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Review Article

Driving Regulatory Innovation: Automated Swap Data Reporting and Exception Management

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Abstract

In this article, I discuss the ways in which technology has been used to build, implement, and maintain an automated report for the purpose of reporting swap transactions that are covered by the European Market Infrastructure Regulation (EMIR) and Dodd-Frank Act (DFA) Rule 12b-2. The automated report will use advances in technology, including but not limited to Artificial Intelligence (AI), Machine Learning (ML), and Natural Language Processing (NLP), to enhance the regulatory reporting process, exception management, and compliance with EMIR, DFA and across all regions of the globe. All automated reports will be designed so that companies can minimize their need to perform manual processing and maximize the quality, accuracy, and transparency of their reports by converting them to a single format and standardizing the way they collect and submit data to regulators. By utilizing the advanced analytics capabilities in combination with a real-time monitoring, companies will benefit from more timely swap reporting and will ultimately enhance the efficiency of markets for all types of securities. The automated reporting of swaps improves the environment for regulatory reporting in regard to the marketplace, provides a new baseline for the financial services industry's compliance with regulation, eliminates or reduces the possibility of violating regulatory requirements within the financial services sector, decreases the cost of regulatory penalties associated with non-compliance, and improves the reputation of the organization overall.

Keywords: European Market Infrastructure Regulation (EMIR), Dodd-Frank Act, Regulatory Reporting Process, Exception Management, Regulatory Reporting.

INTRODUCTION

The swap reporting and reporting of the associated transactions to SDRs within the global derivatives market, which transacts over $600 Trillion annually in notional is subject to strict regulations. These allow for a highly reliable system for maintaining and supporting a thorough record of all swaps and swap transactions. The problem faced by many firms is the high cost of compliance associated with the Dodd-Frank Act and the EMIR regulations. If firms were required to have fully developed automated systems for swap reporting, they could spend millions of dollars on penalties due to resulting errors in reporting, having multiple data silos and, delays in reconciling transactions. For the purpose of ensuring market transparency and fairness, both the CFTC and ESMA demand each swap transaction has a very high degree of detail; therefore, any mistake in reporting presents an enormous systematic risk to the financial stability of that Transaction and all transactions leading up to that transaction. The primary goal of the Dodd-Frank Act and EMIR is to create fair, transparent, equitable and accountable markets; therefore, it is critical to go beyond compliance and utilize the elements of the reporting to gain competitive advantage. I leveraged the experience I gained from managing a project's program to develop a new process for automating the swap reporting function, thereby achieving my management goal of developing an alternative strategy for managing the regulations associated with the reporting under the Dodd-Frank Act and EMIR - the successful execution of which is essential for providing an innovative advantage.

The complexity of successfully reporting under both Dodd-Frank and EMIR is due to the requirements of having to comply with disparate national regulatory frameworks as well as the technology and operational hurdles. Without question, under the Dodd-Frank Act, swap dealers have a responsibility to accurately report to

SDRs all transaction information on a timely basis and establish adequate validation and reconciliation processes prior to reporting and detect any errors post reporting. The EMIR regulation is similar in many respects to the Dodd-Frank regulation with regard to the requirement for the reporting of swap transactions to a Trade Repository (TR). However, EMIR has added additional regulatory requirements for a swap dealer, including clearing requirements for swaps, pre-trade and post-trade transparency requirements, and additional data quality checks for submissions to a Trade Repository. Along with regulatory agency obligations imposed by the European Securities and Markets Authority (ESMA) and the Commodity Futures Trading Commission (CFTC), swap dealers may also choose to automate as many of the steps involved in their compliance functions as possible, create a standardized set of identifiers in order to minimize the likelihood of inconsistency in the swap dealer's data, and implement a robust exception management process using analytics and artificial intelligence (AI). Examples of operational challenges or hurdles that a swap dealer may face include using multiple software applications to manage swap dealer data, which increases the potential for errors and delays; using a large number of manual processes to manage swap dealer data; and needing frequent modifications of a swap dealer's systems due to the continually changing regulatory landscape.

