Managing data challenges for consolidated audit trail (CAT) reporting
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The Securities and Exchange Commission (SEC) and US regulators continuously seek to enhance their ability to oversee the equities and options market effectively in the absence of a single, consolidated view to track trades through their life cycles. The frequent market crashes that have happened in the recent past, causing large financial losses in the process, emphasize the need for increased supervision. It also catalyzed the genesis of the CAT plan by the SEC, with the hope to reconstruct the market in such scenarios using a central repository for complete trade order trails and improved market surveillance.

CAT, a single, consolidated central repository that will collect information on every order, cancellation, modification, and trade execution for all exchange-listed equities and options throughout the US National Market System (NMS), is a paradigm shift in the regulation of US markets. Preparing for and navigating this shift has multiple data management implications. Though compliance deadlines are fast approaching, there is still time for broker-dealers to take the lead in addressing data management challenges and ultimately disrupt through innovation.
On November 15, 2016, the SEC, under Rule 613, approved a joint plan by the Financial Industry Regulatory Authority (FINRA) and the securities exchanges (collectively called the self-regulatory organizations, or the SROs) to create a consolidated audit trail. The Cat (CAT processor) is building the consolidated central repository and will also operate it.

SROs are required to begin reporting to the CAT starting November 15, 2017, and large broker-dealers starting November 15, 2018. Small broker-dealer members will begin to submit data by November 15, 2019. As part of their readiness efforts, the CAT NMS plan requires SROs and broker-dealers to make significant investments to enhance their technology, processes, and controls for daily CAT reporting.

**CAT implementation timeline**

- **July 11, 2012:** SEC adopts NMS Rule 613 to submit plan to create CAT
- **February 27, 1915:** SROs submit revised plan (CAT NMS Plan)
- **April 27, 2016:** SEC publishes CAT NMS Plan by SROs
- **January 17, 2017:** Thesys Technologies selected as CAT Plan Processor
- **Mid-March, 2017:** SROs and broker dealers synchronize business clock
- **Mid-November, 2017:** SROs begin submitting data to central repository
- **November 15, 2018:** SRO members (large broker-dealers) must be submitting data for central repository
- **November 15, 2019:** SRO members (smaller broker-dealers) must be submitting data for central repository

*SEC Rule 613 implementation timeline (http://www.cainmsplan.com/about-catplanning/)*
Data to be reported to the CAT

The SROs and broker-dealers are required to submit the below information about the various stages in the life cycle of an order event by 8 a.m. ET on T+1 or the trading day following the reportable event:

- Initial set of customer personally identifiable information (PII), including ITIN or SSN along with a unique customer identifier assigned by the broker-dealer
- An identifier, provided by the SRO, for the broker-dealer receiving, originating, routing, or executing the order
- The date and time of the order event
- The security symbol, price, size, order type, and other material terms of the order

The SROs and broker-dealers submitting data to the CAT will have to synchronize their business clocks to within 100 microseconds and 50 milliseconds, respectively, of the time maintained by the National Institute of Standards and Technology.
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Regulatory reporting challenges faced by broker-dealers and their causes

Duplicative reporting
The SROs already maintain their own audit trail systems, which vary in scope, data requirements, and format, and the disparate nature of these audit trail systems makes it difficult for regulators to trace orders across multiple markets. Rule 613 requires the CAT NMS Plan to include a proposal to eliminate existing rules and systems rendered duplicative by the consolidated audit trail, specifically:

- Electronic Blue Sheets (EBS, 1989)
- Order Audit Trail System (OATS, 1998)

Areas where CAT extends previous rule requirements for broker-dealer firms include:

- Account-holder information, transaction information, and other allocation details reported as part of EBS
- Trade execution and reported events data for equity securities reported as part of OATS

The SEC has tried to address the issue of duplicative reporting by recommending SROs to submit rule change proposals for duplicative rules and systems within six months of the plan’s approval. These rule change proposals provide that the retirement of duplicative rules and systems would be effective when the CAT data meets minimum standards of accuracy and reliability.

While broker-dealers prepare to transition from the existing regulatory landscape to implementing CAT, it will be prudent for them to assess their current state and take stock of existing constraints and challenges in an endeavor to address these as part of their CAT readiness plans.

Data submission and quality violations
Over the past few years, there has been a significant increase in penalties and fines issued by US regulatory authorities (e.g., SEC and FINRA) against financial institutions for failure to report complete and accurate trade data in a timely manner as part of their blue sheet submissions. Even though the institutions concerned have neither admitted nor denied the charges in settling these matters in most cases, the failures have resulted in substantial material and reputational damages.

