of tracking information regarding entities with reporting obligations, namely broker-dealers and SROs."[66]

3.3.3 Cost Estimate for Existing Identifier Approach for CAT Reporter ID

Based on input from a subset of Top 3 Tier firms[67], the cost of not receiving exemptive relief on CAT Reporter ID was dependent on the extent to which CAT Reporter ID would be embedded in order routing and trading systems. The costs ranged from $312K to $975K/firm. Projecting these estimates across Top 3 Tier firms, the industry cost would be between $78M and $244M. These are conservative estimates because they do not include costs associated with every CAT Reporter.

3.3.4 Answers to SEC Questions re: CAT Reporter ID

Question 128. The Commission granted an exemption from Rule 613 in order to allow the Existing Identifier Approach to be included in the CAT NMS Plan and subject to notice and comment. The Existing

[66] SEC Release No. 34-77724; File No. 4-698 (p. 318)

[67] FIF Cost Estimate for CAT Exemptive Relief – Customer ID, Reporter ID, Allocations, December 15, 2014, http://www.catnmsplan.com/industryfeedback/p602494.pdf

Identifier Approach would allow a CAT Reporter to report an existing SRO-Assigned Market Participant Identifier in lieu of Rule 613's requirement that a CAT Reporter must report a universal CAT-Reporter-ID. Do Commenters believe that allowing the Existing Identifier Approach would be more efficient and cost-effective than the Rule 613 approach of requiring a CAT-Reporter-ID to be reported for each order and reportable event in accordance with Rule 613(c)(7)? Why or why not? Or do Commenters believe that the Rule 613 approach is preferable? Why or why not? Would implementation of the Existing Identifier Approach merely transfer costs from CAT Reporters to the Central Repository?
Answer – FIF CAT WG supports the Existing Identifier Approach with the recommended clarification (as discussed in Section 3.3 of the comment letter) because it allows use of current business processes to identify a CAT Reporter and saves the CAT Reporter the extra expense of maintaining and supplying a unique CAT Reporter ID on every CAT report. Rather than requiring all 1,800 reporting broker-dealers set up mapping tables and change interfaces, centralizing the data mapping within the Central Repository is a less costly, more efficient solution. It should also reduce initial errors with the CAT system, because CAT Reporters will be using a known identifier and will not need to design a new CAT Reporter ID mechanism.

Question 129. Do Commenters believe that the Existing Identifier Approach would affect the accuracy of CAT Data? Would the Rule 613 approach result in greater accuracy? If so, please explain
Answer – The Existing Identifier Approach does not affect the accuracy of CAT Data over the Rule 613 approach. The Existing Identifier can map to a unique CAT Reporter ID within the CAT system without loss of accuracy.

Question 130. Do Commenters believe that the CAT NMS Plan's proposed Existing Identifier Approach would affect the accessibility of CAT Data? If so, how? Would the Rule 613 approach result in a different level of accessibility? If so, please explain.
Answer – The Existing Identifier does not affect the accessibility of CAT Data versus the Rule 613 approach.

Question 131. Do Commenters believe that the CAT NMS Plan's proposed Existing Identifier Approach would affect the timeliness of CAT Data? If so, how? Would the Rule 613 approach result in greater timeliness? If so, please explain.
Answer – The Existing Identifier Approach has no effect on the timeliness of CAT data versus the Rule 613 Approach.

Question 132. Do Commenters believe the Existing Identifier Approach would affect the security and confidentiality of CAT Data? If so, how? Would the Rule 613 approach result in a different level of security and confidentiality? If so, please explain.
Answer – Today, SRO-Assigned Market Participant Identifiers are public data. And use of these identifiers has no effect on the security and confidentiality of the CAT data versus the Rule 613 Approach.

Question 133. What challenges or risks do Commenters believe the Plan Processor would face in linking all SRO-Assigned Market Participant Identifiers to the appropriate CAT-Reporter-IDs? What, if anything, could be done to mitigate those challenges and risks?
Answer - FIF CAT WG does not foresee any risks in the ability of the Central Repository to identify the appropriate CAT Reporter ID, when given the SRO-Assigned Market Participant Identifier. This is a simple relational data mapping exercise that should not pose any technical risk or challenge to the Central Repository. As further evidence, when reviewed with the bidders, they all expressed their ability to support this approach.

Question 134. The CAT NMS Plan does not require that an Industry Member provide its LEI to the Plan Processor as part of the identifying information used to assign a CAT-Reporter-ID. The CAT NMS Plan permits an Industry Member to report its CRD number in lieu of its LEI for this purpose. Do Commenters believe that the CAT NMS Plan should mandate that Industry Members provide their LEIs, along with their SRO-Assigned Market Participant Identifiers, to the Plan Processor for purposes of developing a unique CAT-Reporter-ID? Why or why not?
Answer – We support the LEI concept, and the optional use of LEI as part of its identifying information. The burden of supporting LEIs as mandatory identifiers for CAT would fall unfairly on mostly small broker-dealers who may not currently have or use LEI in their systems.

Question 390 - Should the CAT NMS Plan require an alternative approach to assigning CAT-Reporter-IDs? If so, what alternative should the Commission require and what are the relative costs and benefits of the alternative? Please explain.
Answer – FIF CAT WG supports the Existing Reporter-ID approach. It represents a very reasonable and more efficient, less costly solution than the Rule 613 CAT defined Reporter ID. An alternative approach is not required.

Question 391 - Should the CAT NMS Plan provide for the use of the LEI or another unique identification code as an alternative to the CAT-Reporter-ID? What are the advantages and disadvantages of this approach?
Answer - A firm can choose to use an LEI in which case the CAT should not require specification of any other identifiers. However, because LEIs are not yet widely adopted by the smaller broker-dealers, FIF CAT WG does not feel CAT should force firms to adopt LEI as an identifier. The CAT Processor can map between MPIDs and LEIs if that is a requirement of CAT Users.

3.4 Eliminate Requirement for Order ID on Allocation Report

The Exemptive Relief Request asks for relief from specifying Order ID on CAT Allocation Reports and instead, suggests a Firm Designated ID (corresponding to the sub-account) would be specified on an CAT Allocation Report. In combination with the related Exemptive Relief Request on Customer Information Approach, the CAT Processor can establish the CAT Customer ID associated with that allocation. (The Firm Designated ID associated with the sub-account would have been defined as a customer identifier when the customer was defined to the CAT by the CAT Reporter and thereby linked by the CAT Processor to the CAT-assigned Customer ID). Therefore, the linkage of allocations would be back to the customer, not the order.

Since sub-account information will be supplied on CAT Allocation reports using Firm Designated ID, and because the Firm Designated IDs are linked back to the CAT Customer-ID through the CAT customer definition process (assuming the Customer Information Approach is maintained) the CAT now has linkages among all of a customer's orders, executions and allocations for a single day, although there may not always be sufficient linkage information to relate an allocation to a specific order and execution for a customer within that day.

Of all the exemptive relief requests, this is the only case where the data available to the regulators in the consolidated audit trail would differ from the Rule 613 specification. In our discussions to date, we do not believe any significant benefits to requiring Order ID on allocations have been identified that would justify the large industry expenditure and extensive process re-engineering necessary to include Order ID on all allocations. Associating allocations with the Firm Designated ID, would provide the most important regulatory and surveillance benefits without adding unnecessary burden to the industry.

3.4.1 Issues with Order ID on Allocation Report

In order to supply an Order ID on a CAT Allocation Report, it would be necessary that in all cases, an execution event, where an Order ID would be available, could be uniquely linked to an allocation. While there are business scenarios where this is possible, there are many scenarios in current industry practices where this linkage is not possible today. Various examples were provided in the SROs' Supplement 1 to the Exemptive Relief Request. [68]

Generally, the order and execution processes are handled via front office systems. The allocation process is the responsibility of middle/back office systems. These systems operate independently within the trade flow with linkages between these systems[69] designed to facilitate only the clearance and settlement of trades. Information available in front office systems regarding orders is not typically passed to middle and back office systems or from executing to clearing broker-dealer. Likewise, allocation and clearing information is rarely stored in front office systems. Additionally, a many-to-many relationship often exists between orders and allocations. Given the widespread use of average price processing accounts, it is unclear to the clearing broker, prime broker or even the self-clearing firm which orders resulted in which allocations.

As documented in the FIF Large Trader Relief request[70], to require firms to establish linkages across order and allocation processes would be very costly to the industry and requires extensive re-engineering of middle and back office processes, not just within a broker-dealer but across firms. Issues include addressing average price processing accounts as well as creating new workflows, not just within a firm but across the industry involving buy- side firms, executing broker-dealers and clearing broker-dealers to address new data and linkage requirements. Unlike Large Trader Reporting, CAT includes customer identification on the order which addresses many of the surveillance goals of the SROs/SEC as we understand them. Some of the issues associated with the division of responsibilities of different broker roles in post-trade processing and the limited data passed between the firms are highlighted in the Post-Trade Order Handling Scenarios[71] provided to the SROs and the DAG.

FIF CAT WG has proposed the use of the Firm Designated ID as an alternate identifier to be included on allocation reports.[72] The Firm Designated ID, and associated customer identification process, allows each firm to define to the CAT multiple unique identifiers for one customer, i.e., multiple identifiers all relate to the same LEI. This will allow the firms to use a "master account" identifier for Order Reporting, but provide "sub-accounts" for Allocation Reporting. This would mimic the data available within the firms' various systems at the points of order entry and allocations today, and reduce the impact to implement SEC Rule 613. Additionally, this approach would link the customer that placed the order with the accounts to which it was allocated.

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[68] Letter to Mr. Brent Fields from SROs, April 3, 2015, Supplement to Request for Exemptive Relief from Certain Provisions of SEC Rule 613 of Regulation NMS under the Securities Exchange Relief Act of 1934; http://www.catnmsplan.com/web/groups/catnms/@catnms/documents/appsupportdocs/exemptivesupplement1-allocationsreports.pdf

[69] In many cases, multiple vendor and proprietary systems and potentially different broker-dealers are used to facilitate middle and back office processes.

[70] Letter to Mr. Robert Cook and Mr. David Shillman, from Manisha Kimmel, FIF Large Trader Relief Request, January 25, 2012

[71] Post Trade Order Handling Scenarios, December 11, 2013 submitted for DAG discussion August 6, 2014

[72] FIF CAT WG Optional Use of Order ID on CAT Allocation Report for DAG, August 5, 2014

3.4.2 Qualitative Benefits of Elimination of Requirement for Order ID on Allocation Report

Cost avoidance of significant system and process re-engineering, which would be required to implement the current Rule 613 requirement of linking specific orders, executions and allocations, is the primary benefit of this exemptive relief request.

1. The separation of processing into groups of systems (generically described as front, middle and back office systems) has been established for decades in the financial industry. Firms' internal systems, vendor services, service bureaus, and software packages have been developed in concert with this model. A limited amount of information is needed to be passed between these various systems; changing the interfaces to add Order ID and execution information would be very costly for the industry, as it would require significant re-engineering of many systems. Avoidance of that type of change, and use of the current infrastructure is a significant benefit of this exemptive relief request.
2. The complexities of associating orders, executions and allocations and average price processing accounts were described in detail in the FIF Relief Requests for Large Trader Reporting which resulted in relief requests granted on LTID reporting on executions in average price processing accounts. Establishing these types of linkages, if even possible, would likely require significant changes to current business processes as well as re-engineering of systems (e.g., workflow changes to accommodate order bunching at order entry and post-trade bunched order processing, e.g., many to many scenarios.)
3. Potentially, buy-side allocation messages would need to be altered to include related order IDs.

3.4.3 Cost Estimate of Order ID on Allocation Report

Based on cost estimates gathered for Large Trader Phase 1, where similar linkage requirements were proposed, and consensus industry estimates for linking executions to allocations as specified in Rule 613, the cost would be 3.5 times the cost of Larger Trader Phase 1, or $525M for the top 3 Tier firms[73].

Factors contributing to the costs include: need for re-engineering front and back office systems in a manner not required by Large Trader Phase 1; and availability of subject matter experts required to modify these systems. Please note this is a conservative estimate because it does not include potential costs to the buy-side that may be required to accommodate this change.

In summary, FIF CAT WG is aware that the process outlined in the Exemptive Relief Request and supplement does not link orders, executions and allocations to sub accounts seamlessly. However, our members believe that even if they did go to the extreme expense to re-architect their systems to pass and persist the information from one system to another, the outcome would not provide the conclusive results the Commission is seeking, due to the complexity of the many-to-many relationships involved in average price accounts. FIF CAT WG maintains that the Allocation Report with the Firm Designated ID corresponding to the sub-account to which the transaction was ultimately applied, supplemented by the customer information associated with the Firm Designated ID, will provide the Commission with sufficient information for deeper examination and surveillance.

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[73] FIF Cost Estimate for CAT Exemptive Relief – Customer ID, Reporter ID, Allocations, December 15, 2014, http://www.catnmsplan.com/industryfeedback/p602494.pdf

3.4.4 Answers to SEC Questions re: Order ID on Allocation Report

Question 162. The Commission granted an exemption from Rule 613 in order to allow the alternative of permitting the CAT NMS Plan to provide that Industry Members record and report to the Central Repository an Allocation Report that includes the Firm Designated ID when an execution is allocated in whole or part. This alternative is in lieu of the requirement in Rule 613 that Industry Members must report the account number for any subaccount to which an execution is allocated. Do Commenters believe that providing the information required in an Allocation Report as a means to identify order events and information related to the subaccount allocation information (the "Allocation Report Approach") would be more efficient and cost-effective than the Rule 613 approach requiring the reporting of the account number for any subaccount to which an execution is allocated? Or do Commenters believe that the Rule 613 approach is preferable? Why or why not?

Answer – The exemptive relief approach is superior to the Rule 613 approach. The Allocation Report Approach avoids the cost of significant system and process re-engineering, which would be required to implement the current Rule 613 requirement of linking specific orders, executions and allocations is the benefit of this exemptive relief request. Elements of cost include:

- Potential changes to buy-side allocation messages to include related order IDs
- Workflow changes to accommodate order bunching at order entry and post-trade bunched order processing, e.g., many to many scenarios
- Reengineering front and back office systems to pass Order ID and execution information to the systems that handle allocations

FIF CAT WG estimated a cost of $525M for the 250 largest firms to implement the Rule 613 approach.

The Allocation Report Approach is a reasonable compromise. Linkage through Firm Designated ID to the customer would provide, in FIF CAT WG's opinion, sufficient regulatory oversight without causing undue burden on the industry.

Question 163. Do Commenters believe that the Allocation Report Approach would affect the completeness of CAT Data? If so, how? Would the Allocation Report Approach result in more complete CAT Data? If so, please explain.

Answer – Since sub-account information will be supplied on CAT Allocation reports and because sub-accounts are linked back to the CAT Customer-ID through the CAT customer definition (assuming the Customer Information Approach is maintained) the CAT now has linkages among all of a customer's orders, executions and allocations for a single day, although there may not always be sufficient linkage information to relate a specific order, execution and allocation for a customer within that day.

Question 165. Do Commenters believe that the Allocation Report Approach would affect the timeliness of allocation information? If so, how? Would the Allocation Report Approach result in more timely CAT Data? If so, please explain.

Answer – Timeliness of the reported data is the same in both the Rule 613 approach and the Allocation Report Approach.

Question 166. Do Commenters believe the Allocation Report Approach would affect the security and confidentiality of CAT Data? If so, how? Would the Allocation Report Approach result in a different level of security or confidentiality? If so, please explain.

Answer – The Allocation Report Approach does not affect security or confidentiality of CAT in any way.

Question 167. Do Commenters believe that the Allocation Report Approach described by the SROs is feasible? What challenges or risks would CAT Reporters face in providing such information? What challenges or risks would the Plan Processor face when ingesting such information and linking it to the appropriate Customers' accounts?
Answer – Yes, the Allocation Report Approach is feasible, when implemented in conjunction with the Customer Information Approach. For it is the Customer Information Approach, and the customer definition profiles which contain the linkages that can be used by the Central Repository to determine the customer for the allocation.

3.5 Time Granularity on Manual Order Events

The CAT NMS Plan requires millisecond level time stamps with clock offsets managed to 50 milliseconds for all CAT Reports. An exemptive relief request was submitted to exclude Manual Orders from this level of time stamp granularity and clock tolerance, and instead requested that second level time stamps and clock offsets should be appropriate for the audit trail on Manual Orders. Finer increments cannot be captured with precision for manual processes which, by their nature, take longer to perform than a time increment of less than one second.

3.5.1 Issues with Clock Synchronization Requirements for Manual Orders

The Manual Order process is inherently imprecise because it involves the taking of an order via phone, fax, email and then manually entering the order into an electronic order management system. Traditionally, when an order is received manually, the time of the order can be recorded with a time clock machine which is usually precise to the second. While it might be technically possible to record the time of a manual order at a finer granularity, it does not make sense to do so, because it would give the impression of greater precision than is possible with the overall process. The costs to secure more precise time clocks across the industry is not justified – there is no regulatory benefit in capturing a more precise time stamp on a process which, by definition, is not precise.

3.5.2 Qualitative Benefits of Second Level Time Stamp Granularity for Manual Orders

The benefit of this exemptive relief request is the avoidance of costs to the industry for no regulatory benefit.

3.5.3 Cost Estimate for Clock Synchronization Requirements for Manual Orders

The SROs, in the Exemptive Relief Request, provided estimates from two clock-manufacturing firms that the retail cost of an advanced OATS compliance clock to the second with NTP time synchronization is approximately $1,050. This yields a projected conservative industry cost of $10.5M. A millisecond level time clock would be considerably more expensive, and the clock drift of the stamping mechanism would like to be more pronounced at the millisecond level of granularity.[74] The SROs concluded, and we agree, that the additional cost is not justified given the imprecise nature of manual processes.

3.5.4 Answers to SEC Questions on Clock Synchronization Requirements on Manual Orders

Question 120. The Commission granted an exemption from Rule 613 in order to allow the alternative of

[74] April 3, 2015 filing, Request for Exemptive Relief from Certain Provisions of SEC Rule 613 of Regulation NMS under Securities Exchange Act of 1934, Section B

permitting CAT Reporters to report Manual Order Events with a time stamp granularity of one second, in lieu of the Rule 613 requirement that the CAT NMS Plan require CAT Reporters to report with a time stamp granularity of one millisecond, to be included in the CAT NMS Plan and subject to notice and comment. Do Commenters believe that the CAT NMS Plan's one-second time stamp granularity standard for Manual Order Events is appropriate and reasonable? If not, why not? Would a more granular time stamp requirement for Manual Order Events be feasible?
Answer – FIF CAT WG supports the Exemptive Relief for second level time stamps and second level clock offsets for manual order events. It believes this level of granularity for manual orders is absolutely reasonable. Given the inherent imprecision of manual order handling, any time stamp with a granularity finer than one second would give the false sense of a more precise process than is possible with manual order handling. More granular time stamps on manual orders could lead to confusing analysis of event sequencing, where subsequent CAT reports in the order lifecycle would appear out of sequence (e.g., the electronic recording of the manual order following the manual order CAT report). See also Appendix 5.1.

Question 121. What alternative approach with respect to Manual Order Events may be preferable? Could the provisions in the CAT NMS Plan related to Manual Order Events be more narrowly tailored to, for example, only apply to CAT Reporters who are unable to record and report Manual Order Events with a time stamp granularity of one millisecond?
Answer – FIF CAT WG does not believe that an alternative approach is necessary with respect to Manual Order Events. While the CAT NMS Plan already requires firms that capture more granular time stamps to provide those time stamps in CAT Reports, FIF CAT WG does not support that approach. See Appendix Section 5.1 for a more complete discussion.

Question 122. The SROs note in the Exemption Request that recording and reporting Manual Order Events with a time stamp granularity of at least one second would result in little additional benefit, and, in fact, could result in adverse consequences such as creating a false sense of precision for data that is inherently imprecise, while imposing additional costs on CAT Reporters. Do Commenters agree? Why or why not?
Answer – Yes, we agree that with the SROs that recording and reporting Manual Order Events with a time stamp granularity of at least one second would result in little additional regulatory benefit, and in fact, could result in adverse consequences. Attempting to record a time stamp under a second on a manual operation would give a false sense of precision that does not exist. It would be misleading, and could lead to incorrect conclusions. See also Appendix 5.1.

Question 123. If Manual Order Events are recorded and reported with a time stamp granularity of one second, what, if any, challenges do Commenters believe would arise with respect to the sequencing of order events (for the same order) and orders (for a series of orders)? Would the one millisecond standard originally provided for in Rule 613 be preferable? Please explain.
Answer - A manual order recorded at a second level, and then coupled with a daisy chain of events with millisecond level time stamps should create a fairly clear sequence of events within the order lifecycle for the regulator. The CAT Processor, with intelligent data analysis, could present some of these events to the regulator in a display format that makes the event sequencing clear, even if the time stamps seem "out of sequence". FIF CAT WG does not believe a completely deterministic and sequenced model of events is possible. Regulators, and the data analysis tools available to the regulators, must be capable of looking at events within a range and judging what is reasonable. See also Appendix 5.1.

Question 124. Do Commenters believe the CAT NMS Plan's requirement that time stamp granularity (other than for Manual Order Events) should be to at least the millisecond is granular enough in light of current practices? If not, why not?
Answer - Except for Manual orders and post-trade events including allocations, millisecond-level time stamps are consistent with current industry practices. Regulatory reporting, e.g., OATS reporting, up to now have proven quite effective with use of second-level time stamps for order and trade reporting. FINRA has only recently ruled that millisecond-level time stamps are now required. FIF CAT WG believes that moving from second-level to millisecond-level time stamps for order and trade events, but not post-trade events, is appropriate and represents a significant step in achieving finer time stamp granularity. However, moving beyond millisecond-level time stamps and 50 millisecond clock offsets represents very real technical challenges and significant industry costs, especially given inherent clock limitations when applied across broad geographic regions.

To demonstrate that the industry has not yet adopted more advanced clock synchronization technologies across all of their infrastructures, the FIF Clock Offset Survey reported that 39% of the respondents were using clock offsets greater than 50 milliseconds for their front and middle office servers. The "Time on Allocation" Clock Survey reported that 39% of the respondents do not capture time stamps on allocations at trade booking, and 33% capture a second-level time stamp on allocation trade bookings.

FIF CAT WG urges the SEC and the SROs to adopt a cautious approach to more granular clock synchronization requirements. It recommends using the data collected in the consolidated audit trail as an opportunity to research the importance of more granular time stamps in market surveillance and reconstruction and how much it might help regulators, and at what costs. See also Appendix 5.1.

Question 126. Do Commenters believe the CAT NMS Plan provides adequate enforcement provisions to ensure CAT Reporters time stamp Reportable Events to a granularity of one millisecond (and for Manual Order Events to a granularity of one second)? If not, what additional enforcement provisions should the CAT NMS Plan provide?
Answer – We recommend consistency with current FINRA clock synchronization policies and procedures.