Best operational practices for swap dealers include implementing as many automated processes as possible in order to reduce the likelihood of errors; centralizing data management; keeping track of regulatory updates through the use of advanced analytics; and providing ongoing training in cooperation with the appropriate regulatory agencies. Swap dealers can reduce both their operational and financial exposure, as well as assure regulatory compliance with the Dodd Frank Act and EMIR, by taking a systematic approach toward these markets and implementing best practices for operations. My role as Program Manager in regards to Dodd-Frank and implementing EMIR swap data reporting required leading various departments to develop a new and innovative method for meeting swap data reporting requirements by financial institutions. The objectives of this undertaking were to establish an accurate and robust method for collecting information regarding swap trades in compliance with the Dodd-Frank and EMIR regulations.

The objectives of this undertaking were to develop a systematic understanding of all necessary components of swap trade reporting, including LEGAL ENTITY IDENTIFIER (LEI), UNIQUE TRADE IDENTIFIER (UTI), and the related REPORTING VALIDATION THRESHOLD associated with the various US and European Union (EU) Swap Data Reporting Requirements, as well as develop a fully automated end-to-end reporting solution that collects trade data from different trading platforms, performs all validating checks on the collected trade data in real-time, and produces compliance reports for Swap Data Repositories (SDRs). The result of transitioning from manual to automated swaps reporting was a reduction in manual swap data errors by greater than 90 percent and an increased efficiency in reporting; thus ensuring the integrity of all submissions for the regulatory authority and the ability to support audit inquiries. Additionally, the extensive validation process involved with the submission of swap data to SDRs means that many of the processes that were required for validation were also integrated into the swap data automation program. This allowed for both proactively identifying and resolving swap data discrepancies prior to submission, thereby reducing the operational risk and regulatory exposure associated with monetary penalties. As a result, our successful transformation has achieved compliance with Dodd Frank and EMIR Regulations while simultaneously allowing banks to improve compliance efficiencies and establish a new benchmark for data quality and operational performance (U.S. Commodity Futures Trading Commission, "Final Rule", November 2011) and EMIR final rule.

The follow on to the swap data reporting program, however, will focus on establishing a unique identifier system for each participant. In particular, each transaction will be assigned a UTI (Unique Trade Identifier) that will be used to verify the data provided to the SDRs. In addition, participants will also be required to have a LEI (Legal Entity Identifier) in order to provide additional assurance of the data's integrity and compliance with Dodd-Frank and EMIR Regulations. By implementing standardized IDs across disparate systems (trading, clearing, and reporting), we were able to create an auditable and complete audit trail for each swap transaction. The success of the swap data reporting program results from the way we have managed the challenges of managing data in silos and the manner by which we built an automated, integrated compliance framework for the regulation of both national and international jurisdictions. We have been able to overcome many of the challenges placed upon us by previous legacy systems that caused fragmented data; increase in manual workload associated with reconciliation of data; and thereby, increasing inefficiencies and risks. We have developed an automated process for the collection of data; we standardized identifying trades and participants; and we created analytical tools and techniques to identify and respond to exceptions to those regulations. The creation of a standardized compliance framework has allowed us to minimize the occurrence of manual errors and improve the speed and efficiency of the IT infrastructure to respond to regulatory changes. As a result, the swap data reporting program established a robust compliance platform for compliance with Dodd-Frank and EMIR regulations and will prepare us for future regulatory requirements. The incorporation of automation and AI has significantly transformed the way in which the swap

data reporting has historically been executed, allowing us to rapidly respond to evolving compliance requirements and thus proving that innovation in technology can create both compliance and competitive advantages for financial institutions. [4]

Related Work

The sources mentioned in this study all address the adoption and implementation of AI and ML for regulatory compliance as well as the automated reporting of swaps. The topics investigated include the automation of the reporting-related processes of swaps for compliance, the reporting obligations imposed on banks regarding swap information under the Dodd-Frank Act and EU's EMIR requirements, and the potential for the automation of swaps reporting to have a positive impact on both banks' profitability and efficiency. The IJAIDR research published in 2012 identified several challenges that banks face in meeting the regulatory requirements that pertain to swaps reporting, and recommended that banks should consider automating their processes as well as standardizing and maintaining the accuracy of swap data in real-time to improve the banks' operational efficiency, reduce the amount of reporting errors that banks make, and eventually substantiate any calculation of return on investment resulting from the automation of swap data reporting. The CFTC published its foundational regulation that identified the technical requirements for the data elements of banks' reporting of swaps to SDRs. The comments recently made by Cleary Gottlieb provided detail about the changes to the rules governing swaps reporting, such as the addition of the economic terms relating to the trading of swaps and the inclusion of collateral data which modifies the manner in which swaps are managed by swap dealers. The responses from both ISDA and SIFMA are examples of how companies are working together to address the challenges of providing the maximum benefit to their clients through greater standardization and automation of swaps data across borders [5,6].