Over the last three years, regulatory authorities have fined regional and global financial institutions amounts in the range of $1M–$7M, with some of the common reported causes being:

- Missing or inaccurate trade and transaction data (misreported buy/sell, inaccurate amounts, erroneous customer information, etc.)
- Computer coding and programming errors in system logic resulting in deficient or delayed submissions
- Inadequate audit leading to inadvertent omission or misrepresentation of trades
A quick review of these reported causes reveals there are a few core challenges financial institutions should address. These challenges fall under one of the following three categories:

i. Data management constraints

Trade data submissions need to comply with a specific reporting format. The layout has undergone modifications, sometimes minor, from the numerous regulatory notices issued in a period spanning December 2011–July 2016. Keeping pace with these frequent revisions can be burdensome, sometimes requiring additional process reviews and system assessments.

There is also the need to link trade data to post-execution events, such as order cancellation, data corrections, and quotation prices. Tying together an integrated snapshot of all the necessary data elements through a trade life cycle is often demanding, especially from a resource and technology perspective.

Part of the challenge is an absence of adequate data governance—in terms of effective governance structure, standard policies and procedures, clear business management ownership, assigned data stewards, quality monitoring, and data lineage tools.

ii. Siloed systems and technology shortcomings

Frequently, trading and back-office systems are not connected in real time. Also missing is the ability for member firms to cross-reference with other clearing firms and registered traders. This makes the task of integrating and reconciling between the various systems feeding trade data particularly onerous.

From a technology standpoint, very often the existing database design and system processes do not easily support managing quotes, orders, and execution of trades on derivatives (with underlying assets) or other complex product types. In addition, the change in timestamp requirement for orders and events to milliseconds calls for a reassessment of systems that can only report in seconds.

Many financial institutions, often struggling under the burden of increased regulatory supervision, have yet to invest in strategic long-term initiatives and the technology upgrades needed to meet the current elevated data management and trade reporting requirements.

iii. Customer privacy and data security issues

Often, trade reporting inaccuracies and incomplete customer information errors are inadvertently introduced when rearranging and maneuvering customer data while also protecting customer privacy and security needs.

Since the data submitted to CAT is sensitive in nature and will contain customer PII, there are concerns about sharing this information without adequate encryption procedures and frameworks in place to safeguard against cyber incidents and protect customer identity.

The accuracy of customer data reported is compromised when the client onboarding processes and user training do not align with industry standards and leading practices. Additionally, reporting on historical trade and pricing data requires robust data storage and archival tools, which do not exist at many of these financial firms.
Data readiness considerations for broker-dealers in preparation for CAT NMS reporting requirements

In preparation for the daily reporting of huge volumes of data to CAT, broker-dealers should assess their current data readiness capabilities (data sourcing, data quality, and data governance), identify gaps, and implement needed enhanced data management architecture and operating models. As part of their data readiness for CAT reporting requirements, broker-dealers should keep in mind the following considerations:

• **Assess data management and reporting capabilities of authoritative sources (e.g., trade capture and customer management information systems) and implement enhanced data architecture to meet CAT reporting requirements.**

There is a need for broker-dealers to review the data management and reporting capabilities of trade capture and customer management information systems (MIS) to determine their sufficiency for meeting the daily reporting requirements for equities and options trade order events along with customer PII information. They should also look to enhance data management capabilities for their legacy systems to handle huge volumes of data for daily reporting needs expected from CAT. Both SROs and broker-dealers need to ensure trade data is recorded with a minimum timestamp granularity of one millisecond for all order events. For manual order events, the timestamp granularity must be a minimum of one second.

The broker-dealers should consider implementing enhanced data architecture to address gaps in data management and reporting capabilities of front office data entry systems (equity and options trading/booking systems and customer MIS including know-your-customer (KYC) systems and systems capturing client onboarding data and documents) to prepare for CAT reporting requirements.

The broker-dealers should also explore opportunities using robotics process automation (RPA) technologies to automate routine data capture, data aggregation, and regulatory reporting capabilities as required for CAT compliance.

• **Implement enhanced data governance capabilities, including data reconciliation and data controls to ensure accuracy and integrity across duplicative reporting requirements for CAT and the existing reporting requirement for EBS and OATS.**

Broker-dealers will potentially have duplicative reporting responsibilities for CAT for a period of up to two-and-a-half years before the potential retirement of existing regulatory data reporting requirements to FINRA for OATS and to SEC for EBS.