Question 127. Do Commenters believe that the CAT NMS Plan's requirement that Participants and Industry Members synchronize Business Clocks used solely for Manual Order Events to within one second of the time maintained by the NIST is appropriate and reasonable? Would a tighter clock synchronization standard for Business Clocks used solely for Manual Order Events be feasible?
Answer – We believe the one second interval is both reasonable and appropriate. Refer to FIF CAT WG answers to questions 120 through 123.

Question 392. Should the CAT NMS Plan require an alternative to the requirement to time stamp manual orders to the second? If so, what alternative should the Commission require? For example, should the Plan require millisecond time stamps or one-minute time stamps? Please explain and provide information on the relative costs and benefits of the alternatives.
Answer - FIF CAT WG is satisfied with the current requirement of one second time stamps and one second clock offsets for manual order events. It is a reasonable granularity level, given the inherently imprecise business process of handling manual orders. See also Appendix 5.1.

3.6 Account Effective Date

The industry had requested exemptive relief to replace the "account opened date" with "effective date" to

allow for historical situations where accounts are missing opening dates or dates do not reflect the actual date the account was opened. The historical reasons for these situations include:

1. Institutional relationships may be established without setting up accounts at the top level. (Note: Sub-accounts would subsequently be set up and include the account opening date.)
2. Historically, account opening date may have referred to the date an account was opened in a system or may have been left blank for proprietary accounts.

With the implementation of the CAT NMS Plan, these situations will be corrected for future account openings. However, as is often necessary when new regulation is introduced, the industry has asked that existing accounts be grandfathered via an exemptive relief request.

3.6.1 Issues with Account Open Date

As articulated in the Exemptive Relief Request, there are situations with accounts defined at firms today where either an account was not opened to reflect a "top account", an open date was not captured when the account was defined, or the open date reflects account creation due to conversions, mergers or acquisitions.

3.6.2 Qualitative Benefits of Account Effective Date

This exemptive relief request is only for a subset of accounts established prior to the implementation of CAT. The industry has no effective solution that would enable firms to definitely and accurately establish account open dates on accounts that historically have no account open dates and do not reflect the proposed definition of account open. Accounts established after the start of CAT implementation must adhere to the Rule 613 requirements.

3.6.3 Answers to SEC Questions on Account Open Date

Question 156. Do Commenters believe that the proposed CAT NMS Plan provides sufficient information to determine when broker-dealers would report the "Account Effective Date", rather than the date the Customer's account was opened as required by Rule 613? Is there any ambiguity in the circumstances under which a broker-dealer would report an "Account Effective Date" rather than the date a Customer's account was opened?
Answer - We do not believe there would be any ambiguity in using the Account Effective Date when it is appropriate.

Question 157. Do Commenters believe reporting of the "Account Effective Date" rather than the account open date for a Customer's account under the Rule 613 approach would affect the quality, accuracy, completeness, accessibility or timeliness of the CAT data? If it does, what additional requirements or details should be provided in the CAT NMS Plan prior to the Commission's approval of such Plan? Or do Commenters believe that the Rule 613 approach is preferable? Why or why not?
Answer – The Exemptive Relief is required to address situations prior to the rule where account open date was not captured. There is no loss of data with this approach given that the date account opened either is not available or not applicable.

Question 158. Do Commenters believe that reporting the "Account Effective Date" would provide sufficient information to the Central Repository to facilitate the ability of the Plan Processor to link a Customer's account with the Customer?
Answer – Yes. Uniqueness would be required for any given Firm Designated ID and account effective date.

Question 159. Do Commenters believe that allowing the reporting of the "Account Effective Date" would be more efficient and cost-effective than requiring the Rule 613 approach of reporting of a Customer's account open date? Or do Commenters believe that the Rule 613 approach is preferable? Why or why not? Would allowing CAT Reporters to report the "Account Effective Date" rather than the date a Customer's account was opened merely transfer the costs from individual CAT Reporters to the Central Repository?
Answer – Yes, this is a more efficient approach. There would be no transfer of costs to the CAT Processor since in all circumstances Account Effective Date would be populated.

Question 160. Do Commenters agree that the proposed approach for reporting the "Account Effective Date," which differs depending on whether the account was established before or after the commencement of reporting audit trail data to the Central Repository as set forth in the CAT NMS Plan, is a reasonable approach? Why or why not?
Answer – Yes. The approach limits changes to Rule 613 to the greatest extent possible in order to address an issue which exists with accounts today.

Question 161. The Commission granted an exemption from Rule 613 to permit the alternative of allowing CAT Reporters to report whether the modification or cancellation of an order was given by a Customer, or initiated by a broker-dealer or exchange, in lieu of requiring the reporting of the Customer-ID of the person giving the modification or cancellation instruction, to be included in the CAT NMS Plan and subject to notice and comment. To what extent does the approach permitted by the exemption affect the completeness of the CAT? Would the information lost under the approach permitted by the exemption affect investigations or surveillances? If so, how?
Answer – FIF CAT WG supports the Exemptive Relief and agrees that it is not necessary to specify the customer identifier on the cancel or modification request. Suppling the information on who initiated the cancel/modification request (as either customer or CAT Reporter) is a reasonable proposal, and should provide sufficient information for regulatory purposes of market surveillance. It is consistent with OATS and providing this level of information will allow the Central Repository, if needed, to determine the customer initiating the request.

Appendix 4. Data Submission to CAT

The CAT NMS Plan included two data elements on CAT Reports, Open/Close Indicator for Equities, and Timestamp on Allocations, which have raised serious concerns. Informal surveys of small groups of FIF members were conducted to better describe the impact of these requirements. Feedback received on both of these topics is incorporated below. In addition, there are several other topics related to data submission requirements including customer data, symbology, linkages and protocols that FIF CAT WG has addressed in the following discussion of key concerns, recommendations, and in responses to the SEC's various questions.

4.1 Open/Close Indicator

4.1.1 Issues with Open/Close Indicator

Open/Close Indicator is currently data which is not captured on transactions in NMS/OTC Equities. Including this data element in CAT reporting for Equities would therefore require a significant market structure change at a significant expense. Although this indicator has been in Rule 613 and in the CAT NMS

Plan from the beginning, it was always assumed to apply to only options, not NMS or OTC equities. It was therefore a surprise to the industry to discover in the SEC discussion section of the CAT NMS Plan filing that the intent was for the information to be captured on all CAT order reports.[75] There is no regulatory structure which requires capturing this data element today for equities. The industry would require guidance on how to capture and validate this data. Because of the uncertainty in how this indicator would work for Equities, the complexity required to implement the logic, the many systems impacted to capture the necessary data and pass along on the order lifecycle, it should not be a required element in the CAT NMS Plan. Capture of this information for regulatory reporting purposes should be subject to rule filings, rigorous cost/benefit analysis and public comment.

For options, there are existing standards for capturing Buy to Establish and Buy to Cover indications throughout the order lifecycle. While firms are required to mark equity sell orders as long or short (or short exempt), new values would need to be added to buy orders, such as Buy to Cover to identify whether a buy transaction is opening or closing a position. The assumption is that the Open/Close Indicator would require broker-dealers to capture the data on orders and propagate the information through the order lifecycle. Firms do not have access to the information required to independently identify or validate an Open/Close condition for their customers whose security positions are not maintained at the firm.

Support for this data element would affect many systems in the trade process, making the addition of an open/close indicator on equities transactions an exceedingly expensive proposition. System changes would be required not only by the EMS/OMS vendors, the broker-dealers and the exchanges, but this requirement would also impose significant costs on the institutional buy side investors who transmit orders electronically. Generally, investors as a group do not expect to be impacted by CAT from an implementation perspective. Examples of systems impacted would include:

- All order protocols for ATS/Firms/Exchanges/SROs - FIX protocol, Binary, CTCI, etc. - would need to be changed to handle the open/close indicator
- All OMSs (Order Management Systems) used by broker-dealers and their customers would need to mark and accept orders with new data
- All Smart order routers would need to mark orders with a new value. A process to mark open and close would also need to be defined.
- Trade reporting engines, assuming the information would be needed on the trade reports, similar to long/short/short exempt
- Post execution systems, including allocations
- Multiple databases within a firm, including storage and audit trail data
- Books and records systems
- Surveillance systems
- Re-certification of client/vendor and market connections to support and validate new values for buy transactions

Extensive additional regulatory guidance on the usage of these indicators would be necessary. Requiring entry of this information on orders will add to retail investor confusion, as many do not currently trade Options and are unfamiliar with the concept.

FIF CAT WG solicited input from its members on the impact to their firms to support this indicator. Ten

[75] SEC Release No. 34-77724; File No. 4-698, Section E.1.a.2 (p.286)

firms responded with a wide range of estimates, but indicated that there was not enough time, not enough definition and too many questions (see below) to accurately estimate the impact to support Open/Close indicator for equities on CAT reports. All agreed that it would be a significant project to support this single data element. Given the business analysis that would need to be performed to define the processing for open/close indicator, and the impact on applications, interfaces, databases and systems to support this one data element, the costs to the industry will be quite large.

Following are questions raised by the FIF CAT WG when considering how to support the Open/Close Indicator, which demonstrate the complexity of this one indicator, and why the industry needs significant guidance and rulemaking to govern these changes that would be required of market participants beyond those subject to the CAT NMS Plan:

- How would open/close for equities be defined (e.g., beneficial owner level, aggregation unit level, account level)?
- How should open/close be used in allocations/confirms? Should we allow allocation to book: a) if the execution came in as a Buy, and the allocation is Buy to Cover, b) if execution came in as a Buy to Cover and Allocation is a Buy? What should the allocation/confirm say for each scenario, assuming a. and b. are allowed?
- What if an order fits a dual purpose? Placing a single order which would cover an existing short and also take the firm long? Is the order a Close or Open?
- Is ETF create/redeem activity in scope? That adds additional layers of complexity.
- Is open/close marked based upon known positions or, similar to Regulation SHO, marked based upon the open orders out in the market?
- Who is responsible for the proper marking of the open/close of an order?
    - The firm if it has access to a customer/client position?
    - What if a firm does not have access to a customer/client position? (Prime brokerage and RVP/DVP accounts)
- For proprietary orders, will Open/Close be defined by Firm position? Desk? Aggregation Unit? Information Barrier?
- How should corrections of order side be handled?
- Should buy and buy to cover orders be allowed to be aggregated?

4.1.2 Recommendations on Open/Close Indicator

FIF CAT WG believes that including Open/Close Indicator for Equities in CAT represents a market structure change. As such, it should be subject to its own rulemaking process, including cost/benefit analysis, and subject to a public comment period. We would encourage and welcome further discussions between the industry, SROs, and SEC to better understand what information the SEC is looking to glean from such a requirement, and whether any data already specified in the CAT NMS Plan and in regular use for Equities transactions could be leveraged to meet such needs.

4.1.3 Answers to SEC Questions re: Open/Close Indicator

Question 336. How significant to the total industry costs of the CAT NMS Plan is the requirement to report certain information as part of the material terms of the order? What elements of this requirement contribute to its significance of the potential costs of the Plan? Are there ways in which this data can be made available to regulators that would prove less costly to industry and investors? If so, what are they?
Question 427. Should the CAT NMS Plan require excluding any data fields currently required to be included in the CAT Data (e.g., unique customer identification, allocation time, and CAT-Reporter-IDs at both order

routing and receipt)? If so, which ones? Please explain and provide information on the relative costs and benefits of excluding those data fields, including any cost estimates.
Answer to 336, 427 – There are three data elements that result in significant costs for the industry, all three of which would result in substantial changes to current business processing procedures for the industry: Open/Close Indicator for equities (discussed in Appendix Section 4.1), Time on Allocation Report (discussed in Appendix Section 4.2) and Customer Identifying Information on Initial Order Report (discussed in Appendix Section 3.2).

4.2 Time Stamp on CAT Allocation Report

Time on allocations was not a data element required for CAT reporting in Rule 613[76]. Introduction of time stamp on CAT Allocation Reports represents a costly addition to reporting requirements and FIF CAT WG believe this data will not assist the SEC in achieving the expected regulatory benefit.

4.2.1 Time Stamp on CAT Allocation Report Issue

The industry does not have a standard business flow which consistently captures time at the same point in the allocation process. While in some scenarios allocations are a completely automated process, in other cases the process is "high touch" and requires manual intervention. Allocation instructions are often communicated by phone, emails, fax, and instant messaging; or, standing instructions may be maintained in a local database. And, there are a number of third party service providers which manage many of the steps within the business processes for allocations. The only consistent point in today's allocation flows where a time stamp could be captured by broker-dealers is at the time the allocation is booked into an allocation processing system.[77] FIF CAT WG believes that if a time stamp is captured at that point, it will not provide the regulatory benefit expected by the SEC, which seems to focus on front-office processes and allocation of shares to an order.[78] However, even at that point in the process, capture of a precise time stamp at the millisecond level (with a 50 millisecond drift tolerance) is not meaningful. The process does not require the same type of precision with respect to timing as other activities in the order lifecycle.

In the typical industry work flow, post trade events, which include trade allocations, have not been considered a time-critical process; therefore, middle and back office servers are often not equipped with the latest clock management hardware and software. Many of the servers which process allocations today are not dedicated solely to allocation tasks, and often, the allocation applications may be a low priority application executing on that batch processing platform. E.g., regulatory reporting applications and applications whose output must meet a time deadline will process first, before an allocation application, so processing time on allocation processing can vary widely from day to day.

Because timestamps on allocations were not required under Rule 613, all cost estimates provided to the SROs – both the cost study conducted in 2014 and the FIF Clock Offset Cost Study conducted in 2015 – excluded the requirement of timestamp on CAT Allocation Reports. Furthermore, many firms do not currently capture millisecond level timestamps for their allocations, and some do not capture time stamps at all.; To do so would require significant system upgrades for finer granularity clock synchronization, clock management and logging on these middle and back office servers.

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[76] 17 CFR 242.613 (c)(7)(vi)(A-C)
[77] Allocation Workflows
[78] SEC Release No. 34-77724; File No. 4-698, Sections D.2.b.1.B (p.238) and #.1.a.2 (p.285)

If it is ultimately determined that a timestamp is required, FIF CAT WG strongly recommends that due to the disparate and often manual systems that will ultimately handle allocations timestamps, granularity should be no finer than one second, with a one second tolerance, as required for manual orders under the CAT NMS Plan.

4.2.2 FIF Time Stamp on Allocations Survey Findings

FIF CAT WG recently conducted a survey[79] of the FIF CAT WG members to estimate the delta (costs not captured in the FIF Clock Offset Survey) associated with the additional CAT NMS Plan time stamp requirement on CAT Allocation reports. 18 firms responded, 17 of which would be categorized by the SEC as large firms, with >350,000 ROEs/month (one firm did not provide ROE estimates); 15 would be profiled as "Insourcers"[80]; the remaining 3 firms were service bureaus only firms.

Table 4 shows the average cost/respondent and total costs for all survey respondents for the initial implementation and annual monitoring costs for second level and millisecond level time stamps on allocations. Comparisons are also shown to the 50 millisecond clock offset cost estimates provided in the FIF Clock Offset Survey.[81] As noted by the SEC, the FIF Clock Offset Survey may have underestimated costs for the very large, complex firms.[82]

Table 4. Comparison of Costs to Add Timestamp on Allocations vs. FIF Clock Offset Survey

	"Time on Allocation" Survey				Clock Offset Survey	
Granularity	**Second-level time stamp Second offset**		**Millisecond-level time stamp 50 millisecond offset**		**50 millisecond offset**	
	Initial Implementation	**Annual Monitoring**	**Initial Implementation**	**Annual Monitoring**	**Initial Implementation**	**Annual Monitoring**
Average cost/ respondent	$297,058	$33,333	$639,062	$103,571	$554,348	$313,043
Total cost all respondents	$5,050,000	$500,000	$10,225,000	$1,450,000	N/A	N/A

Table 5 separates the respondents into two groups, Insourcer and Service Bureau, and the average cost by respondent is shown for each group type. An industry projection was calculated (shown in Table 6), by scaling, using SEC-provided estimates of industry size of these groups: "Insourcers", which correspond to SEC definition of large firms with 350,000 ROE/month, and handle all or part of regulatory reporting obligations through in-house processing; and Service Bureaus only. Using the SEC estimates of 126 Insourcers and 13 Service Bureaus, an industry cost projection of $88,775,000 for Initial Implementation and $13,925, 000 for annual monitoring is shown using only these two groups, Insourcers and Service Bureaus. This represents a conservative cost projection for the Industry because it does not include costs associated with "other" CAT Reporters - 45 Insourcers identified by the SEC. Also, costs may be incurred by "Outsourcers". Firms that typically "outsource" their regulatory reporting obligations may use third party providers for allocation processing, but host the applications in-house. The cost of clock management for those third party provider servers/applications then become the responsibility of the broker-dealer, even though the function of allocation processing is "outsourced". There can be other, less standard

[79] Summary of "Time on Allocation" FIF CAT WG Survey, July 8, 2016
[80] SEC Release No. 34-77724; File No. 4-698, *Broker Dealer Reporting Practices (*p. 431)
[81] Clock Offset Survey http://www.catnmsplan.com/industryfeedback/p602479.pdf
[82] SEC Release No. 34-77724; File No. 4-698, Footnote 968

configurations between broker-dealer and third party providers of allocation services that could understate the number of possible "Insourcers" for purposes of calculating industry impact of time on allocation. (Firms that did not provide cost estimates were removed from the averages calculated in these tables.)

Table 5. Respondent Costs by Sub-group

	Second-level time stamp on allocations		Millisecond-level time stamp on allocations	
Respondents' Estimates	**Initial Implementation**	**Annual Monitoring**	**Initial Implementation**	**Annual Monitoring**
Avg. cost/ "Insourcer" Respondents	$339,285	$39,583	$637,500	$93,750
Total cost "Insourcers" Respondents	$4,750,000	$475,000	$8,925,000	$1,125,000
Avg. cost/ Service Bureau Respondents	$100,000	$8,333	$650,000	$162,500
Total cost - Service Bureau Respondents	$300,000	$25,000	$1,300,000	$325,000

Table 6. Total Industry Cost Projections of Time on Allocation Report

	Second-level time stamp on allocations		Millisecond-level time stamp on allocations	
Industry Projection	**Initial Implementation**	**Annual Monitoring**	**Initial Implementation**	**Annual Monitoring**
Total cost "Insourcers" (x126)	$42,750,000	$4,987,500	$80,325,000	$11,812,500
Total cost Service Bureau (x13)	$1,300,000	$108,333	$8,450,000	$2,112,500
Total Cost	$44,050,000	$5,035,833	$88,775,000	$13,925,000

As can be seen from the cost estimates, the costs increase significantly as the time stamp granularity is increased and clock offsets are reduced. The costs for initial implementation of millisecond level time stamps on allocations (with a 50 millisecond clock offset), while similar to the findings with the FIF Clock Offset Survey, are 10% higher. This can be explained by:

- The FIF Clock Offset Survey, which excluded allocation processing from consideration, included front office servers that currently manage time-critical business processes, and have previously been a focus of regulatory oversight regarding clock synchronization. In contrast, the "Time on Allocation" servers are primarily middle and back office servers, which can be mainframe type-servers, batch processing systems and can leverage virtualization technology. With little sensitivity to time criticality, there has traditionally been no investment in clock synchronization technology or clock synchronization regulatory oversight.
- A significant number of servers will be impacted by the requirement to capture time stamps on allocations. In many firms, it represents a new data element which needs to be captured and stored (in databases and logs) and propagated through the processing layers to the (eventual) server(s) responsible for reporting allocation events to CAT. Although the average cost/server is modest ($6,492), given that any hardware, software, configuration change and associated test on a server can be costly, the total cost estimate escalates with the number of servers impacted.

The average yearly maintenance cost associated with Allocations servers is significantly less than the

annual maintenance cost captured in the FIF Clock Offset Survey. This can be explained because the "Time on Allocation" Survey assumptions instructed the respondent to report only delta costs for the related allocation servers, because enterprise infrastructure costs associated with managing clock synchronization were already included in the Clock Offset Survey.

The industry cost projections, which are viewed as conservative estimates, are quite large for initial implementation of adding Time on Allocation Reports ($88,775,000). It is an especially large number when it is considered that this represents the cost to provide one data element in the CAT audit trail which we do not believe will provide the regulatory benefit expected by the SEC.

4.2.3 Time Stamp on CAT Allocation Report Recommendation

FIF CAT WG strongly recommends that time stamps not be required in the CAT NMS Plan for allocations, as allocations are a post-trade process and not time critical. The only time that can consistently be captured by broker-dealers is the time of allocation booking. By their nature, allocation trade bookings are often "high touch" transactions and are not executed with millisecond precision. The same is often true with "no touch" transactions because there is no time sensitivity to complete the allocation, so long it is accomplished within a timeframe to meet business requirements. Including a time stamp on allocations will not yield the regulatory benefit expected by the SEC. If the CAT NMS Plan is adopted with time stamps as a requirement on allocations, we recommend that a second level time stamp with a second level clock offset be accepted as a suitable level of granularity, similar to manual order handling.

If the primary focus for this information is detecting allocation fraud (a.k.a. cherry-picking), we believe there are alternate approaches that could be considered. One approach currently in use does not dependent on millisecond-level time stamps. The "unrealized allocation-time profit and loss" in omnibus (or "allocation") accounts are analyzed over a period of time, comparing the average execution price on the allocation to the market price when the allocation was submitted to move the shares into the intended subaccounts. Highlighted is any subaccount that had total and average profit and loss far exceeding the average for all of the advisor's subaccounts. When this occurs over a given period of time, a deeper review is made to identify if a consistent pattern or practice reveals itself where certain accounts seem to be receiving favoritism (and/or being victimized). Also, any favored account is tracked for flipping on the open of the next day to lock in a relatively risk-free profit. Using this method, a millisecond granularity mark-to-market is not necessary or relevant to identify this pattern or practice of fraud. Practitioners of this kind of fraud are not consistently shaving just a penny per share or so at allocation time but rather, they are often making $0.25/per share or more based on swings in the stock prices which occur over several hours between execution and allocation.