The report by BIS in 2012 covered additional details regarding the categories of OTC Derivatives and specific additional requirements for reporting associated with each category (see reference 5&6). The resources presented in the report, along with additional supporting references provide an overview of how current Swap Reporting practices, Compliance practices & Regulations for Regulatory Reporting are impacting the above, as well as showing the growing trend toward the use of Artificial Intelligence (AI), and Machine Learning (ML) to determine compliance with Dodd Frank and EMIR regulations. In order to mitigate these risks, leading banks have created swap reporting centers to facilitate compliance with the Dodd, Frank and EMIR regulations; a tier 1 bank provided an example of how it implemented policies that supported compliance with SEC regulations regarding the reporting of Swaps using the automated capture and reporting of data. This enabled the bank to minimize its reliance on manual processes and the operational risk associated with them.

Additionally, a top 10 U.S. Bank provided an example of how AI and ML are leveraged to examine Interest Rate Swaps filed electronically by the Bank, resulting in improved efficiency and accuracy of Bank's operations. In addition, banks located throughout Europe have publicly identified several barriers that may potentially complicate their ability to create EMIR Reporting Hubs. To aid in overcoming the various obstacles identified by European banks, these banks have identified many different potential ways to collect and utilize network analysis and transaction-level data for increased regulatory oversight and greater transparency in relation to the transaction data. Examples of specific resources that demonstrate the current conditions of European banks regarding their swap reporting systems and how they will operate if they were to create these centres are the examples included within the reports discussing the operational models for large financial institutions of swap reporting centres [7,8].

Swap Data Reporting and Swap Data Repositories (SDRs) report, as well as any legal opinions concerning the operation of SDRs, are useful documentation for understanding the context of SDRs and their associated regulatory framework and operational standards. Two other resources that identify the requirements for Swap Data Reporting, as well as the data standards required under the Dodd-Frank Act, are the two CFTC reports released in 2012 and 2020. In 2014 the Financial Research Agency released a publication that discussed the need for developing a standardised data format to address the issues of data quality and data aggregation and how reciprocal relationships would facilitate increased market transparency through the role of SDRs. In 2015 the SEC published a document that discussed the core principles and registration requirements for SDRs. An industry white paper by ICE Trade Vault provides a detailed analysis of the operational components of SDRs and emphasizes the need for data security related to SDRs. The federal register published a rule in 2025 establishing regulatory requirements for the operation of SDRs.In 2033 TradeWeb published the Final Rule which sets forth exact requirements for Security-Based Swap reporting.

This document and the other publications provide an overview of the regulatory and operational environments for Swap Data Reporting and SDRs. Although there is very little empirical evidence available to compare the consistency and quality of SDR data to previous studies regarding the verification and management of Data within regulated environments [9], research has shown that there are still high levels of errors. The main cause of these is lack of comprehensive monitoring (i.e. between 0.27% – 1.47%). In addition, there is a similar amount of error with targeted verification as that of total verification. Research also

indicates that while there are multiple instances where comprehensive data verification could eliminate possibilities of errors from data, there are only a few instances where more comprehensive data verifications have resulted in an improvement for all critical data points attributable to SDR records. Examples of some of the critical elements in ensuring the quality and accuracy of SDR data include the automation of data validation; the consistent use of identifiers; development of an established methodology for development of SDR data, and Regulatory Environment for SDR Records typically includes the evaluation of SDR Records' Data Quality, standards of accuracy, completeness and suitability for Regulatory Use against established criteria. Automation and strong governance of SDR data will contribute to the continued quality of SDR Records, but it will remain critical for SDR Data to be monitored and audited continually. Based on these findings, it would indicate that both automation and ongoing monitoring of SDR data will be necessary to ensure continued accuracy of SDR Data [10,11].