The SEC has recommended SROs file proposals for changing duplicative rules and systems within six months of the SEC's approval of CAT NMS Plan and mentioned that retirement of any duplicative rules and systems would be effective when the CAT data meets minimum standards of accuracy and reliability. This enforces the need to review and enhance existing data controls and data reconciliation efforts to avoid data quality issues across the duplicative reporting requirements for trade and customer data. Broker-dealers will be required to establish and report trade data from a central data repository or implement additional checks to cross-verify the overlapping data elements between CAT and OATS/EBS.

In conjunction with enhanced data controls and reconciliation processes, there may be a need for the broker-dealers to review and enhance data quality monitoring, validation, and remediation processes for self-identified/known data issues. This can help achieve accuracy and integrity of the same trade data and customer information used for duplicative reporting requirements. Tapping into RPA and cognitive technologies to automate routine data quality validation checks and manual data reconciliation efforts can make the task of ensuring data accuracy and integrity less overwhelming for data stewards and technology personnel.

Additionally, broker-dealers should review their overall data governance efforts for trade events data and customer PII. They will need to implement enhanced data governance framework with defined key performance indicators (KPIs)/key risk indicators (KRIs) to track data improvements (quality improvements, issue reductions) and improve integrity across duplicative reporting to avoid regulatory scrutiny.
• Implement improved data sourcing process with enhanced data security, data archival, and data recovery capabilities

The CAT NMS regulatory reporting requirement necessitates the need for broker-dealers to have adequate infrastructure for sourcing data from authorized sources that also supports security, storage, archival, and recovery of the trade data, and customer PII information across front-, middle-, and back-office operations. Though the CAT processor will encrypt all PII data received, broker-dealers will need to ensure they can connect in a secure manner. They could also look to implement additional levels of data protection, such as masking and customer ID remapping, to safeguard themselves against the possibility of security breaches or data hacks.

Assessment and review is required of the legacy front office data entry and reporting systems submitting daily reports to CAT to implement enhanced data storage, archival, and recovery processes. The CAT NMS regulatory reporting requirements also require technology personnel to review scalability and flexibility of trade and customer MIS for future data capture requirements in anticipation for SEC to include additional asset classes in the daily reporting and submission to CAT. The broker-dealers should also consider implementing enhanced data security requirements for reporting the customer PII information and other trade and customer data to the CAT central repository.

• RPA, cognitive technologies, and big data analytics solutions should be considered for CAT reporting to achieve higher efficiency across regulatory reporting and data management processes

There is increasing use of RPA, cognitive technologies, and big data analytics solutions across the industry to support the streamlining of legacy enterprise data management and regulatory reporting processes. Broker-dealers should consider implementing these technologies to enhance reporting capabilities for both management oversight and reporting review processes prior to submission to CAT processor and regulatory agencies.

RPA technologies can help standardize and automate both data aggregation and reporting capabilities of legacy reporting systems used for EBS and OATS and new daily data reporting requirements for CAT. Additionally, cognitive models and technologies can be used for automation and to determine ideal data quality rules using learnings from historical data issues faced for critical data elements. Broker-dealers should consider leveraging RPA and CI technologies to implement automated, end-to-end data lineage capture and maintenance of the trail of data for CAT regulatory reporting processes, which would help in efficiently addressing the challenges around data quality and reduce the likelihood of regulatory scrutiny and fines. Similarly, big data analytics solutions can go a long way in solving the data management challenges of managing huge volumes of data and daily reporting needs.

Overall, these emerging technologies have the potential to help revamp and automate routine regulatory reporting processes and, thus, effectively address the data management challenges faced by many broker-dealers.

• Improved data visualization tools and dashboards

As increasing amounts of data will be collected and reported for CAT, the processing, analyzing, and communication of data will quickly become a challenge. To manage massive volumes of data across multiple reports and regulations in an efficient manner, broker-dealers can look to integrate advanced data visualization tools and dashboards into their technology infrastructure. This can help achieve consistent and accurate reporting as well as provide a visual snapshot of KPIs and trends to help senior management and executives identify key priorities and concerns with regards to their organization’s progress and readiness on CAT requirements as well as ongoing compliance with the regulation.
Conclusion

The first reporting deadline (mid-November, 2017) for CAT will be upon us very soon, and broker-dealers will need to take immediate action. Enhanced governance and data management hygiene is integral to the CAT plan and must not be overlooked. Broker-dealers should leverage available data frameworks within their organizations and align their processes and technologies to established standards and policies. In the absence of any pre-existing frameworks or governance structure, as a tactical arrangement to ensure good data quality for CAT reporting in the short term, they should strive to implement the fundamental data controls, business checks, and reconciliation procedures between trade data sources. Going forward, broker-dealers can then further build out these capabilities to implement a more resolute data management platform that includes other necessary competencies, such as centralized reporting repositories, authorized trade data sources, advanced security features, and process automation.
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