4.2.4 Answers to SEC Questions re: Time on Allocations

Question 338 - How significant to the total industry costs of the CAT NMS Plan is the requirement to report allocation information to the Central Repository? What elements of this requirement contribute to its significance of the potential costs of the Plan? Are there ways in which this data can be made available to regulators that would prove less costly to industry and investors? If so, what are they?
Question 387 - Should the CAT NMS Plan require that Allocation Reports provide sufficient information for the Central Repository to be able to link those allocations to order lifecycles? What are the costs and benefits of providing this information? Please explain and provide cost estimates.
Answer to 338, 387 – With the Exemptive Relief Request not requiring direct linkage between executions and allocations, the burden to broker-dealers was significantly reduced. There is concern that the CAT NMS

Plan is not clear if tight linkage is required between subaccounts specified on allocations and top accounts specified on orders. The SEC filing of the CAT NMS Plan specifies (p.311) that there is value to Allocation Reports "…even without clean linkage", which implies that the SEC is not expecting this type of linkage information. If top accounts needed to be provided on allocations, it would be a significant cost to the industry. However, assuming that providing the subaccounts on Allocation Reports allows the CAT to associate the subaccounts with the customer profile, which should contain the Top Account or Relationship Identifier when the original customer was defined, then the cost of providing allocation reports should be reasonable. The one data element on Allocation Reports which is very costly, as indicated in the answer to other questions, is the time stamp (see Appendix Section 4.2.2).

Question 388 - How do broker-dealers currently track which customers should receive allocations from which set of orders and how do broker-dealers ensure that those orders receive the correct average price? Can these same systems provide a key that could accurately link the allocations to lifecycles in many-to-many allocations? Please explain.
Answer – This type of linkage is not possible with today's systems. The many-to-many relationships do not allow unique linkages for all situations. This has been previously documented with the Exemptive Relief Request[83] and Large Trader Reporting.[84] It would require significant system and process re-engineering, not just within a firm, but across firms, because it would require a central repository of all accounts and subaccounts from an industry perspective.

Multiple firms participate in handling an entire order lifecycle, yet do not share all information about the customer or the order across those firms. The Exemptive Relief Request to remove the requirement for linkages between executions and allocations was prompted by the industry's concerns about the enormous cost of attempting to meet the original requirement. It is the FIF CAT WG's belief that regulators will receive sufficient information from linking allocations through reference data back to the customer at fraction of the cost to the industry.

4.3 CAT Reporting Interface

4.3.1 Flexibility in Message Protocols

The CAT NMS Plan lacks specificity regarding the message interface which will be used by the industry for communications with the Central Repository. FIF CAT WG believes this critical component should be widely reviewed and vetted across the industry to ensure an optimum solution that meets the needs of the industry at a reasonable cost, and is minimally disruptive. The SRO decision to allow the bidders to define the protocol that is most appropriate to the bidder's technology infrastructure means that the first view the industry will have of the message protocol will be in the Technical Specifications. Effectively, no significant changes can be made to the interface at that stage without seriously compromising the implementation schedule. FIF CAT WG recommends that, at a minimum, guidelines for the message protocol be included in the CAT NMS Plan.

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[83] Letter to Mr. Brent Fields from "SROs", January 30, 2015, SRO, Request for Exemptive Relief from Certain Provisions of SEC Rule 613 of Regulation NMS under the Securities Exchange Act of 1934;
Letter to Mr. Brent Fields from "SROs", April 3, 2015, Supplement to Request for Exemptive Relief from Certain Provisions of SEC Rule 613 of Regulation NMS under the Securities Exchange Act of 1934
[84] Letter to Mr. Robert Cook and Mr. David Shillman from Manisha Kimmel, FIF Large Trader Relief Request, January 25, 2012

FIF CAT WG recommends that the CAT NMS Plan specify that multiple standard message formats (e.g., OATS, FIX) with modifications be accepted as input to CAT, and not leave this decision to the selected bidder. Supporting message formats that are in wide use would significantly ease the burden to the industry of transitioning to the Consolidated Audit Trail; it would likely reduce errors, because of familiarity with the current message format, as well as costs. In addition, support for a native CAT message protocol should also be specified in the CAT NMS Plan, including a complete and detailed specification of all data elements and normalization rules for each field.

4.3.2 Answers to SEC Questions re: Message Protocols

Question 45. The CAT NMS Plan does not specify the format in which CAT Reporters must submit data, and states the Plan Processor will specify the format. Do Commenters believe that the CAT NMS Plan should specify a particular format? If so, what format? Please explain.
Question 87. Do Commenters believe the Plan should require a specific method for entering CAT Data upon each CAT Reportable Event or upon updates and corrections to CAT Reportable Events? If so, what method? Please explain.
Answer to 45, 87 – FIF CAT WG has consistently taken the position that a flexible input format should be adopted by CAT. We believe that CAT Reporters should be given the choice to submit data in formats that are currently in use (e.g., FIX or current OATS reporting format), or a new format for CAT reporting purposes. The input formats must allow a programming interface, not just a raw data file.

Support of current interfaces has the advantage of reducing industry costs and errors through the reuse of existing, known interfaces. However, it has the disadvantage of introducing a translation layer, which can be another source of errors. A new, "native" CAT interface should be developed for any new CAT reporter who has previously been exempted from regulatory reporting. Some existing CAT Reporters may choose to migrate to this interface, because it should present technical advantages over existing "legacy" interfaces. A web interface, for manual input of CAT reports, may prove useful to Small Industry members.

It should be noted that all of these interfaces should be clearly, and completely, described in the Technical Specifications. Very detailed, and timely, information on the CAT interfaces is essential, given the aggressive CAT implementation plans.

Question 84. Do Commenters believe that the data recording, reporting, and formatting procedures described in the CAT NMS Plan are appropriate and reasonable? Would providing additional details or requirements on these procedures enhance the quality of CAT Data reported to the Central Repository or the efficiency and cost-effectiveness of the CAT?
Question 94. If Commenters believe that it is not necessary to provide additional requirements or details, if any, in the CAT NMS Plan, what additional requirements or details should be included in the Technical Specifications to determine whether the Central Repository could reliably and accurately convert such data to a uniform electronic format, for consolidation and storage?
Answer to 84, 94 – There is almost no information provided in the CAT NMS Plan to understand the data interfaces and procedures required of a CAT Reporter to communicate with the CAT. The first time that FIF CAT WG will have any opportunity to review, and comment on, the adequacy of the CAT interfaces will be with the review of the Technical Specifications. Given the very aggressive schedules specified in the CAT NMS Plan, it is very important that at least two iterative reviews of the Technical Specifications are held soliciting industry comments so that any issues can be raised, and resolved, prior to implementation.

The Technical Specifications must contain a complete description of the message and file formats, each

data element, any cross-dependencies, environmental considerations, error conditions, and data validation and normalization rules. Open source meta-data should be used so that proprietary information is kept out of the specifications and data requirements.

A Bulk Extract function available to CAT Reporters would be useful to verify data normalization and conversion rules (i.e., a CAT Reporter could extract both data submitted "as is" and data transformed to verify accuracy of CAT processing). OATS does provide a function that allows Reporters to retrieve data.

Question 95. Do Commenters believe the CAT NMS Plan's lack of a mandated uniform format in which data must be reported to the Central Repository would affect the accuracy of CAT Data collected and maintained under the CAT? If so, how? Would reporting data in a uniform format result in greater accuracy? If so, please explain.
Question 440. **Data Ingestion Format**. The Plan discusses the trade-offs between requiring that the CAT Reporters report data to CAT in a uniform defined format or in existing messaging protocols. The Plan does not require either method. A uniform defined format would include the current process for reporting data to OATS. This is Approach 2 in the CAT Reporters Study. Several bidders proposed to leverage the OATS format and enhance it to meet the requirements of Rule 613. The Plan states that this could reduce the burden on certain CAT Reporters (i.e., current OATS Reporters) and simplify the process for those CAT Reporters to implement the CAT. Accepting existing messaging protocols would allow CAT Reporters to submit copies of their order handling messages that are typically used across the order lifecycle and within order management processes, such as FIX. This is Approach 1 in the CAT Reporters' Survey. The Plan states that using existing messaging protocols could result in quicker implementation times and simplify data aggregation. The Plan further notes that the surveys revealed no cost difference between the two approaches, but that FIF members prefer using the FIX protocol. Should the Plan specify a particular approach? Please explain.
Answer to 95 and 440– FIF CAT WG is not proposing a specific format; rather, we are proposing flexibility of input formats which includes support of existing formats (e.g., OATS, FIX) as well as a baseline specification where all fields are defined, and normalized. The input formats must be clearly and thoroughly defined in Technical Specifications, including FAQs.

Mandating a uniform format for reporting data to the CAT simplifies the task for the Central Repository of consolidating/storing data, but it puts the burden on each CAT Reporter to accurately translate their current (e.g., OATS) reporting information into a uniform CAT interface. However, that is likely to yield more errors because it is very dependent on accurate, complete and timely information (Technical Specifications, FAQs, meta-data, competent CAT help desk) available to CAT Reporters, availability of sophisticated CAT test tools to validate interface protocols, and the skill levels of the estimated 300+ unique CAT Reporters/Submitters during Phase 1 of CAT. Concentrating the responsibility of data conversions with the Central Repository is a reasonable trade-off that should yield fewer errors, and greater accuracy.

4.4 Customer Information Data

4.4.1 Issues for Reporting of Customer Information Data

There is little experience associated with regulatory reporting of customer information, and FIF CAT WG is greatly concerned with protecting confidentiality. We are also concerned with the procedures for loading customer data (e.g. full refresh, scheduled bulk upload or as needed) and for correcting customer data on a timely basis.

The CAT NMS Plan lists numerous possible data elements to be required for CAT reporting of customer information.[85] FIF CAT WG does not believe that all of these data elements represent the same level of importance for unique customer identification; yet there is no mention in the CAT NMS Plan of materiality of error or inconsistency in the error identification/correction process.

Assuming there are customer profile data elements which are not significant to the regulatory process, error correction time frames for these less critical fields should be extended to provide more flexibility to the CAT Reporter. Correction of customer information data has the added complexity of requiring the CAT Reporter to contact the customer to get corrected data. The customer has no obligation to respond promptly to enable the CAT Reporter to correct any errors within the allotted error correction timeframe.

The CAT NMS Plan does not address the method for resolution of conflicting customer information across multiple CAT Reporters and determination of which CAT Reporter would be assigned responsibility for the error. What, if any, cross-checking will be performed by the CAT on customer information? A variety of false positive errors may be generated if validation rules are too stringent.

4.4.2 Recommendations on Reporting of Customer Information

FIF CAT WG recommends that customer information fields be categorized based on degree of importance for market surveillance and market reconstruction, so that focus can be concentrated on ensuring accuracy of the most important fields from a surveillance viewpoint. Different criteria could be established based on the customer data categorization for correction turn-around time; e.g., customer unique identifier (LTID or social security number) would be of highest priority; zip code may be of lesser importance and not impact regulators' ability to surveil the marketplace.

FIF CAT WG recommends that the LEI definition process be leveraged to the extent possible to reduce the amount of customer information required to be submitted to the Plan Processor for unique identification of each customer, as suggested in CAT NMS Plan Footnote 170.

4.4.3 Full Refresh of Customer Information

FIF CAT WG does not see a need to require a periodic refresh, but the provision should be included in the CAT NMS Plan that a refresh (or method to correct corrupted data) could be requested by a CAT Reporter or Plan Processor if issues were identified.

There should be no need for periodic refreshes if the initial load of customer data was successful and the CAT Reporter has been updating the customer profiles as needed. While removing the requirement for full periodic refreshes may only slightly reduce the burden or cost on the broker-dealer community as well as the Plan Processor, it would however eliminate the need for unneeded transmission and handling of sensitive PII data, thereby improving the overall security of CAT. A CAT Reporter should have the ability to request a refresh if it is discovered that the CAT data and the CAT Reporter's internal customer data are not in synch.

Allowing flexibility in the selection of accounts to be included in any upload to CAT is viewed as important. The broadest definition - if a customer does not have any CAT reportable activity, the CAT Reporter does

[85] SEC Release No. 34-77724; File No. 4-698, Appendix C.A.1.a.iii

not have to define that customer to CAT – is very useful. However, firms would like to decide their upload methodology based on how they manage their customer information processes. It may be easier to define all active customers to CAT, or just active customers who have transacted in NMS securities. It should not matter to the Plan Processor when the CAT Reporter defines a customer to CAT (initial bulk upload or on day of first trade after start of CAT reporting), as long as the CAT Reporter defines the customer to CAT, at the latest, on the day of initiating CAT reportable activity.

4.4.4 Answers to SEC Questions re: Customer Information

Question 435. The CAT NMS Plan requires that CAT Reporters provide periodic refreshes of all customer information to the Central Repository to maintain an accurate database of customer information. What intervals for updates would be appropriate and reasonable, and what information should be required to be updated? Should the CAT NMS Plan remove the requirement for periodic full submission of customer information beyond the daily updates sent when customer information changes? Please explain. Would broker-dealers reduce their costs if they did not have to report all customer information periodically? Would the removal of this requirement significantly reduce the risk of a security breach of personally identifiable information? Please explain.
Answer – FIF CAT WG does not see a need to require a periodic refresh, but the provision should be included in the CAT NMS Plan that a refresh (or method to correct corrupted data) could be requested by a CAT Reporter or Plan Processor if issues are identified.

While removing the requirement for full periodic refreshes would not reduce the costs for the broker-dealer community (firms will still need to invest in a bulk data upload function) or Plan Processor, we do believe removing the requirement is viewed as a significant improvement to data security. Reducing handling of PII data is always a positive. The bulk upload function should continue to be supported by the Plan Processor.

Allowing flexibility in the selection of accounts to be included in any upload to CAT is viewed as important. The broadest definition - if a customer does not have any CAT reportable activity, the CAT Reporter does not have to define that customer to CAT – is very useful. However, firms would like to decide their upload methodology based on how they manage their customer information processes. It may be easier to define all active customers to CAT, or active customer who have transacted in NMS securities. When the CAT Reporter defines a customer to CAT, it should not matter to the Plan Processor, as long as the CAT Reporter defines the customer to CAT prior to initiating CAT reportable activity.

4.5 Listing Symbology

The CAT NMS Plan requires that the listing exchange's symbology be used by CAT Reporters for all CAT Reporting.[86]

4.5.1 Issues with Listing Symbology

Listing Symbology is not the symbology used today for OATS reporting. The CAT NMS Plan calls for the CAT to publish a symbol history and table at the start of each day. This is insufficient for both equities and options. Today, the symbology table is published at the start and end of day for equities. For options, it would need to be published intra-day as well.

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[86] CAT NMS Plan, supra note 3, at Appendix C, Section A.1.a

4.5.2 Recommendations on Listing Symbology

The CAT NMS Plan calls for the CAT to publish a symbol history and table at start of each day. However, its use by CAT Reporters should be optional, as should use of listing symbology. CAT Reporters should be allowed to use current symbology standards and the CAT system can perform normalization. The same symbology should not be required throughout the order lifecycle so that each CAT Reporter can use the symbology meaningful for that stage in the order lifecycle. (e.g., symbology relevant to the exchange an order is being routed to for route events).

A symbology table for equities should be published by the CAT at the beginning and end of each day, as is available today; for options, the table should be published intra-day in addition to start and end of day. It is also recommended that the CAT support an automated method for the download of this table.

Also, clarity is needed in the CAT NMS Plan on what symbology is required for options; that is, will CAT require the 4 separate attributes included in the root symbol or the 17 to 21 character options symbol.

4.5.3 Answers to SEC Questions re: Listing Symbology

Question 337. How significant to the total industry costs of the CAT NMS Plan is the requirement to report information to the Central Repository using listing exchange symbology? What elements of this requirement contribute to its significance of the potential costs of the Plan? Are there ways in which this data can be made available to regulators that would prove less costly to industry and investors? If so, what are they?

Question 422. Should the CAT NMS Plan exclude the requirement to report listing exchange symbology and instead allow CAT Reporters to use existing symbologies? Please explain. Would excluding this requirement allow broker-dealers to report data to CAT without processing the data ahead of the report? Please explain. What would be the relative costs and benefits of removing this requirement from the Plan? Please provide any cost estimates.

Answer to 337, 442 – FIF CAT WG supports the CAT providing daily file(s) of symbol mappings but recommends that use of listing symbology is optional for the CAT Reporter. The Central Repository will have the data and capability to map existing symbology into listing exchange symbology, if the regulators prefer that nomenclature.

Costs have not been estimated relating to use of listing symbology. FIF CAT WG does not expect the use of existing symbology, rather than listing symbology, to result in a large cost savings; however, it does provide a data quality advantage. Use of existing symbology that is already incorporated into current (successful) regulatory reporting reduces the introduction of errors if broker-dealers are required to use listing symbology. Consider these points: a) if broker-dealers already have coding that uses existing symbology, and it works, it would be less error-prone to continue to apply that logic for reporting purposes, rather than changing the logic to use listing symbology; b) if listing symbology is required, it would be more efficient to have the Central Repository manage the mapping tables in one place, as it is less error prone and less costly than to have all reporting broker-dealers mapping to their separate tables.

4.6 End of Trading Day

The CAT NMS Plan does not define the cut-off time for the trading day, but it does stipulate that CAT reporting data is required to be submitted by 8AM following the trading day. FIF CAT WG believes the cut-off time for the trading day should be clearly defined in the Plan, and we strongly suggest that it be defined

as 4PM (ET), consistent with the current OATS cut-off time. 4PM also aligns well with the start of trading in other time zones.

A trading day defined by CAT to end later than 4PM would present a burden for broker-dealers, as additional data must be collected for CAT reporting (e.g., customer information, options, allocations), and moving the cut-off time beyond 4PM would mean compressing more collection, validation and reporting processing into a shorter time period before submission is required to CAT. A later trading day may also require additional off-shift staffing. Having sufficient time between cut-off and report submission allows firms to properly validate the CAT reports prior to submission, and may perhaps allow corrections after submission but before the 8AM deadline. This would greatly contribute to improved data accuracy and quality for the consolidated audit trail.

4.7 Answers to SEC Questions re: CAT Linkages

Question 43. Sections 6.3(d) and 6.4(d) of the CAT NMS Plan set forth the details that Participants and Industry Members must report to the Central Repository. Do Commenters believe that these details will be sufficient to allow the Central Repository to link information to accurately reflect the lifecycle of an order? If not, what additional information should be required to be reported for this purpose?
Question 273. Do Commenters believe that the provisions in the CAT NMS Plan related to linking data would result in improvements to the accuracy of the data available to regulators? Would the process for linking orders across market participants and SROs improve accuracy compared to existing data? Would the Plan Processor be able to develop expertise in linking data more efficiently than the regulatory staff members from each entity could on their own? Please explain.
Answer to 43 and 273 – It is expected that the provisions in the CAT NMS Plan (linkage requirements, daisy chains, Firm Designated ID, linking orders and allocations) will result in a more complete, and accurate linking of order events across market participants and SROs. However, details of this linking logic will not be provided for a complete evaluation until the Technical Specifications are published. It is the expectation and recommendation of FIF CAT WG that through skillful application of this linkage functionality, reporting of data can occur once in the linkage chain eliminating unnecessary, costly, and potentially error-prone duplicative reporting. See also Appendix Section 5.1.2 Sequencing.

Question 425. The Plan proposes using a "daisy chain" approach for linking order events within the Central Repository. This approach was chosen in favor of an approach that would require a unique order ID to be assigned by the first market participant that receives an order, and that order ID to be passed to and used by any market participant that handles the order afterward (the "unique order ID" approach). Do Commenters believe that a unique order ID approach or any other alternative approach would produce more accurate linkages than a daisy chain approach or any other benefits? Please explain. According to the Plan, the daisy chain approach would minimize impact on existing OATS reporters because OATS already uses this type of linkage. Do Commenters believe that a unique order ID approach or any other alternative approach would increase the costs for CAT Reporters who currently report to OATS or have any other effect on the costs of the Plan? Please explain and provide estimates. Given that the Bids from potential Plan Processors all utilize the "daisy chain" approach, would adopting a unique order ID approach at this stage cause a significant disruption in the progress toward the implementation of a consolidated audit trail? Please explain. What would the costs of such a disruption be?
Answer – The "daisy chain" approach has been used successfully by OATS and is logic that is well known and supported by the industry. This approach is preferred over the alternative that was first proposed by SROs to have a unique order id retained throughout the order lifecycle and passed from one event to the next. There were strong objections and concerns about sharing an id between firms, as well as

complications and exception logic that would be required in some situations (e.g., aggregation of orders). The industry was comfortable with "daisy chain" and could see no benefit, but many down-sides, risks and additional costs to adopt a unique order id.

Appendix 5. Alternatives Raised by SEC

As part of the discussion in the April release of the CAT NMS Plan, the Commission reexamined numerous topics and offered different perspectives than those stated in the Plan, including several on which the FIF CAT WG wishes to provide comment. The Commission's discussion of timestamp granularity and tolerances for clock offset raised particular concerns, and the FIF CAT WG has addressed the SEC's comments in great detail in this section. We will also take this opportunity to address the SEC's questions regarding Primary Market Allocations, inclusion of OTC Equities, and expansion of OATS as an alternative to building CAT.

5.1 Discussion on Clock Synchronization

Underlying many of the FIF CAT WG recommendations on clock synchronization are our views on the broker-dealer community and its segmentation, clock synchronization technology and its limitations, and methodology utilized in sequencing events for surveillance and market reconstruction. There is a discontinuity in the expected outcome of the time synchronization requirement and the precise engineering requirements which would be necessary to implement time synchronization below 50 milliseconds. For example, how frequently time accuracy (synchronization) is checked on local servers, how frequently time accuracy (synchronization) is checked on master time servers, the algorithm used to correct time, how the difference between local server time versus atomic time (errors) are reported (a distribution or an average) - all make a tremendous difference in attempting to have consistent results across disparate and distributed systems. To establish a requirement for more granular timestamps than milliseconds and tighter offsets would set unrealistic expectations for levels of accuracy that cannot be achieved when applied across the industry.

5.1.1 Segmented Marketplace

There are segments of the securities industry that have business models that demand tighter clock synchronization, and those businesses operate in tightly controlled, non-distributed, co-located environments that allow (even demand) very low clock offsets for very precise and fine grained time stamps. Exchanges are an example of this market segment, which may offer some opportunity for more stringent clock synchronization requirements. Although few in number, exchanges operate at lower clock tolerances and are managed in these highly specialized environments, often within the same managed facilities, or within blocks of each other. Assuming exchanges continue to manage to tighter clock synchronization standards, the CAT would gain the benefit of improved sequencing of cross firm order flows from the point of view of the specific exchange where those trades were ultimately routed or executed.

However, the broader broker-dealer community operates in a very different environment – distributed across a broad geography, with business demands and regulatory requirements for managing the order lifecycle that are quite different from exchanges. Business processes within any organization may range from highly automated electronic systems, to "high touch" procedures with heavy manual intervention and customer involvement throughout the order lifecycle. This broad and diverse infrastructure requires a set

of clock synchronization requirements that will allow an enterprise to operationally manage to a common standard. Despite the fact that some of the business units within broker-dealer firms are keeping more granular timestamps, they are currently managed on a best efforts basis, and are not managed with the rigor that would be necessitated by more stringent (regulatory) rules.