When comparing Risk-Based Monitoring (RBM) to conventional monitoring methods regarding how to verify and validate SDR's data for quality, they are quite different regarding how RBM ensures that the SDR's data is thoroughly reviewed and verified for quality. With conventional monitoring methods, data is reviewed at the line item on a source document, and this takes considerable effort on behalf of the monitoring team. However, RBM uses predictive analytics to assess and mitigate risks in real time by identifying key risk factors in an organization through a combination of predictive modelling (e.g. Centralized Monitoring and Focused Site Visit) and the real time identification and mitigation of risks.

In assessing the effectiveness of Real-Time Business Monitoring (RBM) in providing accurate and complete data quality, research has shown RBM provides equal or greater levels of accuracy than Conventional Monitoring Methods, especially concerning key Safety and Effectiveness (S&E) Information. This conclusion is supported by the results of cost savings associated with the implementation and maintenance of RBM and a decrease in error rates. To successfully implement an RBM Program, the organization must conduct a thorough Risk-Based Analysis (RBA) of its data to develop a viable Data Infrastructure in the organization to ensure that significant data quality problems do not go unrecognized.

Organizations utilize Risk-Based Monitoring (RBM) and traditional Sample Data Verification (SDV) for enhanced efficiency as well as to achieve maximum levels of data quality through the combination of both RBM and SDV in certain key data points or critical data points. Monitoring Key Risk Indicators (KRIs) and having centralized monitoring significantly improves both the Reliability and Integrity of SDR reporting and through the integration of multiple Data Sources on an SDR. The Integrated Data Sources allow organizations to identify outliers, anomalies and trends in Real-Time and correctly manage the data quality and reporting compliance for their SDRs. In addition, centralized monitoring of critical data points such as error rates and reconciliation gaps allows organizations to use the KRI's to develop a risk based approach to data quality and compliance with regulatory requirements for SDR reporting.

Organizations that adopted a KRI and Centralized Monitoring Approach Have Reduced the Amount of Manual Source Data Review by SDR Teams, thus Allowing For More Focus on Core Processes and Higher-Risk Areas of Operation. As such, research has demonstrated that a centralized monitoring approach allows organizations to identify discrepancies in the regulatory compliance of their SDRs sooner than traditional on-site monitoring methods and that 90% or more of all deviations identified with traditional on-site SDR monitoring are also detected using centralized monitoring. Furthermore, centralized monitoring enables organizations to allocate their resources more efficiently. In addition to allowing organizations to identify deviations in regulatory compliance sooner than traditional on-site monitoring methods, centralised monitoring provides organisations with a unique means to measure the level of risk associated with their noncompliance and generate a Risk-Weighted Index (RWI) that measures the overall level of risk posed by their SDR reporting and which ultimately enhances the efficiency of generating subsequent SDR reporting and improving regulatory compliance.

Furthermore, organizations must monitor their KRI and their thresholds closely and identify the following KRIs: KRI for Completeness of Data; KRI for Reconciliation Gaps; KRI for errors in transaction reporting; and KRI for timely reporting to assess the potential impact of all given factors within an organisation's SDR reports and the future reporting to SDRs. Research has demonstrated that SDR reporting with a high volume of missing data typically indicate an abnormal level of reconciliation gaps within SDRs, indicating that there will most likely be substantial discrepancies in future reports.

Further, research has shown Sodtastic statistics indicating an unusually high volume of validation failures (e.g., 0% or 2% of total estimates are failing validation or showing duplicate entries), may indicate a process/system issue and, therefore, poses a risk to accurate future SDR reporting. Where KRI values are overlaid with statistical methodologies, such as Robust Minimum Covariance Determinant Distance, KRI datasets (which are designated as "High Risk" datasets) will typically indicate potential discrepancies in future SDR Reporting. Organizations that focus on monitoring

"High Risk" Creation Centers will increase the likelihood of achieving accurate SDR reporting and successfully achieve SDR Regulatory Compliance.

System Architecture

Before creating a workaround for reporting swaps (or "derivatives"), thorough assessments of all relevant legislation (i.e., Dodd-Frank & EMIR) need to be completed. This will set the project's boundaries—specifically what type of data is considered "reportable" and when it must be submitted. In order to ensure corporate commitment to the project, confirm input from a multitude of departmental representatives involved with swaps. The goal is to create an integration point between trading systems that will allow for the seamless exchange of swap data, enabling real-time reporting of that data, as well as ensuring that each report containing swap data has its own unique identifier; thereby creating a digital footprint that reflects activity in the swaps market. Continued compliance with the regulations and the establishment of an exception management system to allow for tracking and reporting of non-compliance are important goals of the Swap Data Reporting project.