Clock synchronization requirements should be broadly applied against the entire broker-dealer community. FIF CAT WG is a strong proponent of the "level playing field" principle. Even if some participants are technically capable or their business models justify managing to lower clock synchronization tolerances, the regulatory oversight across all broker-dealers should be uniform.

5.1.1.1 Answers to SEC Questions re: Market Segmentation Relative to Timestamps and Clock Synchronization

Question 108. Do Commenters believe that certain categories of market participants should be held to a smaller or larger clock offset tolerance? If so, what category of market participant and why? How, if at all, would that affect sequencing of Reportable Events in CAT?
Question 118. What market participant systems, if any, should have less granular time stamp requirements? Why? What time stamp granularity standard should these systems have? Why?
Question 119. What market participant systems, if any, should have more granular time stamp requirements? Why? What time stamp granularity standard should these systems have? Why?
Question 393. Should the "industry standard" for the purposes of the clock synchronization and time stamping be "one-size-fits-all"? Please explain. If not, how should the CAT NMS Plan structure variations in clock synchronization and time stamp requirements that are based on industry practices?
Question 395 - What benefits, if any, would derive from applying the same uniform clock synchronization standards to all market participants versus applying different standards to different participant types? Which approach is preferable? If applying different standards to different participant types, which participant types should have smaller clock offset tolerances and which should have larger clock offset tolerances and what are the industry standards for those participant types? Please explain and provide any supporting data.
Question 401. What market participant systems, if any, should have smaller clock offset tolerances? Why? What clock synchronization standard should these systems have? Why? What market participant systems, if any, should have smaller clock offset tolerances? Why? What clock offset tolerances should these systems have? Why?
Answer to 108, 118, 119, 393, 395 – In general, there appears to be at least two separate environments: the broader broker-dealer community and exchanges – which operate under very different business and regulatory requirements, and operate very different infrastructures. Exchanges capture more granular time stamps. Exchange matching engine environments are quite isolated from the broader broker-dealer community and do not represent the norm for broker-dealers. These more precise time stamps provided by exchanges may be of benefit to the audit trail as corroborating evidence when sequencing events that terminate at an exchange. Most of the time sensitive (non-manual) execution events are already clock synchronized by the exchanges with high precision due to business reasons and should be continued. The order chains can be sequenced backward from the execution sequencing, based on the exchange- based clock synchronizations.
Broker-dealers are currently working towards being clock synchronized and time stamped at the granularity specified in the CAT NMs Plan for pre-trade/trading events. FIF CAT WG recommends against tightening the regulatory standards further, while allowing the entities to voluntarily use better precision/granularity, without the associated reporting requirements. FIF CAT WG does not support the requirement that more granular time stamps should be supplied on CAT reports if captured by the CAT

Reporter. For the broader broker-dealer population, FIF CAT WG believes that one clock synchronization requirement should apply to ensure a level playing field.

The post-trade events that are executed at the broker-dealer are the least time sensitive, and should not require any time stamp, or if one is required, it should be at the second level with a second clock offset. As explained in the answer to Question 49, there are different order events within the order lifecycle that, due to business processes, are more or less time sensitive (e.g., manual vs. electronic order events) and the clock synchronization requirements should reflect this.

The implications of additional precision in isolated market centers on the overall sequencing of the consolidated audit trail is not clear and should be carefully studied before any conclusions are drawn. E.g., micro-second granularity when captured in very tightly controlled environments might be too tight a measurement and give false readings of sequencing when applied to the broader industry infrastructure. Given the issues with sequencing of geographically distributed events (see Appendix Section 5.1.3), benefits of further tightening of standards is unclear and needs to be studied once the CAT is "live", against the costs both in terms of liquidity and initial implementation/on-going maintenance.

5.1.2 Sequencing

Regulators have not yet attempted event sequencing at the 50 millisecond level, which might prove to meet their needs when combined with correlated exchange data and other techniques. Nor has the CAT NMS Plan demonstrated that cross market events can be accurately sequenced if a lower clock offset is established. FIF CAT WG believes that perfect sequencing of market events based purely on time stamps is a theoretical goal, but is not practically possible. With today's technology, as long as there are clock offset tolerances, no matter how narrow, there will always be events that are time stamped within those ranges. These events must be considered contemporaneous and cannot be further sequenced by time stamp only. The CAT Processor must use other logic, in conjunction with time stamps, to sequence events; e.g., the daisy chain logic can assist in sequencing events within an order lifecycle. Data from exchanges and ATS matching engines can help in sequencing events that terminate on those market centers.

A 50 millisecond offset, given today's geographic dispersion of enterprises allows accurate construction of events while absorbing the side effects of jitter and clock signal delays (see Appendix Section 5.1.3, Geography). All events within the +/- 50 millisecond offset must be considered contemporaneous, because it would be impossible, without other corroborating data, to determine the absolute sequence of these events. The CAT NMS Plan has not demonstrated that cross market events can be accurately sequenced if a lower clock offset is established. More granular time stamps and lower clock offsets will generate a false sense of accuracy, without providing any real improvement in sequencing of events within the audit trail. FIF CAT WG believes that attempts to drive to greater precision and accuracy will result in many unwarranted regulatory inquiries based on false interpretation of event sequencing that is inherently imprecise when operating in a distributed infrastructure spread across many firms.

FIF CAT WG recommends that for order and trade events across the broad broker-dealer community, a uniform clock synchronization requirement be established. Business units within firms that selectively capture more granular time stamps should not be required to provide those time stamps on CAT reports. Providing those more granular time stamps will not enable sequencing across servers, environments or datacenters and will likely lead to a false appearance of more accurate sequencing. Providing more granular time stamps at matching engines can allow more accurate sequencing of events occurring within that market center, but not across hosts or market centers (Appendix Section 5.1.3, Effects of Geography).

FIF CAT WG recommends that Pilot studies should be conducted to test the boundaries of clock synchronization and its accuracies across a broad geographic region at different tolerances, for the purposes of event sequencing. This data driven approach can then provide valuable insight into what is technically possible in this space. Else, significant burden could be placed on the broker-dealer community to achieve lower clock tolerances which will prove to be useless in attempting cross market sequencing of events. FIF recommends that the consolidated audit trail provides a "laboratory" to study this question and determine what regulatory issues remain, and what clock offset would be required to satisfy the remaining issues, and at what cost.

5.1.2.1 Answers to SEC Questions re: Sequencing

Question 115. Do Commenters believe the CAT NMS Plan's time stamp granularity requirement is precise enough to reliably and accurately sequence Reportable Events? If not, why not? Is there a better time stamp approach and what should the requirement(s) be?
Question 116. To what degree does the millisecond or less time stamp granularity requirement enable or prevent regulators' ability to sequence events that occur in different execution venues? Please explain.
Answers 115, 116 – Event sequencing is inherently challenging. FIF CAT WG believes that sequencing of events is not possible with only time stamps. The CAT Processor must use other logic, in conjunction with time stamps, to sequence events. FIF CAT WG supports the CAT NMS Plan position - "For this reason, the Participants plan to require that the Plan Processor develop a way to accurately track the sequence of order events without relying entirely on time stamps."[87] E.g., the daisy chain logic can assist in sequencing events within an order lifecycle. CAT data from exchanges and ATS matching engines can help in sequencing events across firms and market places.

No matter the time stamp granularity and clock offset tolerance established, there will always be independent events occurring within the broker-dealer distributed environment that will be time stamped with identical time stamps or within the specified tolerance. Any events within the specified tolerance must be defined contemporaneous for purposes of sequencing, because it would be impossible, without other corroborating data, to determine the absolute sequence of these events.

A 50 millisecond offset, given today's geographic dispersion of enterprises and adoption of clock synchronization technologies, allows accurate construction of events to absorb the side effects of jitter and clock signal delays. (See Appendix Section 5.1.3, Effects of Geography) All events within the 50 millisecond offset must be considered contemporaneous. For the time being, the time stamps and clock offsets are precise enough. The delta cost to attempt to achieve more granular time stamps and lower clock offsets, given where the industry is today, is not worth the resources it would require because the SEC has not conclusively proven that it is technically possible to achieve much improved sequencing with lower clock offsets. The other corroborating data available today should be sufficient to allow reasonable sequencing. Going forward the SEC can make use of the CAT data to study this question and determine what regulatory issues remain, and what clock offset would be required to satisfy the remaining issues, and at what cost. (See Appendix Section 5.1.2, Sequencing.)

Question 116. To what degree does the millisecond or less time stamp granularity requirement enable or prevent regulators' ability to sequence events that occur in different execution venues? Please explain.

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[87] SEC Release No. 34-77724; File No. 4-698, Appendix C, C-25

Question 267. Do Commenters believe that the provisions in the CAT NMS Plan related to event sequencing would provide improvements in accuracy? To what degree does the 50 millisecond clock synchronization requirement enable or prevent regulators' ability to sequence events that occur in different Execution Venues? Are the provisions of the Plan related to event sequencing appropriate and reasonable in light of the goal of improving data quality? Please explain.
Answer 116, 267– The CAT NMS Plan provides an improvement in accuracy compared to what is available today. Movement to a millisecond level time stamp with 50 millisecond clock offset represents a significant step forward for the audit trail. 50 millisecond clock offsets are reasonable and achievable for trade and order events in a widely distributed network over a broad geographic area. Any lower clock offset would only result in significant expenditure by the broker-dealer community to implement with no additional regulatory benefit because it would only provide a false sense of precision, especially as sequenced against other events.

As explained in Question 115 and Appendix Section 5.1.2, time stamps alone cannot be used to sequence events. Daisy chains that logically sequence an order life cycle are useful. Because exchanges manage micro-second level time stamps with very low clock offsets (in a very controlled and local environment), it is possible to further refine event sequencing of events that terminate at the execution venue.

Question 268. The Plan does not specify the approach that would be used to sequence events when time stamps are identical. Do Commenters believe that there is a way for the Plan Processor to sequence events with identical time stamps? How would this process, or the lack of a process, affect the quality of the CAT Data?
Question 269. The Plan states that "the Participants plan to require that the Plan Processor develop a way to accurately track the sequence of order events [of a particular order] without relying entirely on time stamps." Do Commenters believe it is feasible to properly sequence the events of a simple or complex order without relying entirely on time stamps? Please explain. If such a procedure could be developed, how accurate would it be?
Question 270. The Plan further states, "For unrelated events, e.g., multiple unrelated orders from different broker-dealers, there would be no way to definitively sequence order events within the allowable clock drift as defined in Article 6.8." Do Commenters believe it would be feasible for the Plan Processor to develop a way to accurately sequence such unrelated orders given the time stamp and clock synchronization requirements of the Plan? Please explain. If such a procedure could be developed, how accurate would it be?
Answer 268, 269, 270– See Appendix Section 5.1.2, Sequencing. As has been answered with other questions, FIF CAT WG believes that sequencing of events needs to take multiple factors into account including time stamps, the daisy chain which would logically sequence events within an order cycle, and multiple order lifecycles that terminate at a common point, e.g., exchanges or ATSs. Each of these factors should assist the Central Repository to sequence market events. However, unrelated events that have no common execution point or other logically related and common event, should be considered contemporaneous when the time stamps on those unrelated events are within the clock offset tolerance.

It is not clear to FIF CAT WG what the regulatory relevance is to sequence unrelated events across market centers, especially orders and routes. Sequencing does increase in importance with execution events but the consolidated audit trail gets the benefit of events reported with tighter synchronization due to exchange and ATS reporting. We believe that it is almost impossible, given a large broker-dealer distributed infrastructure, to synchronize events across these environments to a very low tolerance.

In a distributed market place with multiple servers, data centers, matching engines and other applications, regardless of timestamp precision, there will also be time stamps that will be exactly the same time stamp and even if the time stamps would be different there is no guarantee that the events actually are correctly sequenced, given, the geographical, networking application delays and other speed bumps (e.g., IEX). Therefore, the time stamp granularity of below 1 millisecond should be considered de minimus for sequencing of events, and should not be pursued, as it will give false sense of precision, where none exists.

Question 273. Do Commenters believe that the provisions in the CAT NMS Plan related to linking data would result in improvements to the accuracy of the data available to regulators? Would the process for linking orders across market participants and SROs improve accuracy compared to existing data? Would the Plan Processor be able to develop expertise in linking data more efficiently than the regulatory staff members from each entity could on their own? Please explain.
Answer – As indicated in answers to previous questions, daisy chains will significantly assist the Central Processor in sequencing order events, as will tighter clock synchronization of matching engines when unrelated events are routed to common matching engines. (See 5.1.2, Sequencing)

5.1.3 Effects of Geography

The accuracy of the clock is unaffected by geography: every point of the world can reach perfect synchronization with the atomic clock by (1) receiving a satellite clock signal and (2) adjusting it because of the distance the signal had to travel from the satellite to the particular point on the planet. As a generalization, this is already happening in many datacenters across the world (although there are technical challenges for some data centers to easily receive a satellite signal). Geography, however, makes the events occurring in one particular location be seen with a delay at other geographical points.[88] A mix of events that were timestamped at different geographical points may lead a regulator to assume that the sequence of events as observed at any one geographical point was as the timestamps suggest – that would be an incorrect assumption that could lead to incorrect conclusions (e.g., accusations of "front running" where there was none).

FIF CAT WG believes that 50 milliseconds is the lowest reasonable tolerance that should be applied to event sequencing in a geographically dispersed market because it can absorb the jitter introduced through the geographic effect. Any lower tolerance can create the illusion of a more accurate time sequence of events, but in practice can cause geographically dispersed market events to be sequenced incorrectly, causing many false alarms of possible fraudulent activities. It is important to define a clock offset tolerance that absorbs geographic effects.

5.1.4 Technology Limitations

Managing clocks to achieve very precise and accurate time stamps is technically challenging in the best of conditions and becomes almost impossible in a distributed environment composed of general purpose

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[88] "Synchronization accuracy on any particular NTP client system is affected by the distance and quality of the network that links it back to a stratum-1 time-server. Long and variable network delays, or asymmetric delays, reduce the achievable accuracy. In a switched local area network where the time-server is located in the same facility as the client and network delays are relatively low and constant, accuracy in the range of 1-10 milliseconds can be expected using standard implementations. Over wide area or routed networks which are subject to longer delays and more jitter, accuracy can degrade to the range of 10-100 milliseconds". Executive Summary: Computer Network Time Synchronization. David L. Mills,

hardware and software components which are not customized for managing more granular time stamps and low clock offsets. Managing time on a single host optimized for performance (minimizing interference) allows more precision and accuracy of time stamps. As variables are introduced into the environment – multiple hosts, communications delays, layers of general purpose hardware/software not optimized for single purpose performance goals – the accuracy of time stamps are degraded. With very specialized software and hardware (beyond the scope of most broker-dealer IT environments today), this degradation can be minimized (perhaps 10 milliseconds[89]) but not eliminated. The broker-dealer community operates in an infrastructure that is at the opposite end of the spectrum of a specialized very precise and accurate environment. The current millisecond level time stamp and 50 millisecond clock offset best matches the precision and accuracy achievable in the broker-dealer community for the order lifecycle so that the audit trail using these time stamps would accurately reflect that level of time imprecision. As attempts are made to lower the granularity and tolerances, the time stamps in the audit trail would start to cloud that level of imprecision, which would result in a false sense of accuracy and unwarranted regulatory inquiries.

Some models of hardware servers and operating systems that are in use across the industry today do not adequately support millisecond level stamps and lower clock offsets. Third party products and/or customization are required to upgrade these versions to the support currently required by the CAT NMS Plan.[90] Some firms prefer to re-engineer their infrastructures, securing hardware and software that natively support the more precise and accurate clock synchronization requirements required by CAT rather than customizing or modifying their base infrastructure components.

Virtualization technology is widely used throughout the industry to both reduce IT costs, as well as improve the operational efficiencies of running multiple operating systems ("OS") and applications concurrently. It allows multiple virtual servers to run on one physical hardware machine. "Virtualization adds an extra layer between the hardware and the OSs, which creates additional resource contention and increased latencies, that impact performance."[91] The operating system synchronizes its (virtual) clock against the clock of the physical server on which it runs. Introducing NTP into this virtual machine ("VM") environment requires extensive reconfiguration and customization of the hardware, operating system, and NTP (e.g., the virtual machine cannot synchronize to its virtual clock)[92]. VM servers with especially demanding workloads and frequent (program) interruptions can result in more significant clock drifts. These environments need to be assessed and measured to determine the clock offset tolerances that can be effectively managed in their VM environments. Reconfiguring and rebalancing these VM environments may be sufficient. Or, in more extreme cases, applications that need to be managed to more precise and accurate times may require their infrastructure to be re-architected to remove virtualization, which is a difficult task. When clock offsets move to below one second and approach 50 milliseconds, the VM environments need to be assessed to determine the accuracy that can be achieved. Firms are especially sensitive to environments that produce variable results depending on workloads, creating time "out of synch" conditions, which can jeopardize compliance with regulatory oversight.

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[89] James C. Corbett, et.al., Spanner: Google's Globally Distributed Database http://research.google.com/archive/spanner.html

[90] E.g., IBM z-system Parallel Sysplex manages to 100 ms offset, and restrictions of coupling within 100 miles; older versions of Microsoft Windows have time server restrictions.

[91] "Virtualize Everything but Time", Timothy Broomhead, et. al.

[92] "Timekeeping in VMware Virtual Machines – Information Guide"

5.1.5 Operational Challenges

As the clock offset tolerance decreases, the operational complexity increases. Managing fine grained clock synchronization in a large, geographically diverse environment requires a trained and disciplined operations staff. All firms do not have the skills and procedures in place to manage this type of environment. And, there are unique operational challenges if different clock synchronization standards need to be managed for the same report types across a data center or enterprise, especially if the environment requires management at a consistently reliable level and in compliance with all regulatory oversights. Although selected firms have limited applications that may use a lower granular time stamp and clock offset, those applications are very narrow in scope, tightly controlled, limited in footprint, and do not manage to the demands and rigors and penalties associated with regulatory oversight.

5.1.6 Clock Synchronization Management

The CAT NMS Plan lacks any specificity on the regulatory requirements for clock synchronization management. FIF CAT WG poses the following questions that should be answered by the CAT NMS Plan:

- When discussing time stamps and clock offsets, what should be the sustained level of clock offset tolerance? What standard deviation from the norm, over what extended period of time, would be considered an exception? There needs to be more precision to define the degree (e.g., .99 or .999% frequency) of achieving that clock offset.
- What situations require reporting? What situations require "overnight" actions? What situations, if any, require "immediate" corrective actions? If disclosure of errors is included in CAT reports and corrections are handled on a timely basis, is that sufficient to meet regulatory requirements?
- If the clock offset cannot be maintained during the trading day, is the firm obligated to take that application/server off-line? E.g., what are the risks and trade-offs in taking a trading system off-line versus being out of clock offset tolerance for a portion of the day? What is considered a "persistent" failure vs. a "transient" failure? If a Market Maker was forced to take a server off-line due to clock synchronization issues, it could have a negative impact to the market.

Guidance to answer these questions should be added into the CAT NMS Plan, because the industry must comply with the Rule 613 clock synchronization requirement by Effective Date plus four months, well ahead of any Technical Specification availability. FIF CAT WG recommends that CAT NMS Plan consider using the approach provided in FINRA's OATS Clock Synchronization FAQ #S9.

5.1.6.1 Answers to SEC Questions re: Regulations on Clock Management and Enforcement

Question 111. Do Commenters believe the CAT NMS Plan provides adequate enforcement provisions to ensure CAT Reporters synchronize Business Clocks within the proposed 50-millisecond clock offset tolerance? If not, what additional enforcement provisions should the CAT NMS Plan provide?
Question 112. Do Commenters believe that sufficient detail has been provided in the CAT NMS Plan concerning the reasonable justification or exceptional circumstances that would permit a pattern or practice of reporting events outside of the specified clock synchronization standard?
Question 126. Do Commenters believe the CAT NMS Plan provides adequate enforcement provisions to ensure CAT Reporters time stamp Reportable Events to a granularity of one millisecond (and for Manual Order Events to a granularity of one second)? If not, what additional enforcement provisions should the CAT NMS Plan provide?
Answer to 111, 112, 126 – The Plan does not address the measurement and enforcement of clock-synchronization and timestamp granularity requirements in much detail. FIF CAT WG recommends that

reasonable policies and procedures be in place to be in compliance. The current OATS practice of requiring a daily sign-off by a supervisor that clock synchronization procedures were being followed may be reasonable. To be judged "out of compliance" with the clock synchronization measurement should require that the firm did not have policies and practices in place, or could not demonstrate adherence to the policies and practices, or the clock was out of tolerance for extended periods of time with no back-up procedures in place. Extreme action of stopping of trading or liquidity provisioning should not be required in case of transient clock-drift events because it would have adverse effects on liquidity in the market. The enforcement via fines for transient events that cause clock-drift can result in reduction in provisioning of liquidity in times of high volatility and is also not recommended. FINRA's OATS approach to clock synchronization management, as described in OATS Clock Synchronization FAQ #S9 is also recommended.

Question 113. The CAT NMS Plan generally requires CAT Reporters to record and report Reportable Events with a time stamp of at least to the millisecond but provides for a 50 millisecond clock offset tolerance. Do Commenters believe the time stamp granularity requirement and the clock offset tolerance should correspond more closely or even identically? If so, please explain, including what such time stamp granularity requirement and clock offset tolerance should be.
Answer – Time stamp granularity and clock offsets are separate, but related, factors in managing clock synchronization, as is the environment and infrastructure in which clock synchronization is being managed. How granular the time stamp and how low the clock offset should be or even can be, is dependent on many factors. One factor to consider is what are the events being time stamped and how time sensitive those events are. There is not a single answer to the question posed by the SEC, because all of the factors need to be considered with balanced pairings defined for the possible variations. Single host versus distributed network, fully electronic versus all manual events, batch versus real-time processing, highly optimized and state of the art technology versus commoditized general purpose systems, regulated versus unregulated processes, time critical or not, single purpose, specialized systems managed independently versus multi-purpose business units managed as a cohesive enterprise– all must be considered when recommending clock synchronization factors.

As has been stated in many of the answers to the other questions, the current CAT NMS Plan time stamps for electronic order events (millisecond time stamp and 50 millisecond offset) is a reasonable pairing for the broader broker-dealer distributed network environment. Given the geographical considerations (discussed in Appendix Section 5.1.3, Effects of Geography), any lower clock offset would create a false sense of accuracy, resulting in many false regulatory inquiries. Given the geographical, networking, application delays and other speed bumps (e.g. IEX), the timestamp granularity of below one millisecond should be considered "de minimis" and should not be required. It will create a false sense of precision and also cause unwarranted regulatory inquiries.

The CAT NMS Plan calls for annual reviews of clock synchronization rules so the success of audit trail sequencing can be monitored, as well as technological advances and industry practices. If improved sequencing is demanded for improved market surveillance or market reconstruction, improvements in clock synchronization can be considered as one element in sequencing techniques. However, it is better that such synchronization granularity is left to tighten voluntarily based on business requirements rather than due to regulatory requirements, to avoid any possible unintended consequences to liquidity in times of volatility.

5.1.6.2 *Answers to SEC Questions re: Annual Assessment for Clock Synchronization*

Question 110. The CAT NMS Plan provides that as time synchronization standards evolve, the Participants

would assess, on an annual basis, the ability to tighten the clock synchronization standards for CAT to reflect changes in industry standards. Do Commenters believe that this would establish an appropriately rigorous process and schedule for the Participants to evaluate whether the clock synchronization standard should be tightened? Are there any other factors that should affect when and how to tighten the clock synchronization standard?

Question 125. The CAT NMS Plan provides that as time stamp standards evolve, the Participants would assess, on an annual basis, the ability to require more precise time stamp granularity standards for CAT to reflect changes in industry standards. Do Commenters believe that this establishes an appropriately rigorous schedule for the Participants to evaluate whether time stamp granularity requirements could potentially be set to finer increments? Are there any other factors that should affect when and how the requirements for time stamp granularity increments could be made more precise?

Answer 110, 125 – Yes, FIF CAT WG agrees with an annual process to re-assess clock synchronization standards for CAT. The review should include what problems, if any, exist with current data in the audit trail, and how any more granular clock synchronization would affect those problems. The analysis should include the current state and cost of clock synch technology, and what the current industry practices are regarding adoption of these technologies, as well as the cost to the industry to lower the clock synch requirements. Considerations should include adoption rates of clock synchronization technologies, fully electronic work flows, the sequencing success rate of the Plan Processor given the current clock offset tolerance, inherent limitations of technology and clock synchronization in a distributed network, importance of uniform standards across broad broker-dealer community, and the success rate of the regulators to accurately assess potentially conflicting events based on time stamps and sequencing.

While FIF CAT WG agrees that an annual review may be beneficial, we stress that any clock synchronization requirement should be set in place for approximately three years, because it is a very costly and disruptive change for the industry, and lower clock offsets can take two years to implement.

5.1.7 Industry Costs

FIF CAT WG has conducted two surveys[93] over the past two years to determine the industry costs associated with millisecond level time stamps and various clock offset tolerances. The Clock Offset Survey focused on front/middle office server impacts of clock synchronization, specifically excluding the clock synchronization costs to allocation related servers, because at that time, time was not a required element on CAT Allocation Reports. The second survey "Time on Allocation" Cost Survey was conducted to capture the clock synchronization costs which affect middle/back office allocation servers. Both surveys demonstrated the high cost to firms to meet the clock synchronization requirements.

The Clock Offset Survey (see Table 7) showed that costs escalate dramatically as the clock offset is lowered below 50 milliseconds. Even at 50 millisecond clock offset, the average cost/respondent is $554,348 for initial implementation, with annual monitor/maintenance costs of $313,043/year.

[93] FIF Clock Offset Survey Preliminary Report, February 17, 2014; Summary of "Time on Allocation" FIF CAT WG Survey, July 12, 2016

Table 7. Clock Offset Survey – Cost Escalation at lower clock offsets

Clock Offset Survey	100µs	1ms	5ms	50ms
Average Cost	$ 1,550,000	$ 1,141,667	$ 887,500	$ 554,348
Total Cost for Respondents	$ 37,200,000	$ 27,400,000	$ 21,300,000	$ 12,750,000
% Cost Increase over 50 ms	192%	115%	67%	

The SEC noted[94] that the projected costs from this survey may be understated for the very large/complex firms.

The "Time on Allocation" Cost Survey captured the costs for providing a second-level and a millisecond-level time stamp for CAT Allocation Reports (See Table 8). As with the Clock Offset Survey, costs increase significantly as the granularity of the time stamp (and associated clock offset) is lowered. Adding time stamps on allocations impacts many servers because a new data element must be captured at allocation trade booking time and then propagated down to the servers responsible for CAT reporting. The average cost/server was $6,492, a modest amount but when multiplied across all the impacted servers, results in a large cost to broker-dealers. Annual monitoring costs in this survey reflect only the delta costs from additional clock synchronization to allocation servers; base infrastructure costs were included in the Clock Offset Survey.

Table 8. FIF Time on Allocation Cost Survey

	Second-level time stamp on allocations		Millisecond-level time stamp on allocations	
	Initial Implementation	**Annual Monitoring**	**Initial Implementation**	**Annual Monitoring**
Average cost/ respondent	$297,058	$33,333	$639,062	$103,571
Total cost all respondents	$5,050,000	$500,000	$10,225,000	$1,450,000

These surveys demonstrated four main points:

1. Broker-dealer industry practice does not show that managing to clock synchronization technologies below one second has been broadly implemented across the industry. FINRA's clock synchronization requirement until recently has required second level time stamps with second level clock offsets. More granular time stamps and lower clock offsets were not implemented unless demanded by very particular and narrow applications.
2. Front office servers, due to business and regulatory requirements, more widely adopted improved clock synchronization technologies. There has not been similar business or regulatory demands to apply this technology to back office servers.
3. The costs to adopt more fine-grained clock synchronization technologies is significant, and should only be adopted if there is an offsetting and compelling regulatory benefit. FIF CAT WG believes that the 50 millisecond clock offset is a reasonable and achievable requirement for orders and executions at this time. Consistent with the recently approved FINRA requirement, the industry is moving forward with this level of granular time keeping.

[94] SEC Release No. 34-77724; File No. 4-698; Section F.3

4. The cost/benefit analysis has not been provided to clearly demonstrate that a more precise clock synchronization is needed, or even possible at this time.

5.1.7.1 Answers to SEC Questions re: Costs related to Clock Synchronization

Question 334. How significant to the total industry costs of the CAT NMS Plan are clock synchronization requirements, the requirement that Options Market Makers send quote times to the exchanges, the requirement that the Central Repository maintain six years of CAT Data, and the inclusion of OTC Equity Securities in the initial phase of the implementation of the CAT NMS Plan? Why?

Answer – (This answer only addresses Clock Synchronization costs. The other significant cost drivers are addressed in other sections of this document). See Appendix Section 5.1.7 (Industry Costs) for the costs included in the Clock Offset Cost Study and the "Time on Allocation" Cost Study. Based on the SEC's own cost analysis, clock synchronization will cost the industry $268M for initial implementation of 50 ms clock offset and $25M for annual monitoring/maintenance. By any measure, that should be judged as a significant element of the overall industry costs of the CAT NMS Plan. This estimate did not include allocation servers. If millisecond level time stamps are required on CAT Allocation reports, then the total industry implementation costs for clock synchronization, based on the FIF "Time on Allocation" Cost Survey[95] would increase by about 33% and monitoring costs would increase by an additional 25%. If the clock offset requirement is reduced to below 50 milliseconds, the industry costs increase significantly, as evidenced in the FIF Clock Offset Survey[96] and the SEC calculations of total industry costs at various offsets.[97]

FIF CAT WG supports the SEC alternative to limit the log requirement to only clock synchronization exceptions, and not all clock synchronization events. Feedback on the FIF Clock Offset Survey indicated that logging of all clock synchronization events would be a costly change for some broker-dealers.

It should be noted that if the CAT NMS Plan is approved with inclusion of a lower clock offset, it will be exceedingly difficult, and significantly more costly, for the industry to achieve that lower clock offset by Effective date plus 4 months, as currently indicated in the CAT NMS Plan. The industry has been working diligently for a few years, since publication of Rule 613 and recently, the approval of FINRA clock synchronization requirement, to achieve 50 millisecond clock offset. To achieve lower clock offsets, different clock technologies must often be employed. Notice of at least two years is required by the industry to achieve clock offsets lower than 50 milliseconds.

It should also be pointed out that operating at different levels of clock synchronization across a broad enterprise is a non-trivial operational challenge. Managing different procedures, policies, and technical solutions creates more opportunities for compliance gaps.

Question 396. Do Commenters agree with the Commission's cost estimates for clock synchronization alternatives? Are there CAT Reporters other than broker-dealers that would incur significant costs from increasing clock synchronization standards to allowable clock drifts of less than 50 milliseconds, such as 1 millisecond or 100 microseconds? At what level of clock synchronization would these costs become material? Please explain. Do Commenters have estimates of these costs?

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[95] Summary of "Time on Allocation" FIF CAT WG Survey, July 12, 2016
[96] FIF Clock Offset Survey Preliminary Report, February 17, 2015
[97] SEC Release No. 34-77724; File No. 4-698 (p. 613)

Answer – SEC did use the costs provided by the FIF Clock Offset Survey for their calculations of projecting an industry cost for clock synchronization. Even though the SEC calculated an industry cost of $268M for initial implementation of 50 millisecond offset, and a $25M annual monitor/maintenance cost, the Commission also stated that it did not view clock synchronization costs as a significant expense for the industry. FIF CAT WG disagrees with the SEC's conclusions and believes this represents a "material" expense.

There are a few points in the SEC calculations we would like to highlight, to illustrate that the SEC projected industry cost is understated:

- The $554,348 average cost/firm for initial implementation of 50 millisecond clock offset might be challenged because the participants in the FIF Cost Offset Survey was skewed towards smaller firms, which do not match the SEC "insourcer" model
- The SEC stated that the FIF Cost Offset Survey underestimated the costs per firm because of the methodology used to select a "midpoint" for the top cost range.
- The SEC "Outsourcer" model assumes virtually no cost (1/4 of a FTE for initial implementation) for an outsourcer in support of clock synchronization, because it is assumed that all of the costs are borne by a service bureau. This cannot be assumed for all under the "outsourcer" model, as there might be different third party provider models where some costs are borne by the "outsourcer". E.g., some software runs within the broker-dealer infrastructure, in which case the broker-dealer might have to bear some clock infrastructure costs and oversight support.

In the FIF Cost Offset Survey, FIF CAT WG took the position that the costs, and cost curve, become very significant when the clock offset moves below 50 milliseconds. There is no proven benefit for capturing time stamps lower than one millisecond, or managing tolerances under 50 milliseconds for the broader broker-dealer community. Before significant cost is invested by the industry, the expected results, and benefits, should be proven.

It should be noted that exchanges did not participate in the FIF Cost Offset Survey, so their costs are not reflected in the results.

Question 397. Does the FIF Clock Offset Survey reflect the operational capabilities of all potential CAT Reporters? Please explain.
Answer – The FIF Clock Offset Survey did not include any exchanges in its survey.

5.1.8 Answers to Other SEC Questions on Clock Synchronization

5.1.8.1 Answers to SEC Questions re: Clock Synchronization

Question 48. Do Commenters believe that the CAT NMS Plan's requirement that Participants and Industry Members synchronize their Business Clocks to within 50 milliseconds of the time maintained by the National Institute of Standards and Technology ("NIST") is appropriate and reasonable? Do Commenters agree with the Participants that this clock offset tolerance represents current industry standards? Would a tighter clock offset tolerance be feasible?
Question 101 - Do Commenters believe that a clock offset tolerance of 50 milliseconds is appropriate and reasonable, in light of the increase in the speed of trading over the last several years? If not, what would an appropriate and reasonable standard be?
Question 103. Would a smaller clock offset tolerance be reasonably achievable? Please identify such tolerance and incremental additional costs that achieving that smaller clock offset tolerance might entail.

Question 104. If Commenters believe that, in light of the current speed of trading, the clock offset tolerance should be more rigorous, what, if any transition period would be reasonable and appropriate for reducing the clock offset tolerance standards of CAT?
Answer 48, 101, 103, 104 – 50 millisecond clock offset is a reasonable target across the broad industry given today's environment and the adoption rate of clock synchronization technology within the industry. FIF CAT WG agrees that 50 millisecond clock offset is reasonable and achievable to improve time stamp accuracy.

However, as documented in the FIF Clock Offset Survey[98], there are many technical and operational challenges to move the broad industry towards a more granular time stamp and a lower clock offset. A smaller clock offset tolerance would not be reasonably achievable, especially in the near future. Based on the Clock Offset Cost Survey, the cost per firm increases dramatically as the clock offsets are lowered (see Table 7 for the costs to support clock offsets lower than 50 milliseconds). Changes needed would include upgrade of clock synchronization infrastructure, including moving to more accurate protocols (e.g., NTP, PTP), upgrading hardware and operating systems that do not support low clock offsets, potentially re-architecting distributed hardware environments to more centralized, tightly controlled environment, re-architecting virtual machine environments, expanding the logging infrastructure due to the significant increase in log records to meet CAT logging requirements. It would take at least two years for the industry to move to a clock offset below 50 milliseconds.

It has not been demonstrated that a more precise and accurate time stamp will result in a more accurately sequenced audit trail, or if it will lead to more frequent and incorrect regulatory inquiries because of the false sense of accuracy. As documented in Appendix Section 5.1.2 (Sequencing), sequencing cannot only depend on time stamps to order events. The SEC analysis on numbers of contemporaneous events does not reflect how many of those events can be resolved through supporting evidence. Once that is factored in, is there a significant number of contemporaneous events that represent questionable events that need to be challenged?

A Pilot Study should be conducted once the consolidated audit trail is built to study this issue, and determine the technical issues, regulatory requirements and benefits associated with sequencing the audit trail.

Question 109. Do Commenters believe a 50-millisecond clock offset tolerance would materially impair the quality and accuracy of CAT Data? If so, please explain. Would such a standard undermine the ability of the Central Repository to accurately and reliably link order and sequence event data across venues, or combine it with other sources of trade and order data? If so, please explain. Is there a benefit from applying the same uniform clock offset tolerance to all market participants, or would a variable clock offset tolerance approach be preferable? For example, should a high-volume market participant trading on multiple exchanges and ATSs have the same clock offset tolerance as a small retail-focused regional office? Would the benefits of a smaller clock offset tolerance for service bureaus that report but do not record order events be lower than for other types of CAT Reporters? Would the benefits of a smaller clock offset tolerance for clearing brokers that record and report information available only after an execution be lower than for other types of CAT Reporters? Please explain.
Answer – We believe that 50 millisecond clock offset is the most reasonable and achievable clock offset

[98] FIF Clock Offset Survey Preliminary Report, February 17, 2015

that can be implemented across the broad broker-dealer community today, given the geographically diverse environment in which they operate (see Appendix Section 5.1.3, Geography). Time stamps, in conjunction with other corroborating data (e.g., daisy chains and more accurate sequencing at exchanges), can provide effective sequencing for the audit trail. There has been no evidence to prove that more granular time stamps can result in a more accurate audit trail, without increasing the preponderance of falsely identified conflicts between contemporaneous events.

As discussed in Appendix Section 5.1.1, Segmented Marketplace, FIF CAT WG believes in a level playing field, and strongly supports one uniform clock synchronization standard for each set of CAT reports (e.g., full electronic trading, manual order events) across the broad broker-dealer community. However, exchanges, and possibly at the next level, ATSs, operate in a very different market place and operating infrastructure – more tightly controlled, on centralized servers, managed to more rigorous clock synchronization practices – that could benefit the CAT. Order events that terminate at exchanges (and possibly ATSs) can already be more accurately sequenced by the CAT.

5.1.8.2 Answers to SEC Questions re: Timestamps

Question 49. Do Commenters believe that the CAT NMS Plan's requirement that Participants and Industry Members report information to the Central Repository in milliseconds is appropriate and reasonable? Would a more granular time stamp requirement be feasible? Do Commenters agree with the Participants that time stamp granularity to the millisecond represents current industry standards?
Question 114. Are the time stamp granularity standards for both electronic and non-electronic reportable events appropriate and reasonable? If not, why not and what would be a better alternative?
Question 115. Do Commenters believe the CAT NMS Plan's time stamp granularity requirement is precise enough to reliably and accurately sequence Reportable Events? If not, why not? Is there a better time stamp approach and what should the requirement(s) be?
Question 116. To what degree does the millisecond or less time stamp granularity requirement enable or prevent regulators' ability to sequence events that occur in different execution venues? Please explain.
Question 124. Do Commenters believe the CAT NMS Plan's requirement that time stamp granularity (other than for Manual Order Events) should be to at least the millisecond is granular enough in light of current practices? If not, why not?
Question 402. Should the Plan require time stamps to be reported more granularly than the one millisecond required in the Plan? If so, what standard should be required? Do Commenters agree with the Commission's analysis of the costs and benefits of requiring finer time stamp resolution than 1 millisecond? Please explain.
Answer 49, 114, 115, 116, 124, 402–There are categories of transactions that share similar properties that merit similar treatment relative to clock synchronization. FIF CAT WG supports the following clock synchronization requirements for these CAT report types.

- Manual order entry – one second time stamp, with clock offset of one second, as specified in CAT NMS Plan
- Manual intervention in handling one or more steps in the order flow – proposed one second time stamp with one second clock offset
- Fully Electronic trading – time stamp of millisecond with clock offset of 50 millisecond, as specified in the CAT NMS Plan
- Post-trade events – timestamps are not relevant and therefore should not be required; however, if time stamps are required, then FIF CAT WG recommends one second time stamps with one second clock offset. FIF CAT WG has raised an issue to the time stamp requirement on allocation reports (See Appendix 4.2)

A millisecond level time stamp is precise enough for order and trade events from broker-dealers to reliably and accurately sequence reportable events, when paired with other corroborating reporting events including daisy chains which link events within one order lifecycle. In combination with order lifecycle events terminating at a market center, and the more granular time stamp available from Exchanges, it is possible to sequence order lifecycles across firms that terminate at the same Exchange. See Appendix Section 5.1.2, Sequencing.

Millisecond level time stamps are also appropriate given the geographic effects on clock synchronization in the distributed broker-dealer community, and the distributed infrastructure within an enterprise (See Appendix Section 5.1.3, Effects of Geography). Additional precision would not add any accuracy to the time stamp in this infrastructure, making sub-millisecond time stamps meaningless and it would not help in the sequencing of events.

Until recently, the industry practice was a second level time stamp, based on business requirements and FINRA second level time stamp rule. With Rule 613 and the CAT NMS Plan, and the recently approved FINRA 50 millisecond clock offset ruling, a millisecond level time stamp and a 50 millisecond offset will become the industry practice for fully electronic trading events, once the CAT NMS Plan is approved. A more granular time stamp, in micro-seconds, is selectively used by specialized applications and is not broadly applied across the industry. It would be extremely disruptive and very costly to attempt to apply that protocol to the broader broker-dealer community at this point in time.

In addition, with the recent SEC declaration in response to the IEX exchange application that delays under 1 millisecond are “de minimis”, it emphasizes the false sense of accuracy under a millisecond. FIF CAT WG does not support a sub-millisecond time stamp. Millisecond level time stamps provide sufficient precision in today’s market place to allow reasonable sequencing of events, in conjunction with daisy chain linkages, and exchange ordering of execution events. For isolated environments that operate under different business models, regulatory oversight and tightly controlled environments (e.g., exchanges) the SEC could consider a more granular time stamp and lower clock offsets. However, the exchanges are already reporting lower granularity time stamps with lower clock offsets through voluntary efforts. It is not clear what regulatory benefit would be achieved in making this a requirement.

Moving to micro-second level time stamps would not help sequence data across data centers and would provide a false sense of precision, resulting in avoidable inquiries. It would be very difficult, costly and disruptive to change the time stamp granularity for broker-dealers at this point in the CAT NMS Plan cycle. A time stamp more granular than a millisecond has very large implications to broker-dealers involving expanding database fields, expanding application interfaces, log files and managing to a clock offset lower than 50 milliseconds (see Appendix Section 5.1.7, Industry Costs). And as importantly, a more granular time stamp should not be required because it would provide a false sense of precision and result in avoidable inquiries.

See also Appendix 3, Answers to Questions 123 and 124.

5.1.8.3 Answers to SEC Questions re: Current Practices Related to Clock Synchronization and Timestamps

Question 50. How should “industry standard,” for purposes of the CAT NMS Plan’s clock synchronization and time stamping requirements, be determined? Do Commenters believe that “industry standard” should be based on current industry practice? If not, how should “industry standard” be defined? What other

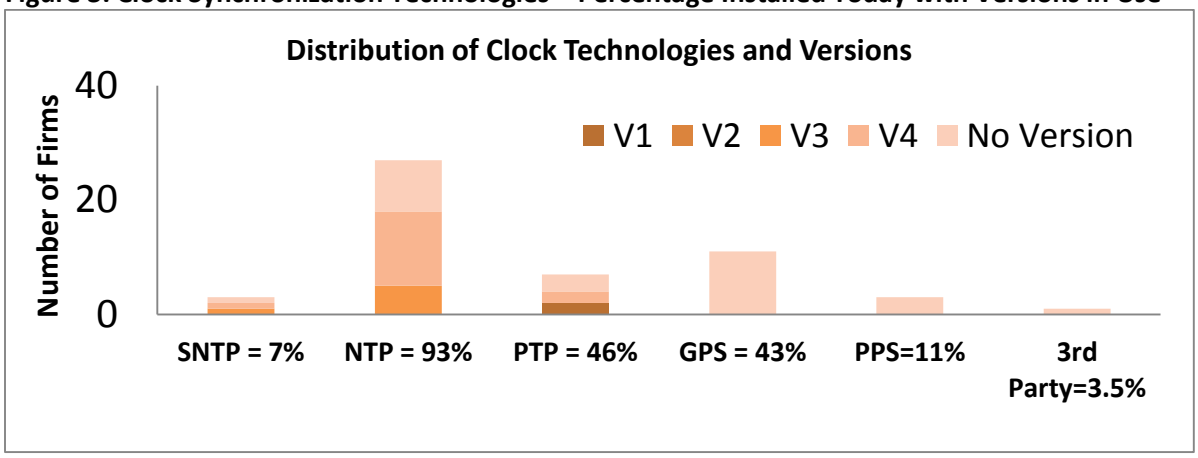
factors, if any, should be considered in defining such "industry standards"?
Question 106. Do Commenters believe the range of clock synchronization practices should be considered when considering the appropriate clock synchronization standard?
Answers 50, 106 – There is no formal "industry standard" regarding clock synchronization. Therefore, basing an industry standard on current industry practices seems fair and reasonable, especially given that the industry practices are driven by business and regulatory requirements. Inherent limitations of available technologies given the nature of this geographically dispersed market place must also be considered. And cost/benefit analysis needs to be performed during the definition of such a standard. Adoption of new and advantaged technologies should be driven by business reasons, not regulatory requirements. No standard should be created that increases costs without compensating benefits (e.g., sub-millisecond time stamp capture). Input from industry groups' comments and surveys should be given importance in making the determination on industry standards because industry forums are used extensively for understanding proposed regulations and assessing impacts of proposed regulation. Industry forums can provide insights into current state, costs, benefits and issues on proposed standards.

Question 102. What are current clock synchronization practices? Do Commenters believe that current industry clock synchronization practices are sufficiently rigorous in light of current trading speeds? If not, please explain.
Question 105 - What is the range of clock synchronization practices across the industry?
Answer- The current industry practices are determined by each business units' business needs and best efforts basis and has proven to be sufficient given the safe functioning of the markets. While the industry selectively keeps tighter clock synchronization for certain subsets of the business, those should not give way to such tighter regulatory requirements across the broader broker-dealer community that result in unreasonable costs and may impact liquidity if there are systematic events causing the delays (where participants decide not to provide liquidity purely due to clock synchronization related regulatory requirements).

Current clock synchronization practices were documented in the Clock Offset Survey. Even though the Clock Offset Survey was completed close to 18 months ago, the results are still relevant. The current technology is still as described in the survey, and firms continue to make progress in migrating to the 50 millisecond clock offset, as prescribed by the CAT NMS Plan and FINRA. NTP is generally used, and has become more prevalent since the Clock Offset Survey was taken.

Figure 3 shows the distribution of clock technologies in use on front office servers as reported in the Clock Offset Survey. Of note is that less than half of the firms reported use of the more advanced clock technologies. There has not been broad adoption of clock synchronization technologies that better support clock offsets below 50 milliseconds.

Figure 3. Clock Synchronization Technologies – Percentage Installed Today with Versions in Use



The "Time on Allocation" Cost Survey, which reflects middle and back office servers that support allocation processing, showed 86% use of NTP, 6% use of SNTP and 29% use of PTP. More advanced clock technologies lag in use on the middle and back office servers because there has not been either business or regulatory demand for time sensitivity.

Question 107. If an SRO or broker-dealer can or does synchronize its clocks to an offset tolerance more rigorous than 50 milliseconds, do Commenters believe that that SRO or broker-dealer should be required to synchronize its clocks to that standard? Why or why not? If so, how, if at all, would that affect sequencing of Reportable Events in CAT?
Question 272 - Do Commenters agree with the Plan's assessment of the industry standard for clock synchronization? Does this reflect the standards for all CAT Reporters, including exchanges, ATSs, and other broker-dealers? If not, what would be a more appropriate way to define the industry standard for clock synchronization?
Question 394. Should the "industry standard" for the purposes of the clock synchronization and time stamping requirements be defined based on industry practice? Please explain. If not, how should "industry standard" be defined? Should the "industry standard" consider information other than current industry practice, such as the most accurate technology currently available in the industry, or the standard recommended by a particular industry group or authority? Could a definition of "industry standard" set a maximum clock offset threshold with an expectation that each CAT Reporter would be responsible for smaller clock offsets if the CAT Reporter is technically capable of such clock offsets? Please explain and include information on the relative costs and benefits of such alternative definitions.
Answer 107, 272, 394– The broader broker-dealer community, operating under a similar set of business requirements, and driven by the CAT and FINRA clock synchronization regulatory requirements, are in the process of complying with millisecond time stamp and 50 millisecond clock offset for electronic order and trade events. Rule 613, approved in 2012, set the requirement for millisecond level time stamp, with an implementation data set for CAT NMS Plan effective date. So the industry has had many years to plan for and implement this new requirement. The 50 millisecond clock offset was defined in the CAT NMS Plan for electronic order and trade events in early 2015, followed by a similar FINRA rule for clock offset. The impact of these requirements are quite large (evidenced by the costs and feedback collected in the FIF Clock Offset Survey); the industry is still in the process of implementing these requirements, targeting to be complete at the expected deadlines. As evidenced in the FIF Clock Offset Survey, it has been difficult, costly and time consuming for the industry to achieve the millisecond time stamp and 50 millisecond clock offset

requirement. Any change in the clock synchronization requirements to move lower in either time stamp or clock offset, is an even more significant change and technological challenge, which will require, at a minimum, two years notice to implement.

FIF CAT WG has raised an issue with adding a time stamp on the CAT Allocation Report which expands the set of servers and applications impacted by clock synchronization requirements to a new set of middle/back office servers. Previously, the CAT and FINRA focus was on order and trade events, which are primarily front office applications.

Exchanges and ATSs represent very different and distinct market places from the broader broker-dealer community. They operate under different business and regulatory requirements, and in very unique, tightly controlled and specialized operating environments. They currently employ more rigorous clock synchronization practices for business reasons.

There is a range of events throughout the order lifecycle which follow different business processes and flows, and therefore exhibit different time sensitivities. (See answer to Question 49). This can be seen in the FIF Clock Offset survey, in the wide distribution of clock synchronization technologies in use across the industry and the clock offsets to which broker-dealers manage their environments. Primarily, each business segment within the industry is driven to adopt the clock technology that best meet their business and regulatory requirements.

There should be a few fundamental principles when setting clock synchronization requirements: 1) the underlying business practice and flow in which the event takes place (e.g., electronic vs. manual); 2) controlled and auditable business flow so that time stamp has consistent meaning across the industry; 3) the cost/benefit trade-off of providing a time stamp (e.g., business and regulatory benefit derived vs. cost to produce), and 4) fairness in applying the requirement (i.e., no business segment or firm is disadvantaged or advantaged by the clock synchronization requirement).

FIF CAT WG does not support requiring a CAT Reporter who can or does synchronize its clocks to an offset tolerance more rigorous than 50 milliseconds to therefore be required to manage to the more rigorous tolerance. To require a CAT Reporter to manage to a more rigorous regulatory standard than its peers for clock synchronization management, just because it has chosen, for business purposes, to manage to a lower clock offset, is not fair nor does it create a level playing field for all market participants. This is not done with any other standards, and creates a bad precedent.

Please note, however, that just because technologies are available does not mean it is appropriate or even reasonable that the technology must be broadly applied across an industry. There are many examples, both within the securities industry and in other industries, where technologies can take many years for broad adoption, and for good reason including costs, priorities, or business requirements. Industry groups, such as FIF and SIFMA, are useful forums within the industry for understanding new technologies and regulatory requirements and to gauge the impacts and consequences of changes in technologies and requirements; however, these industry groups do not “set standards”. Their insights and feedback reflecting industry views and issues can be valuable tools for regulatory agencies.

5.1.8.4 Answers to SEC Questions re: Time Sensitivity to CAT Events

Question 117. Are certain CAT Reportable Events more time-sensitive than other CAT Reportable Events? If so, what events are more time-sensitive and why? What systems are more likely to process these more

sensitive events and to what level of time stamp granularity are such events processed? Where are those systems located (i.e., within broker-dealers, service bureaus, execution venues)? Please explain.
Question 400. Are some CAT Reportable Events more time-sensitive than other events? If so, what events are more time-sensitive and why? What systems are more likely to process these events, and where are those systems located (i.e., within broker-dealers, service bureaus, Execution Venues)? Please explain.
Answer 117, 400 – Yes, some CAT Reportable events are more time-sensitive than other events. The range of events, generally, could be ordered in terms of time sensitivity:

- Matching engines, which are separated from the broader broker-dealer community because of their specialized environments, and are the most capable of reporting at lower granularities and smaller clock offsets.
- The following events are handled within the broker-dealer community, including service bureaus, with decreasing levels of time sensitivity:
  - Fully electronic trading events
  - Electronic order requiring manual intervention (e.g., approval)
  - Manual order events
  - Post trade events are less time sensitive due to discretion of the broker-dealer on when to process these events. Many of these processes involve some manual handling, or batching of events, or processing of the events on batch servers which schedule and execute jobs based on priorities and resources available.

5.1.8.5 Answers to SEC Questions re: Manual Orders

Question 120. The Commission granted an exemption from Rule 613 in order to allow the alternative of permitting CAT Reporters to report Manual Order Events with a time stamp granularity of one second, in lieu of the Rule 613 requirement that the CAT NMS Plan require CAT Reporters to report with a time stamp granularity of one millisecond, to be included in the CAT NMS Plan and subject to notice and comment. Do Commenters believe that the CAT NMS Plan's one-second time stamp granularity standard for Manual Order Events is appropriate and reasonable? If not, why not? Would a more granular time stamp requirement for Manual Order Events be feasible?
Question 121. What alternative approach with respect to Manual Order Events may be preferable? Could the provisions in the CAT NMS Plan related to Manual Order Events be more narrowly tailored to, for example, only apply to CAT Reporters who are unable to record and report Manual Order Events with a time stamp granularity of one millisecond?
Question 122. The SROs note in the Exemption Request that recording and reporting Manual Order Events with a time stamp granularity of at least one second would result in little additional benefit, and, in fact, could result in adverse consequences such as creating a false sense of precision for data that is inherently imprecise, while imposing additional costs on CAT Reporters. Do Commenters agree? Why or why not?
Question 127. Do Commenters believe that the CAT NMS Plan's requirement that Participants and Industry Members synchronize Business Clocks used solely for Manual Order Events to within one second of the time maintained by the NIST is appropriate and reasonable? Would a tighter clock synchronization standard for Business Clocks used solely for Manual Order Events be feasible?
Answer – As noted before, second level time stamps is appropriate and reasonable for manual order events, and anything more granular is not reasonable, as evidenced by the SROs' report - "Upon investigation, the SROs did not find any company that currently produces a manual time stamping device

that records time to the millisecond".[99] FIF CAT WG supports the position taken by the SROs in requesting exemptive relief for second level time stamp and second level clock offset for manual order events. "Moreover, the SROs believe that such costs would be incurred only to adopt a time stamp process that would be inherently imprecise, due to the nature of the manual recording process. Thus, the SROs believe that such an approach would result in little additional benefit, and, in fact, could result in adverse consequences such as creating false reliance on data the SROs know is likely imprecise in the reconstruction of order event sequences, while imposing additional costs on CAT Reporters."[100]

FIF CAT WG agrees with the SROs' statement that attempting to record a time stamp under a second on a manual operation would give a false sense of precision that does not exist. It would be very misleading, and would have regulators draw the wrong conclusions. And, as stated in the answer to other questions, FIF CAT WG believes it is important to have a level playing field with all firms held to the same standards. A firm should not be "penalized" with additional regulatory oversight because they have invested in more advanced clock synchronization technologies to meet their business requirements. (See also Appendix 3.5)

Question 123. If Manual Order Events are recorded and reported with a time stamp granularity of one second, what, if any, challenges do Commenters believe would arise with respect to the sequencing of order events (for the same order) and orders (for a series of orders)? Would the one millisecond standard originally provided for in Rule 613 be preferable? Please explain.
Answer – A manual order recorded at a second level, and then linked with the CAT report of the electronic entry of that order, with a millisecond time stamp, and linked with a daisy chain of events with millisecond level time stamps should create a fairly clear sequence of events within the order lifecycle for the regulator. The CAT Processor, with intelligent data analysis, could present these events to the regulator in a display format that makes the event sequencing clearer, even if the time stamps seem "out of sequence". We do not believe a completely deterministic model of events are possible. Regulators must be capable of looking at events within a range and judging what is reasonable. (See also Appendix 3.5)

Question 249. Do Commenters agree with the Commission's assessment of the Baseline of clock synchronization for broker-dealers, exchanges, and others in the securities industry? Please explain. Does the Commission's analysis appropriately describe the frequency of orders that regulators may need to sequence and the challenges to sequencing given current clock synchronization standards? If not, do Commenters have more appropriate analyses? How could the Commission improve the analysis? Please explain.
Question 250. - Do Commenters believe that the Baseline appropriately describes granularity of time stamps in the trade and order data currently available to regulators? Please explain.
Question 271. Do Commenters agree with the Commission's data analysis of the clock synchronization improvements from the Plan? If not, how could the Commission improve the data analysis? Do Commenters have their own data analysis that informs on the expected improvements from the Plan? If so, please provide. Do Commenters agree that the improvements to the percentage of sequence-able order events by Plan standards are modest and the requirements of the Plan may not be sufficient to completely sequence the majority of market events relative to all other events?

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[99] January 30, 2015 letter to Mr. Brent Fields from "SROs", Request for Exemptive Relief from Certain Provisions of SEC Rule 613 of Regulation NMS and Securities Exchange Act of 1934
[100] January 30, 2015 letter to Mr. Brent Fields from "SROs", Request for Exemptive Relief from Certain Provisions of SEC Rule 613 of Regulation NMS and Securities Exchange Act of 1934

Answer to 249, 250, 271– The Baseline assessment used primarily SIP data, reflecting exchange only recording of events, which is a tightly controlled, co-located and specialized environment. It does not reflect the broader broker-dealer communities' recording of events (e.g., customer definitions, orders, routes and allocations) in a distributed environment, a much less controlled and less precise environment. Within every order lifecycle, the events leading up to the execution venue can be synchronized due to daisy chaining. To the extent that the exchanges are maintaining more granular time stamps, the consolidated audit trail will inherently benefit from these time stamps. This should cover a significant portion of events. Also missing from the data analysis is what represents "meaningful" – what does it mean if two independent events executed thousands of miles apart have a time stamp within 1 millisecond of each other, or a hundred milliseconds? Regardless of clock offset, there will be unrelated events across geographically dispersed market centers that cannot be sequenced; and, those events that are within the clock offset tolerance should be considered contemporaneous. (See Appendix Section 5.1.3, Effects of Geography)

As discussed in Appendix Section 5.1.2, Sequencing, there are inherent limitations to how much accuracy can be provided by time stamps for the purpose of sequencing, given, the geographical, networking, application delays and other speed bumps (e.g. IEX). The timestamp granularity of below one millisecond granularity should be considered de minimis and the 50 millisecond of clock-drift should be considered reasonable standards. The technology deployed by the industry should be allowed to evolve due to business requirements, rather than due to regulatory requirements, especially as this could impact liquidity provisioning.

Question 392. Should the CAT NMS Plan require an alternative to the requirement to time stamp manual orders to the second? If so, what alternative should the Commission require? For example, should the Plan require millisecond time stamps or one-minute time stamps? Please explain and provide information on the relative costs and benefits of the alternatives.
Answer – FIF CAT WG is satisfied with the current requirement of one second time stamps and one second clock offsets for manual order events. It is a reasonable level of granularity, given the inherently imprecise business process of handling manual orders. (See also Appendix 3.5)

5.2 Answers to SEC Questions re: Primary Market Transaction Reporting

Question 428. Should the CAT NMS Plan exclude primary market information? Why or why not?
Answer – FIF CAT WG agrees with the approach in the current Plan which excludes Primary Market top account allocations from the Plan and includes subaccount allocations. It would be very expensive and burdensome to include top account allocation transactions in the CAT. It is not obvious to FIF CAT WG that the regulatory benefits of including top account allocations outweigh the costs to the industry to support this level of reporting.

The systems and business flows which handle top account allocations are very separate from the systems and business processes of the secondary market which are currently within the scope of Phase 1 of CAT. In addition, there is little standardization of business processes across the industry for top account allocations. Further many of the steps are not automated in any way. Broker-dealers have dramatically varying levels of systematization of the artifacts of these work flows. Additionally, there is a lot of fluidity in top account allocations up to the point of making sub-account allocations.

These separate and diverse business flows and systems require significant analysis, new requirements and data modelling which is distinct from the Phase 1 scope of CAT. Because the primary market has been

addressed so little to date, there are likely new events and reference data which have not been articulated in the Plan. In addition, the broker-dealers who would be subject to reporting, would likely need to participate deeply in this analysis, since it may result in requirements to change their business work flows and create new front-end capture systems to support this new reporting regime. While the volumes are low, the challenges are very different than secondary market transaction reporting. Analyzing workflows, creating new, well-functioning front-end capture systems, essentially automating what is currently a very manual process, is a full project unto itself. None of this has been studied or contemplated to the same level as the scope of Phase 1 of CAT. There is significant technical risk in adding a significant effort of very different scope. Reporting on Primary Market Transactions has not received the years of attention of the other reporting required in Phase 1, nor will it build upon more than 15 years of experience with OATS reporting. We understand that this information is of benefit for regulatory review. However, FIF CAT WG strongly recommends the effort be included in a later phase of CAT, where it can be given the proper analysis and focus of FINRA, the Plan Processor, and the broker-dealers.

Question 429. Do Commenters agree with the analysis in the Plan of the feasibility, benefits, and costs of the inclusion of primary market information (including primary market transactions) in the CAT NMS Plan? Please explain.
Answer – FIF CAT WG does not agree with the cost estimates related to including Primary Market transactions in the CAT NMS Plan. Please see FIF CAT WG's answer to Question 432.

Question 430. Do Commenters have additional analysis relevant to the decision to include primary market information (including primary market transactions) in the CAT NMS Plan? If so, please describe that analysis, including any data.
Answer – In June 2016, FIF CAT WG conducted an informal sampling of its members to further understand both the challenges of reporting and diversity of workflows and systems in the primary market. Five broker-dealers responded to the survey and all working group participants reviewed the results. While it is inadvisable to generalize too much from such a small sample, the results do provide insight. FIF CAT WG confirmed that broker-dealers perform a variety of roles in the primary market, with some broker-dealers participating in different roles on different deals: lead underwriter, member of the selling group, institutional broker-dealer receiving a primary market allocation, retail broker-dealer receiving a primary market allocation. FIF CAT WG found a large range of deals for a broker-dealer annually, depending on the role, from 1 to 300 per year. Among the five broker-dealers, there was a variety of approaches to workflow: fully manual workflows with some electronic capture of information to mostly automated workflows. Working group participants who were not survey respondents emphasized that their business workflows were mostly manual with very little systemization of artifacts. The survey respondents used a total of 0 to 3 proprietary systems and 1 to 2 different vendor systems, naming 4 different vendor systems in all. Some of the challenges cited were the following: properly reporting on the changes in the syndicate membership; properly reporting on changes in allocations; timing of reporting, as sub-allocations are sometimes not finalized until days after pricing; additional workflow systemization required to capture and report information. While the 60-day comment period did not permit a larger, more in depth study, the challenges and diversity were evident even in this small sample and further confirmed by the working group members.

FIF CAT WG would recommend that the SEC or FINRA create a project to perform an in-depth analysis to study primary market transactions and determine what regulatory reporting is appropriate, given the structure of the business processes.

Question 431. Do Commenters agree with the Plan's decision to include subaccount allocation information for primary market transactions in the Discussion Document, which commits the Operating Committee to consider the implementation of this subaccount allocation information in the CAT NMS Plan? Please explain.
Answer – Yes, FIF CAT WG agrees with Plan's decision to include subaccount allocation information for primary market transactions in the Discussion Document. We believe that this is a reasonable first step in reporting primary market transactions to CAT and believes any reporting beyond this is ill-advised for the reasons cited in answers to questions 428 and 430.

Perhaps an alternative, first step solution, would be for FINRA to report the information it currently receives on primary market activities to CAT, thus at least providing the SEC a central repository of this information.

Question 432. Do Commenters agree with the Commission's assessment of the costs and benefits of requiring top-account allocation information for primary market transactions? Please explain. Should the Operating Committee consider requiring top-account information? Please explain.
Answer – There is so little information about the requirements of this reporting that trying to improve upon the Plan's original cost estimates is guess-work. Further, we are concerned that benefits which are anticipated by the SEC on having reporting on primary market transactions imply that reporting on all events in this lifecycle may be needed. Specifically, the SEC cites analysis based on the reporting "could identify potential allocations that preference some customers over others in the IPO allocation process because the SROs and Commission could examine the relationship between IPO initial allocations, initial indications of interest, and fluctuations in allocations and indications of interest during the book-building process".[101] Reporting all the events in a deal's lifecycle would add complexity and cost, which was not contemplated in the original cost estimation provided by industry members to the DAG, upon which the cost estimates present in the Plan are based.

Question 433. What are the implications of the SROs decision not to include top-account information for primary market transactions in the Discussion Document? Please explain.
Answer – FIF CAT WG recognizes the SEC's statement that having only subaccount allocations is less valuable from a regulatory perspective than having top account allocations. FIF CAT WG's perspective is that subaccount allocations represent a good first step, in perhaps a multi-step process of collecting complete information on primary market activities. This would allow time for FINRA and the plan processor to study the complexities and difficulties associated with reporting on transactions in this business flow.

Another aspect of the Primary Market Transactions is that only the SEC and FINRA have jurisdiction over these activities (**not** the exchanges). This effort would be more effectively and efficiently driven as a separate effort reporting into CAT, but involving only the regulators who have jurisdiction over the Primary Markets and the broker-dealers involved in underwriting and syndication. This would be a much smaller set of regulators and reporters than are currently involved in Phase 1.

5.3 Answers to SEC Questions re: Alternatives to CAT

Question 436. Do Commenters agree with the Commission's analysis of the broad alternatives to approving the CAT NMS Plan, such as modifying OATS and/or other data sources to meet the objectives of

[101] SEC Release No. 34-77724; File No. 4-698 (p. 655)

Rule 613? Please explain. Are there other alternative approaches that the Commission has not identified that it should consider? Please explain.
Answer – When Rule 613 was adopted in 2012, it rejected the option of using an existing system, like OATS, as a base for the Consolidated Audit Trail. As the vision of CAT has evolved through the years to become a much more comprehensive system than OATS or any other current system, there is an opportunity now to take advantage of new technologies and the associated cost benefits they provide. FIF CAT WG would like to see the SROs move forward with a modern base for CAT, on which current, and future reporting requirements can be built.

There are many disadvantages to the current OATS interface, and one primary benefit, that is, it is known. Given FIF CAT WG's concern with the cost and burden of an extended period of duplicative regulatory reporting (of which OATS is the most burdensome), consideration should be given within the CAT NMS Plan to ease that burden while the industry transitions to the more modern, comprehensive and flexible platform. FINRA stated in the Plan that they will consider exempting broker-dealers from reporting to OATS based on the quality of the broker-dealer CAT reporting.[102] This is very appealing to the broker-dealer community because it creates the opportunity to minimize the period of dual reporting to OATS and CAT. FIF CAT WG's proposal to address the duplicative reporting burden centers on a Retirement Error Rate and an accelerated Trial Period of validation followed by exemptions for the industry (or individual firms) when the Retirement Error Rate is met. FIF CAT WG would encourage this idea to be formalized in the Plan.

The CAT NMS Plan could require more functionality to facilitate the transition from duplicative reporting systems to CAT and visa-versa. For example, the Plan could require the Plan Processor to have functionality to publish "OATS reports" to FINRA based on information in the CAT repository; or, the Plan could require the Plan Processor to allow use of an "enhanced" OATS interface for CAT Reporters to submit CAT data reports to CAT. Similar methodologies could be adopted for other duplicative reporting systems.

5.4 Answers to SEC Questions re: Inclusion of OTC Equities

Question 434. Should the CAT NMS Plan exclude OTC Equity Securities? Please explain. Would the exclusion of OTC Equity Securities in the CAT NMS Plan delay the retirement of OATS? If so, by how long and what would be the added cost be? Please provide an estimate. What are the other costs and benefits of excluding OTC Equity Securities from the CAT NMS Plan?
Answer – FIF CAT WG strongly prefers to have OTC Equity Securities included in the CAT NMS Plan. We concur with the SEC assessment, but differ in the conclusion. The exclusion of OTC Equity Securities in the initial reporting scope for large broker-dealers would delay the retirement of OATS because it would require an additional rule filing and an additional implementation cycle. Responding to the rule filing, managing the implementation cycle, and performing regression testing would cost more than the incremental cost of including OTC Equity Securities in the initial scope of reporting for large broker-dealers. FIF CAT WG judges the inclusion in the initial CAT Phase 1 to be an incidental cost because the work to report to CAT for NMS securities is so similar. Further, FIF CAT WG would like to clarify that the scope of OTC Equity Securities for CAT is the same as it currently is for OATS reporting with regard to foreign securities.

There are no benefits to FINRA and the SEC in excluding OTC Equity Securities from the CAT NMS Plan, as they would continue to rely only on OATS data to surveil this segment of the market.

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[102] CAT NMS Plan, Appendix C, Section 9 (page C-99)

5.5 Answers to SEC Questions re: Periodic Refresh of Customer Data

Question 435. The CAT NMS Plan requires that CAT Reporters provide periodic refreshes of all customer information to the Central Repository to maintain an accurate database of customer information. What intervals for updates would be appropriate and reasonable, and what information should be required to be updated? Should the CAT NMS Plan remove the requirement for periodic full submission of customer information beyond the daily updates sent when customer information changes? Please explain. Would broker-dealers reduce their costs if they did not have to report all customer information periodically? Would the removal of this requirement significantly reduce the risk of a security breach of personally identifiable information? Please explain.

Answer – FIF CAT WG suggests having the functional support for a voluntary full refresh, but to eliminate the mandated requirement to provide full refreshes periodically. Generally, FIF CAT WG believes that the initial load, daily updates and standard error processing should be sufficient to maintain data integrity.

However, if contrary to our recommendation, the requirement stands as currently stated in the Plan, FIF CAT WG recommends a frequency of not more than annually. (See also Appendix Section 4.4.3).

5.6 Answers to SEC Questions re: Cost Reduction Alternatives

Question 398. Do Commenters agree that an alternative that would relax the logging requirements such that CAT Reporters would only need to log exceptions and resulting synchronization events (and not every synchronization event) would reduce costs of the CAT NMS Plan without materially reducing its benefits? Why or why not? Do Commenters have an estimate of how much such an alternative would reduce costs, either in isolation or in combination with the alternative to not require synchronization outside of event recording times? Please provide supporting documentation for these estimates.

Answer – FIF CAT WG agrees with this alternative. A recommendation from the FIF Clock Offset Survey was to only log exceptions, because many respondents cited logging as a major cost (36% cited the costs associated with logging as "high"). Another recommendation was to reduce the archive requirement to under 5 years. Some of the sizes of the logs and estimated daily events that would need to be logged were quite large. Comments from the FIF Clock Offset Survey include:

- Requires implementing new log/archive system (current system logs are only 86K events/day, across 400 machines which would grow to 35M events/day)
- Currently 1 gig/day of log synch events then compressed for archive. The low clock offsets would increase data storage requirements at least 10 fold.

The FIF Clock Offset Cost Study did not capture separate costs for logging expenses, so we cannot provide cost savings for this alternative approach.

Another factor to consider is that under the current Plan the logs will be flooded with benign synchronization events and meaningful alerts/exceptions could be lost in the log overload; it would be easier to manage with more targeted log data. Managing such an ever expanding log (as clock offsets lower, clock synch events increase) becomes more complicated for no real benefit. Clock synchronization events are often managed automatically by the clock synchronization protocols (and can be every few seconds or less). While there are some options that can be specified by the CAT Reporter in the protocol configuration, there are limitations available to the CAT Reporter regarding the logging controls, and what data is logged. It seems reasonable to limit the requirement to log clock synchronization configuration settings and alerts/exceptions to demonstrate compliance with the firm's policies/procedures.

Question 399. Is there a need for clock synchronization standards outside of regular and extended trading

hours? Is clock synchronization beneficial for retail orders that come in overnight? Are there examples of times or events outside of regular and extended trading hours when clock synchronization is more beneficial? Do Commenters agree that an alternative that would not require synchronizing clocks outside of times when servers record Reportable Events would reduce costs of the Plan without materially reducing its benefits? Do Commenters have an estimate of how much such an alternative would reduce costs? Please explain and provide supporting documentation if possible.
Answer – FIF CAT WG supports this recommendation, as it isn't needed from either a business or regulator perspective. We cannot quantify the cost savings associated with this alternative because this segment of cost was not captured in the Clock Offset Survey. Without this provision, firms would require additional off-hours staffing, or it will prevent the off-hours support staff from focusing on more pressing issues that need to be resolved during off hours.

Appendix 6. Production/Test Infrastructure and Customer Support

6.1 Production, Test and Customer Support Recommendations

This section addresses FIF CAT WG's general concerns related to infrastructure, support functions and data security/confidentiality.

6.1.1 Production Support

The RFP to Bidders specified that the Plan Processor must support 24x6 production systems.[103] This requirement for the Plan Processor should be explicitly stated in the CAT NMS Plan.

Typically, larger firms, who are already staffed to take advantage of a 24x7 operating schedule, could find benefit in 24x7 production support[104] because it provides them extra flexibility, especially in error processing or recovery scenarios, and allows them to take advantage of off-shore staffing. In managing 24x7 operations, if it is beneficial to the Plan Processor to limit Sunday operations only to the functionality available to CAT Reporters such as submission of CAT Reports, error analysis and error corrections, which could be an acceptable compromise.

6.1.1.1 Answers to SEC Questions re: CAT Production

Question 88. Do Commenters believe that the CAT NMS Plan should include a requirement that the Participants and the Plan Processor set forth a more detailed schedule, with milestones, for CAT Reporters to adhere to in setting-up or configuring their systems to become CAT Data reporting compliant? If so, please explain and describe what details and milestones should be included in the schedule (e.g., publication of Technical Specifications and announcements of CAT Reporter-facing technology changes).
Answer – Connectivity requirements for test and production systems should be published at least 3 months prior to when CAT Reporters need to connect to each respective system. The 3-month window should accommodate those firms that need to secure outside carriers for the connectivity (which typically

[103] CAT NMS Plan, RFP, Section 2.6
[104] "To timely correct data-submitted errors to the Central Repository, the Participants require that the Central Repository receive and process error **corrections at all times**.", CAT NMS Plan, Appendix C Section A.3(b); "support 24x6 hours of operation…", CAT NMS Plan, RFP, Section 2.6

require at least 6 weeks), and the practical considerations involved when more than 186 firms[105] will be simultaneously establishing connections to CAT. These connectivity requirements should be contained in the Technical Specifications, but can be independently published. The connectivity requirements should include all specific security requirements (firewalls, etc.) that must be established, the methods for testing the connectivity with the CAT, and any certification requirements that must be completed to allow CAT connectivity. It is highly recommended that the Plan Processor establish a staggered schedule for connectivity testing and verification so that a bottleneck is avoided when all CAT Reporters attempt connectivity just prior to test or production start.

Question 89. The CAT NMS Plan requires that all Participants report Participant Data to the Central Repository by 8:00 a.m. Eastern Time on the Trading Day following the day the Participant records such data, and that Industry Members report Recorded Industry Member Data to the Central Repository by 8:00 a.m. Eastern Time on the Trading Day following the day the Industry Member records such data and Received Industry Member Data to the Central Repository by 8:00 a.m. Eastern Time on the Trading Day following the day the Industry Member receives such data. Do Commenters believe that the CAT NMS Plan provides sufficient detail and information to determine whether the applicable 8:00 a.m. Eastern Time data reporting deadlines provided in the CAT NMS Plan are achievable? If not, why not?
Answer – Generally, an 8AM reporting deadline for submission of the required CAT reports from the previous trading day is thought to be acceptable assuming that the end of trading day is defined as 4PM of the previous trading day, as is defined today for OATS (see Appendix Section 4.4.3). Because so little detail is included in the CAT NMS Plan on the data interfaces to CAT, achievability is also very dependent on the details of the reporting requirements to be defined in the Technical Specifications.

Question 90. Do Commenters believe that CAT Reporters will submit their reports at or about the same time? If all or most of the CAT Reporters would report at or just before 8:00 a.m. Eastern Time, what, if any, impact would there be on the necessary CAT infrastructure? Would this place an excessive burden on the Plan Processor? Do Commenters believe this would increase operational risk and/or increase costs? If so, please explain. Are there alternative reporting mechanisms that could reduce such risks?
Answer – Many firms have a process today, for OATS reporting, that captures the data required for reporting as soon as available at end of day, and perform verification of the data prior to submission. For some event reporting, data is required from other systems, which must be consolidated and then verified. The firms then submit the data as soon as verified. This is one of the reasons why it is so critical to have end of trading day defined as 4PM. The process of collecting, consolidating and verifying the reporting records can be time consuming. FINRA should have statistics on the arrival time of OATS reports today, which would provide a good baseline for estimating CAT report arrival times.

Some firms are planning to design an updated validation and error correction system that would take advantage of the continuous feedback function specified in the CAT NMS Plan. This would allow those firms to receive error notification, and possibly correct those errors, prior to the 8AM deadline for record submissions. Again, without having more detailed, specific information about the record submission and error correction cycle, it is difficult to predict if firms will be able to take advantage of the continuous feedback functionality.

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[105] Rough estimate of unique firms to connect to CAT (using SEC numbers= 126 large b/d, 45 non-OATS new reporters (insourcers), and 15 service bureaus)

6.1.1.2 Answers to SEC Questions re: Capacity

Question 91. The CAT NMS Plan provides that the Plan Processor must be able to handle two times the historical peak data to ensure that, if a significant number of CAT Reporters choose to submit data at or around the same time, the Plan Processor could handle the influx of data. Do Commenters believe that the SROs' estimate of capacity is sufficient? If not, why not and what capacity should be required?
Answer – Continuous monitoring and evaluation of the measured capacity of the CAT system and the projected capacity requirements for the CAT are essential in managing capacity and peak traffic. It is highly recommended that the Plan Processor model its capacity methodology on proven systems which have successfully projected and managed volatile and large capacity systems over the past few years, e.g., OPRA. Options reporting will be one of the key determinants of CAT record volumes. OPRA capacity management methodology would be an excellent base for CAT.

6.1.1.3 Answers to SEC Questions re: CAT System Architecture

Question 42 - The CAT NMS Plan does not mandate a specific method for primary data storage of CAT Data, but does require that the storage solution would meet the security, reliability, and accessibility requirements for the CAT, including storage of personally identifiable information ("PII") data, separately. The CAT NMS Plan also indicates several considerations in the selection of a storage solution including maturity, cost, complexity, and reliability of the storage method. The Commission requests comment on whether the CAT NMS Plan should mandate a particular data storage method. Why or why not? What are the advantages and disadvantages for CAT of the various storage methods?
Question 438. Primary Storage. The CAT NMS Plan states that bidders proposed two methods of primary data storage: traditionally-hosted storage architecture and infrastructure-as-a-service. The CAT NMS Plan does not mandate a specific method for primary storage, but does indicate that the storage solution would meet the security, reliability, and accessibility requirements for the CAT, including storage of PII data, separately. The CAT NMS Plan also indicates several considerations in the selection of a storage solution including maturity, cost, complexity, and reliability of the storage method. The Commission requests comment on whether the CAT NMS Plan should mandate a particular data storage method. Why or why not? How can the storage method affect the costs and benefits of the Plan? What are the relative strengths and weaknesses of the different primary storage methods?
Answer to 42, 438 – The CAT NMS Plan should not mandate storage methods. The bidder and eventual Plan Processor is in a better position to define the storage methods to use. FIF CAT WG has little insight into the technical proposals and architectures that have been brought forward by the bidders. One needs to evaluate the total system design, not storage methods in isolation.

The FIF CAT WG notes, to the extent the Plan Processor is required to store CAT data, if given the option to store via WORM (write once, read many) technology such that it satisfies SEC 17a-4 storage requirements, the data stored by the Plan Processor in CAT on behalf of broker-dealers could potentially satisfy some portion of the broker-dealers' SEC 17a-4 obligations in a convenient and cost-effective manner.

6.1.2 Test and Customer Support

FIF CAT WG is appreciative of some of the test and customer service functionality that was included in the CAT NMS Plan, such as continuous validation and auto-correction, the fact that linkage breaks would not be grounds to cause subsequent errors and that broken linkages would be repairable without having to resubmit all subsequent activity, the varied CAT network connectivity options, the test system replication of production systems and the availability of help support 24x7. However, there are insufficient details mandated in the CAT NMS Plan regarding customer support, Help Desk functionality and tools, which has

left room for the selected bidder's discretion on investment in these services. FIF CAT WG recommends that customer service guidelines and functionality details should be required elements in the Plan.

A robust tool set and customer service model are needed that would provide the technical assistance to CAT Reporters that would allow them to meet the aggressive error rates and error correction timeframes. Highlights of the support needed include:

- A 24x7 test environment[106] is required. It would provide flexibility to firms in processing in time zone differences, addressing system problems which require extensive corrections and resubmission, as well as utilizing off-shore staffing.
- Functionality is required to allow pre-processing of CAT Reports that include both syntactic and semantic validation.
- Bulk access to the CAT Reporter's data stored in the CAT. This is discussed in more detail in Appendix Section2.4.
- CAT Reporters should be able to sort by error code through a CAT portal and then correct and submit the erroneous fields, in bulk, as opposed to re-submitting the entire set of data.
- A tool to test a firm's CAT report submissions against yesterday's production data for linkage validation and/or mismatches would be very useful. The CAT Reporter would be able to verify its changes in response to reporting errors quickly and without impact to other CAT Reports.
- Plan Processor support of a test environment in which a subset of CAT Reporters could submit newly formatted records. Then, the Plan Processor could run linkages on this subset of data, reporting any errors.
- The Plan Processor could create an internal "shim" such that a CAT Reporter could report yesterday's data with the new format and run this against "mocked-up" production records from yesterday. Then the Plan Processor could run linkages in a meaningful way on the new format of the participating CAT Reporter.
- The Plan Processor can create standalone testing tools available for download and capable of accepting CAT files and generating CAT rejects similar to the actual rejects.
- Intelligent matching algorithms including suggestions to CAT Reporters on how to resolve unmatched records.

FIF CAT WG recommends that the scope of functionality and level of service expected of the Help Desk should be specified in the CAT NMS Plan. The level of service to be provided is directly tied to the industry's ability to meet the aggressive quality goals and error rates, and directly tied to customer service costs in bidders' proposals, and ultimately in costs to be borne by the industry. This should be dictated by the Plan and not left to Plan Processor discretion. For example, criteria that would be expected by FIF CAT WG include:

- Average wait time for answering a Help Desk call should be under 1 minute.
- SLA-like criteria should be defined and monitored, e.g.:
    - Severity 1 problems – immediately assigned to technical expert; problem diagnosed within 3 hours; temporary fix provided within 6 hours
    - Severity 2 problems – assigned to technical expert within 15 hours; problem diagnosed within 48 hours.

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[106] "…CAT provide a dedicated test environment…available on a 24x6 basis", CAT NMS Plan, April 27, 2016, Appendix C, Section 12.h

- Ability for CAT Submitters to be authorized by their clients to submit problems/questions on behalf of the client.

One specific detail not included in the CAT NMS Plan raises a concern for FIF CAT WG: there is no target level of call volume during the test, on-boarding and initial roll-out of the Plan Processor. The Plan states: "… Plan Processor must handle increased call load (sic over 2500 calls/month) in first few years…"[107]. If the selected bidder is not adequately staffed, or does not have a sufficient budget for a reasonable customer service work load, particularly during this critical period, the result will be seriously degraded customer service responsiveness which will impede successful testing and on-boarding of CAT Reporters.

6.1.2.1 Answers to SEC Questions re: Customer Support

Question 85. Do Commenters believe that the CAT NMS Plan, including Appendix D thereto, requires sufficient outreach, support, training, guidance and/or documentation to ensure that CAT Reporters are able to make data transmissions to the Central Repository that are complete and timely? If not, please explain. Describe what, if any, further requirements may be needed.
Answer – FIF CAT WG agrees that customer support, including training, outreach, documentation such as complete and accurate Technical Specifications with use cases and FAQs, and an adequately staffed help desk with technical expertise readily available, are all critical components to the success of CAT with good data quality, accuracy and timeliness. This support structure also assists the CAT Reporters to be more cost-effective, reducing errors and quick turnarounds on problems. The other component is a robust set of test, validation tools and error correction tools within a testing infrastructure to allow CAT Reporters to quickly validate the initial and on-going implementation of CAT reports and corrections of any submitted CAT reports. Development tools to assist in initial implementation would also speed up the implementation process and assure better quality CAT reports.

There is no specificity in the CAT NMS Plan to ensure that a robust customer support environment will be provided.

Question 92. Do Commenters believe that the CAT NMS Plan allocates, or requires the Plan Processor to have, sufficient resources to work with the approximately 1,800 CAT Reporters that would, under the CAT NMS Plan, have to establish secure connections over which CAT Data will flow from their systems to the Central Repository? Do Commenters believe that the Plan Processor could implement the CAT Reporters' Central Repository connections nearly simultaneously without compromising testing periods and implementation timelines?
Answer – FIF CAT WG members need connectivity requirements to test and production systems published at least three months before start of industry test and three months prior to promotion to production to provide sufficient time to arrange connectivity resources, configure and test the connections, especially any security set-ups. This is not the current schedule in the CAT NMS Plan. In addition, sufficient resources must be available throughout this process to ensure timely responses for connectivity configuration changes, connectivity testing and inquiries regarding connectivity requirements. The CAT NMS Plan call volume projection of 2500 calls/month is completely inadequate for initial testing, on-boarding and roll-out. (See Appendix Section 6.1.2). Without adequate technical support, aggressive implementation schedules will be impossible to meet and costs to broker-dealers would sharply increase due to delays in resolving problems and missed schedules.

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[107] CAT NMS Plan, Appendix D, Section 10.3

Question 86 - Do Commenters believe that the CAT NMS Plan should have a formal communications plan, other than the public website, to provide CAT Reporters the information they would need in order to set-up or configure their systems to record and report CAT Data to the Central Repository? If so, how, when, and by whom should such information be disseminated to CAT Reporters?
Answer – All aspects of communications/connectivity to the CAT system and all aspects of the technical interfaces/protocols to CAT should not be broadcast via a public website. A private website, or alternative private communications mechanism, should also be established and maintained by the Plan Processor to disseminate information on more sensitive information, e.g., relating to aspects of communications and connectivity to the CAT system. Some more technical, sensitive areas of the specifications/interfaces should also be communicated via the private, not public mechanisms.

Question 346. Should the Plan require the inclusion of a web-based manual data entry option for initial CAT reporting in addition to updates and corrections? Please explain. How would a web-based manual data entry option affect the costs incurred by CAT Reporters? Do any current regulatory data reporting systems have a web-based manual data entry option? If so, which ones and how often do broker-dealers utilize that option for data submission?
Answer – Yes, a web-based manual data entry option should be offered by CAT, in addition to file-based and message-based processes for submission of data. A web interface is provided today by a number of other regulatory reporting systems (TRACE, MSRB, EBS, TRF) and CAT should provide one as well. The web-based interface would be very useful for small broker-dealers who have a small number of CAT reports to submit and do not want to invest in the development of a more automated file submission or FIX interface (if supported). Also, a web-based manual data entry option can also be used by large broker-dealers who have only a few submissions to make (e.g., for error corrections). In these instances, it could be that manual entry is the fastest and most efficient method.

Question 447. User Support and Help Desk. The CAT NMS Plan discusses several alternatives related to how the Plan Processor provides a CAT Help Desk that would be available 24 hours a day, 7 days a week and be able to manage 2,500 calls per month.1361 Specifically, alternatives relate to the number of user support staff members, the degree to which the support team is dedicated to CAT, and whether the help desk is located in the US or offshore. The CAT NMS Plan discusses the benefit and cost trade-offs, but does not mandate any of the particular alternatives. Instead, the CAT NMS Plan commits to considering each bidder's user support proposals in the context of the overall bid. The Commission requests comment on whether the help desk is located in the US or offshore. The CAT NMS Plan discusses the benefit and cost trade-offs, but does not mandate any of the particular alternatives. Instead, the CAT NMS Plan commits to considering each bidder's user support proposals in the context of the overall bid. The Commission requests comment on whether the CAT NMS Plan should specify the standards for user support. How would the various alternatives affect the benefits of CAT? How would the various alternatives affect the implementation costs of CAT? How would the various alternatives affect the ongoing costs of CAT for CAT Reporters, Participants, and the Central Repository? Please explain and provide estimates, if available.
Answer – The inadequacy of the projected call volume of 2500 calls/month is discussed in the answer to Question 78 and Appendix Section 6.1.2. It will be very difficult to project what should be the steady state and peak volume projections. Instead, following is a framework of expected functionality and criteria that should be used to measure the staffing required of user support and help desk, during peak and normal demand cycles.

- Average wait time for answering a call should be under 1 minute
- SLA like criteria, e.g.:

    - Severity 1 problems – immediately assigned to technical expert; problem diagnosed within 3 hours; temporary fix provided within 6 hours
    - Severity 2 problems – assigned to technical expert within 15 hours; problem diagnosed within 48 hours
- CAT Reporters and Submitters should have access to their own problems within tracking system via a Web interface (this will reduce load on CAT and assist CAT Reporters in understanding status of problems)
- Ability for CAT Reporters and Submitters to submit problems or questions via Web interface.
- "On-line Chat" function with help desk
- Ability for CAT Submitters to be authorized by their clients to submit problems/questions on behalf of the client

If a CAT Reporter submits a problem that would prevent submission of accurate CAT reports, it should be considered "self-reporting", as with OATS (see Appendix 6.1.3). It should work similar to OATS today - opening the case with FINRA does not relieve the CAT Reporter from the potential penalty, but it does allow the Reporter to refer to this case later on during investigation and lead FINRA to it. Penalties are still possible, but the benefit of self-disclosure is that it covers the explanation portion and usually additional inquiries are avoided.

Question 448 - CAT User Management. The CAT NMS Plan discusses several alternatives to manage users, but does not require a specific approach or standards. Specifically, the CAT NMS Plan discusses help desk creation of accounts, user creation (by broker-dealers or regulators), and multi-role solutions. Generally, there are trade-offs in terms of convenience and security in the approaches. The Commission requests comments on whether the CAT NMS Plan should specify an approach for user management. How would the various alternatives affect the benefits or regulators), and multi-role solutions. Generally, there are trade-offs in terms of convenience and security in the approaches. The Commission requests comments on whether the CAT NMS Plan should specify an approach for user management. How would the various alternatives affect the benefits of CAT, such as accessibility? How would the various alternatives affect the implementation costs of CAT? How would the various alternatives affect the ongoing costs of CAT for CAT Reporters, Participants, and the Central Repository? How would the various alternatives affect the risk of a security breach or misuse of the CAT Data? Please explain and provide estimates, if available.
Answer – The CAT NMS Plan need not require a specific approach to user management; however, it could specify some functionality that should be included in whatever approach is proposed by the Plan Processor, and criteria for evaluation of whatever approach is proposed. Some considerations are listed below:

- A standard approach should be provided for on-boarding of all CAT Reporters and CAT Submitters.
- The ability for an administrator within a firm to define or modify user definitions or CAT Submitters within the firm.
- A mechanism must be provided such that CAT Reporters can authorize CAT Submitters to submit CAT Reports on their behalf, to receive error reports and submit corrections, to receive communications/notifications/alerts regarding the CAT system and to submit problems and questions on the CAT Reporter's behalf.
- A web interface should be provided for the on-boarding process. It should be tied in to the same ticketing system as with system problems (e.g., ability to submit problems/questions, on-line chat, etc.)

FIF CAT WG does not currently envision the need for a bulk submission of CAT Reporter definitions.
The user management system should support levels of entitlements. The following were identified, and are

not meant to be a complete list:

- Administrator
- CAT Reporter (order data)
- CAT Reporter (customer profile data)
- CAT Reporter (PII data)
- CAT Submitter (order data)
- CAT retriever (getting data back at several levels)

6.1.3 Incident Reporting and Tracking System

FIF CAT WG recommends that the Plan Processor provide a comprehensive incident/problem/question reporting and tracking system. This tracking system can be used by both the CAT Reporters and the Plan Processor to record status updates on the problem, and track progress through to closure. This system should be usable (both view. manage and enter/update incidents) via the CAT web interface. The problem tracking system should be used by both the Plan Processor and CAT Reporters to view all open and closed problems. CAT Reporters should only be allowed to see their own problems, of course; however, CAT Reporters should be able to view CAT System problems, except for security issues, because these problems can affect CAT Reporters. This would also help compliance with Regulation SCI requirements as CAT will be a Regulation SCI system – notes on CAT unavailability would be required Regulation SCI disseminations. Some examples of use of this tracking system are:

- The Help Desk should enter a problem into the tracking system, and the tracking id should be returned to submitter on initial call; the severity of problem is initially assigned by submitter (can be later modified by CAT staff).
- Ability for CAT Reporters and Submitters to submit problems or questions via Web interface.
- CAT Reporters and Submitters have access to their own problems within tracking system via Web interface (this will reduce load on CAT and assist CAT Reporters in understanding status of problems).
- "On-line Chat" function with help desk.

FIF CAT WG recommends that CAT provide an "incident" error reporting function similar to the function available today with OATS. A CAT Reporter who is experiencing a systemic issue that will require extensive corrections and testing, and therefore will not make the error correction window, could submit an "incident" report to CAT and receive a case number, so it can be tracked and referenced when analyzing a firm's Compliance Threshold. This case number can be correlated with or replaced by the tracking number discussed above. If a CAT Reporter reports an incident that would prevent submission of accurate CAT reports, it should be considered "self-reporting". Opening the case would not relieve the CAT Reporter from the potential penalty, but it does allow the Reporter to refer to this case later during investigation and assist the Plan Processor in its investigation of the error incident. Penalties are still possible, but the benefit of self-disclosure is that it covers the explanation portion of the incident and additional inquiries may be avoided.

6.2 Data Confidentiality and Security

FIF CAT WG appreciates the SROs' consideration of data security and confidentiality in the CAT NMS Plan. However, the security and confidentiality concepts included in the CAT NMS Plan represent an inconsistent body of requirements – some general, some more detailed. Inconsistent security requirements make it difficult to discern the SROs' intent. As currently stipulated, it is unclear whether a provision related to data security has been omitted because it is too detailed and better included in the Plan Processor policies

and procedures, or whether it is missing because it is not intended as a requirement for the Plan Processor. Because the FIF CAT WG will not have visibility into the Plan Processor security and confidentiality policies and procedures, we must use the CAT NMS Plan as the basis for our assessment of the security and confidentiality framework that will be required of the Plan Processor. It is recommended, however, that securities experts from the broker-dealer community be solicited to review and provide feedback on the Plan Processor security controls, policies and procedures to ensure the Plan Processor and the industry are aligned in this very important area.

FIF CAT WG submits the following comments, in that context, to identify elements missing from the security framework as it has been outlined in the Plan. This is not intended to be exhaustive or complete.

6.2.1 Regulation SCI Requirements as they apply to the CAT System

The CAT NMS Plan mentions that the CAT is a SCI system and as such, must abide by Regulation SCI security requirements. However, the Plan does not mention how the Regulation SCI security requirements will be incorporated into the CAT System. For example, Regulation SCI requires that SCI entities adopt a risk-based approach within their security infrastructure. FIF CAT WG recommends that the CAT NMS Plan provide clarity regarding the process that the Plan Processor will undertake to determine the security risk levels of the various aspects of the CAT system and the appropriate security controls that will be implemented in its information security program.

6.2.2 NIST Industry Standards

Although the CAT NMS Plan references NIST industry standards, mere mention of the NIST standards does not adequately instruct the Plan Processor regarding which standards must be implemented. Once the risk level is assigned to each system/function, as required by Regulation SCI, different families of controls within the standards can be applied. Thus, inclusion of a requirement for an on-going assessment of risks associated with the CAT System and data is also needed to meet the NIST Industry Standards referenced in the CAT NMS Plan.

6.2.3 Security Controls

6.2.3.1 Security Controls in the Central Repository

The CAT NMS Plan contains adequate requirements regarding the security and confidentiality controls specifically related to database controls within the Central Repository.[108] However, the CAT NMS Plan fails to reference security requirements for other data formats that are likely to be included in the Central Repository (e.g. CAT Reporter flat files received via file transfer by the CAT). The FIF CAT WG believes that the CAT NMS Plan must provide more clarity regarding the confidentiality and security requirements of all required data formats, to ensure all CAT Reporter data, regardless of data format used for submission, transmission or storage, are adequately secured.

6.2.3.2 Security Controls of the CAT System

The CAT NMS Plan lacks proper guidance concerning the requirements for security and confidentiality controls of the CAT System. While Appendix D covers security and confidentiality controls for the Central Repository, these controls should be expanded to the overall CAT System which would cover, as examples, network security, firewalls, systems management and library controls, IT personnel access to CAT System

[108] CAT NMS Plan at Appendix C.

and data, system logs and archives. FIF CAT WG believes that the Plan Processor should incorporate clear policies and procedures that protect data during the loading stage to and from the Central Repository, including but not limited to the encryption of sensitive data.

6.2.3.3 Security Controls of the CAT Test Systems

As currently proposed, the CAT NMS Plan provides no guidance regarding the security and confidentiality controls that focus on the CAT Test Systems. FIF CAT WG believes that clear policies and procedures should be delineated that require CAT test systems to implement the same data protection and confidentiality controls included in production environment in order to both create a functionally similar and equally secure testing environment for test purposes and because production data will likely be introduced into the test environment.

The FIF CAT WG believes that the CAT test environment will be vulnerable to attack if the CAT environment is not secure prior to testing. Thus, penetration testing and an application security code audit should be completed, with the implementation of the most serious fixes in place prior to the start of CAT Reporter testing.[109] FIF CAT WG advises that all penetration testing for the production environment be applied fully to the test environment to protect sensitive and confidential CAT System data. Furthermore, we suggest that the individual(s) conducting the penetration test must have the necessary certifications (e.g. GIAC Penetration Tester (GPEN), GIAC Web Application Penetration Tester (GWAPT)).

6.2.3.4 Security Controls Regarding Commingled Infrastructures and Public Cloud Infrastructures

The CAT NMS Plan includes requirements regarding commingled infrastructures and public infrastructures that are inconsistent and incomplete. Currently, there is a focus on the public cloud infrastructure without reference to required controls around commingled infrastructures. At minimum, FIF CAT WG suggests that the CAT NMS Plan specifically reference virtual private networking and firewall controls similar to those required of public cloud infrastructures. Clear and consistent controls will allow for a clear and uniform implementation of security controls whether commingled infrastructures or public cloud infrastructures are used.

6.2.3.5 Audit Log Controls

FIF CAT WG recommends that the Plan provide greater clarity regarding the security and confidentiality controls on the CAT data held within the audit logs. Currently, Appendix D.7.3 stipulates that "the plan processor must maintain a detailed audit trail capturing corrections to and replacement of records."[110] Of particular importance - is PII data included in the log, and if yes, what controls are required to monitor and prevent unauthorized access to this sensitive data? The CAT NMS Plan should provide guidance regarding what security and confidentiality controls will be in place around the data contained in the audit logs in order for the Plan Processor to best prepare for those security requirements.

6.2.3.6 Security Controls on Physical Plant

The CAT NMS Plan does not adequately address the requirements expected to be enforced by the Plan Processor regarding physical access to the data centers housing the CAT infrastructure, offices of CAT employees, and any ancillary infrastructure hardware. As an example, should the CAT NMS Plan require the Plan Processor to destroy all hardware which contained CAT data when retired from use? Is logged and

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[109] CAT NMS Plan, Appendix D.4.1.3.
[110] CAT NMS Plan, Appendix D.7.3

monitored badge entry sufficient to the physical plant or is biometric access required, with 24x7 security camera monitoring?

6.2.4 Security Certification of all Participants

FIF CAT WG believes that proper certification of all CAT Users, CAT staff, and third party agents should be required of those who have access to CAT Data, the CAT System, or the Central Repository. Generally, authorized users represent the most vulnerable point of entry for malicious third parties and thus the Plan Processor should require policies and procedures to ensure that all authorized users are properly educated and trained in cybersecurity best practices.[111] The CAT NMS Plan currently dictates that users with PII access must be reviewed and certified by the Participant's chief regulatory officer on an annual basis. At a minimum, FIF CAT WG believes those users should be certified on a quarterly basis.

6.2.5 Encryption and Key Management

Appendix D.1.1.1 stipulates that "CAT Reporters must connect to the CAT infrastructure using secure methods…." FIF CAT WG recommends that the Plan Processor include in their policies and procedures clear guidelines regarding the encryption and access requirements needed for Participants, the SEC, Plan Processor employees, and third parties who will be connecting to the CAT Infrastructure. FIF CAT WG recommends that, at a minimum, connection to the CAT infrastructure should be protected by TLS/SSL through a secure Tunnel. Additionally, clear policies and procedures should be articulated by the Plan Processor that dictates which party is responsible for key management and storage.

6.2.6 Plan Processor Governance, Policies and Procedures

6.2.6.1 CCO and CISO Roles and Responsibilities

Appendix D.4 of the CAT NMS Plan enumerates CCO and CISO roles and responsibilities but only with reference to Central Repository Requirements.[112] FIF CAT WG recommends the roles and responsibilities of the CCO and CISO should be clearly delineated to ensure proper oversight of the CAT system. For example, the annual audit should include a comparison of the implementation of security controls against the Plan Processor approved policies and procedures.[113] FIF CAT WG believes that oversight of the entire CAT System should be afforded the same security oversight as the Central Repository, as breaches at any point within the CAT System will pose similar systemic risks as breaches within the Central Repository. Therefore, FIF CAT WG believes the CISO's responsibilities should extend beyond review and include the development and maintenance of the information security program referenced in Article VI.6.2.a.v.h and Article VI.6.12.

6.2.6.2 Plan Processor Responsibilities

The CAT NMS Plan includes numerous references to Plan Processor responsibilities that pertain to the Central Repository security and confidentiality requirements but fails to mention any Plan Processor responsibilities that cover the entire CAT System. The entire CAT System is vulnerable to breaches and thus, FIF CAT WG recommends that Plan Processor roles and responsibilities that pertain to the Central Repository should be extended to include the CAT System. Without clear policies and procedures that

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[111] http://tabbforum.com/opinions/regulators-intensify-focus-on-cybersecurity-and-the-consolidated-audit-trail-is-first-up

[112] See Article VI, 6.1 o.ii, Article VI, 6.2. b.v., Article VI, 6.5.f.i.B

[113] Article VI.6.2.a.v.C, Appendix C.A.4.a.

govern the protection and monitoring of the overall CAT System and network access, security controls around the Central Repository will be meaningless.

6.2.6.3 Participant and SEC Responsibilities

The CAT NMS Plan excludes the SEC from an agreement to use appropriate safeguards and the execution of a personal "Safeguard of Information Affidavit."[114] FIF CAT WG believes that SEC exclusion of safeguard requirements under the CAT NMS Plan is inappropriate without a compensating statement about safeguards that will be executed by the SEC. Due to the sensitivity of data incorporated in the CAT System, and the systemic risks that will arise should a breach occur, the SEC should clearly indicate which safeguards will be utilized to protect the integrity and confidentiality of CAT data as well as to maintain consistency with the overall security policy included within the CAT NMS Plan.

The CAT NMS Plan permits extraction of CAT data by regulators but does not stipulate what data security and confidentiality controls must be in place to secure that data at the regulator's location. The CAT NMS Plan, as currently drafted, allows for bulk extraction by regulators of sensitive CAT data from the Central Repository. Even if the extracted data remains encrypted, the Plan does not account for the continued monitoring of extracted CAT data once it is removed from the Central Repository. FIF CAT WG believes that data extracted from CAT poses a greater security risk than that data that remains within the CAT system and thus, the CAT NMS Plan should include policies and procedures around the monitoring of extracted data once it is removed from the CAT System. The FIF CAT WG prefers an approach where the data is accessible by the Regulators but the data is not extracted and stored outside the Central Repository, except for extraction of "comparable" data that would facilitate exemption from duplicative reporting and retirement of high priority duplicative systems. Moreover, if combined dataset surveillance is needed (with data external to CAT), the SROs should be allowed to upload external SRO data to a sandbox environment within CAT, in order to enable the combined surveillance. This would better ensure confidential and secure controls on the CAT data. At a minimum, the CAT NMS Plan should specify the equivalent confidentiality and security controls required to be implemented by all regulators who will access, and extract, CAT data.

Furthermore, FIF CAT WG recommends that the Plan Processor includes procedures around the monitoring of remote access and user management of employees and CAT users who have access to CAT data as well as the inclusion of automated processes by which CAT user credentials are retired once an employee or CAT user leaves the firm or changes position within the firm. Quarterly review will ensure that credentials that allow access to the CAT System are not provided to former or unnecessary SRO employees longer than required, which should help insulate the CAT system from potential breach.

6.2.7 Data Usage & SRO Controls- Data Query and Usage

FIF CAT WG recommends that the Plan Processor include role-based controls that have the capability to limit regulators to specified sections of CAT data, and prevent extraction of all data from CAT Reports, except when justified.[115] These role-based controls should be incorporated in order to provide tighter and more streamlined oversight of sensitive CAT system data. FIF CAT WG recommends that the Plan Processor supports various levels of access to the CAT System so that the principle of "need to know" (authorized to the minimum set of data required to perform the job) can be followed. There should also be controls, policy and procedures to prohibit download of certain sensitive information; that is, certain PII data should

[114] CAT NMS Plan, Article VI.6.5f.i A-B.
[115] CAT NMS Plan, Appendix D.4.1.4.

not be permitted to leave the CAT environment. Additionally, FIF CAT WG believes that specific (e.g., temporary) IDs should be issued to allow access by SROs to sensitive data in response to a specific enforcement action.

6.2.8 PII Data Retrieval and Usage

PII data has been defined in the CAT NMS Plan as "… personally identifiable information, including a social security number or tax identifier number or similar information." The exact scope of PII should be defined, i.e., are all fields associated with a customer included as PII? Is the sensitivity of a customer's address or account number equal to the sensitivity of the customer's social security number?

Furthermore, FIF CAT WG believes that clarification is needed regarding the meaning of 'masked' under Article VI.6.10.c.ii. Plan Processors would benefit from clarity regarding whether masked refers to "direct queries must not return or display PII data. Instead, they will return existing non-PII unique identifiers" (e.g., Customer ID or Firm Designated ID). [116]

FIF CAT WG recommends that temporary user IDs are assigned to regulators who require PII access, thereby ensuring that PII data is minimized and requires constant oversight.

Appendix 7. Plan Governance Impact on Implementation

FIF CAT WG's focus is on implementation issues and rarely cover Governance topics; however, there are several important points with impacts to implementation that should be addressed:

- Breadth and composition of the Advisory Committee
- Definition and vetting of Material Amendments

These points are discussed below.

7.1 Advisory Committee

Unlike other current long-standing National Market System Plans, like OPRA and UTP, which have Advisory Committees to help inform those Plans with industry input, the CAT NMS Plan represents the development of a new and quite broad regulatory reporting system with a new set of interfaces, across a broad set of securities asset classes. The breadth and depth of systems, interfaces and products mandate a broad representation from the industry on the Advisory Committee to ensure all facets of the industry are represented. It also mandates, especially during its development phases and early roll-out years, that the Advisory Committee participation is more active and collaborative in nature to ensure the creation and maintenance of a high quality, responsive regulatory reporting system that meets the requirements of both the regulators and the CAT Reporters.

As previously commented[117], the FIF CAT WG recommends that the composition of the Advisory Committee should be widened to 20 participants with a minimum of 12 broker-dealer firms represented,

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[116] CAT NMS Plan, Appendix D.4.1.6

[117] Letters to Ms. Elizabeth Murphy from Manisha Kimmel, December 23, 2013, 2014, Re: Release No. 34-70892, File Number 4-668, Proposed National Market System Plan Governing the Process of Selecting a Plan Processor and Developing a Plan for the Consolidated Audit Trail

which would provide a broad selection of different types of firms within the industry. Multiple participants from each category should be considered because one firm cannot represent all of the possible business models in use by firms within a business category. Categories of participants that should be added are trade processing and order management service bureaus, as well as the industry associations, such as FIF and SIFMA, to provide insight from a broader industry perspective not possible with limited Advisory Committee membership. Industry associations have been active participants in the DAG, and their contributions have provided valuable feedback to the SROs in their development of the CAT NMS Plan.

The FIF CAT WG recommends that the CAT NMS Plan consider defining the Advisory Committee to reflect a more participatory, active role in the formulation of decisions and directions being reviewed by the SROs. This would be consistent with the Advisory Committee purposed as included in Rule 613:
"The Commission believes that the Advisory Committee could provide members of the SROs with a forum for informing the plan sponsors of any potential implementation or operational issues faced by them in connection with the consolidated audit trail. Plan sponsors also will be able to draw on the knowledge and experience of these members to help assure the Commission and market participants that any requirements imposed on SRO members will be accomplished in a manner that takes into account the costs to SRO members. The Commission also believes that an Advisory Committee could help foster industry consensus on how to approach and resolve possible issues that may be disputed, and approaches that may conflict, regarding operation of the consolidated audit trail."[118]

The scope of the Advisory Committee should include the CAT System in addition to the Central Repository.

7.2 Material Amendments

The definition of a Material Amendment should be expanded to include:

- An **External Material Amendment** -any change that affects the CAT Reporter Interface, including CAT Reporter or CAT Submitter coding changes or configuration changes or changes that impact CAT Reporter error definitions or error rate statistics (e.g., create new errors or mismatches or impacts firm statistics).

  For any External Material Amendment, an implementation plan with reasonable time for development and testing should be required. The Advisory Committee should be consulted on any External Material Amendment to assess general impact and that assessment should be submitted to the Operating Committee for their consideration, and made public. The change should not be enforced until it is announced with an implementation plan. This recommendation is similar to CBOE-2012-087: the filing states "The Exchange will not enforce compliance with this proposed rule change until the Exchange has announced an implementation plan."

- An **Internal Material Amendment** -any change which does not affect the CAT Reporter interface (e.g., does not require or CAT Submitter coding changes or configuration changes or changes that impact CAT Reporter error definitions or error rate statistics) is "internal" to the Plan Processor.

  For an Internal Material Amendment, the Advisory Committee must review the proposed change to ensure that the change will not materially affect CAT Reporters and/or CAT Submitters. With that addition, the current procedures for Non-Material Amendments stated fit well for an Internal

[118] SEC 17 CFR Parts 242 (Release No. 34-67457, File No. *27-11-10*) RIN 3235-AK51, Consolidated Audit Trail (p. 246)

Material Amendment.

7.3 Answers to SEC Questions re: Material Amendments

Question 52. Do Commenters believe the Plan Processor should have sole discretion to amend and publish interpretations regarding the Technical Specifications, except for Material Amendments? Why or why not? What discretion or input, if any, should the Operating Committee or other parties, including the Advisory Committee, have in amending and publishing Technical Specifications interpretations?
Answer – The Advisory Committee, which must be composed of industry representatives with technical knowledge, needs to review all changes, and provide input to the Operating Committee if a proposed change defined as Non-Material fits that category. The Advisory Committee should be allowed to solicit expert opinions (in a manner that does not represent a confidentiality risk) to ensure adequate review of changes. This includes amendments and interpretations regarding the Technical Specifications. (See recommended definition of Material Amendment in Appendix Section7.2.)

Question 55. The CAT NMS Plan provides that non-Material Amendments and published interpretations will be deemed approved ten days following provision to the Operating Committee, unless two unaffiliated Participants call for a vote to be taken on the proposed amendment or interpretation. Do Commenters have any views on this process? If so, please explain.
Answer –Based on the definition of material amendments included in Appendix Section 7.2, the CAT NMS Plan should allow the Advisory Committee to raise an issue to the Operating Committee that the proposed amendment or interpretation is improperly categorized and that the proposed change will materially affect CAT Reporters.

Question 56. Do Commenters have any views regarding the definition of Material Amendments? Is the definition too broad? Too narrow? Please explain. Do Commenters have any views on who should be responsible for determining whether an amendment to the Technical Specifications is a Material Amendment? Do Commenters believe the CAT NMS Plan clearly states who shall have the responsibility to make the determination? Do Commenters have any views on how the determination should be made? Please explain.
Answer – A recommendation to change the definition of Material Amendments, as well as comments pertaining to responsibilities for determinations of materiality, is included in Appendix Section 7.2.

Question 57. The CAT NMS Plan requires that Material Amendments be approved by the Operating Committee by Supermajority Vote and allows the Operating Committee to amend the Technical Specifications on its own motion by Supermajority Vote. Do Commenters have any views on these processes? If so, please explain.
Answer – All Amendments, both Material (external and internal) and Non-Material, should always be reviewed by the Advisory Committee, with their recommendation submitted to the Operating Committee for their consideration.