We will also employ new technologies/methodologies (e.g., machine learning and predictive analytical systems) to continuously enhance our reporting capabilities and prepare for the future. In developing project management methodologies that can be used to track progress and outcomes while also measuring success through code review, the Swap Data Reporting project will use standardized project procedures and follow a global implementation strategy to maintain the highest quality standards across all implementations. Continuous collaboration among all project stakeholders will foster ongoing improvement in the Swap Data Reporting project's solution(s) and enhance the degree to which it meets the goals of market transparency and regulatory compliance. This methodology is based upon the use of technology and best practices and will assist in achieving compliance with relevant legislative requirements; and ultimately deliver an enhanced ability to execute trade activities. Referencing Figure 1 below:

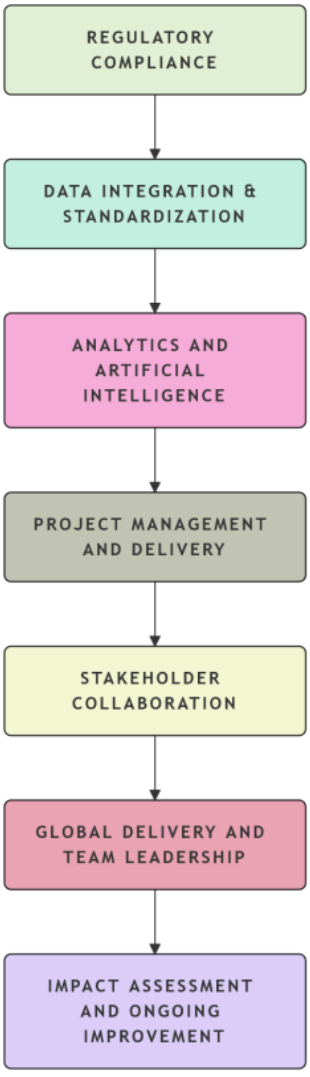

Figure 1: Architecture for Automated Swap Data Reporting

1. Layer of Regulatory Compliance:
   - Evaluate EMIR Swap Data Reporting & Dodd-Frank Regulation.
   - Report Requirements/Mapping - Map data elements to reporting responsibiities using regulatory rule engine.
   - Change Management/Exception Management module.
   - Regulatory Compliance Dashboard - Tracks audit trails and updates to regulations.

2. Layer of Data Integration & Standardization:
   - Create unique transaction IDs and product IDs.
   - Ensures data from the trading platform (Sophis and Calypso) is delivered smoothly.
   - Has a live pipeline for receiving data.
   - A standardization process creates a legal entity identifier (LEI) and a unique trade identifier (UTI).
   - The data harmonization module uses data deduplication and data consistency techniques to ensure that the duplicated data is removed.

3. Analytics and Artificial Intelligence:
   - ML, NLP and Data Analytics to detect reporting errors and identify what is required to complete reports.
   - Use of Predictive analytics engine to meet the reporting needs and to assess risks.
   - Using ML for impact analysis and Anomaly Detection.
   - Use of NLP to provide regulatory feedback, exception log analysis.

4. Project Management and Delivery:
   - Managing the Entire Project Life-cycle (from planning to post implementation).
   - All aspects of Project Planning including Scope, Estimation and Change Management.
   - Integration Management between Business Applications.
   - Project risk Mitigation of People, Technology and Process Risks.
   - Tracking Code Reviews, Sprint/Release Burndown Metrics, etc.

5. Stakeholder Collaboration:
   - Enhancing the Relationship between Business Units and Management.
   - Developing a Strategic Road Map for Technology and Risk Management.
   - Customer Relationship Management throughout the Deployment Process.
   - Providing a Collaborative Workflow Tool for Stakeholder Interactions.

6. Global Delivery and Team Leadership:
   - Global Delivery Model with Strong Leadership for Quality Delivery.
   - Training on Best Practices for Project Management and Product Development.
   - Team Development through Recruitment and Mentoring.
   - A foundation for global distribution with Effective Risk Management.

7. Impact Assessment and Ongoing Improvement:
   - Using Impact Assessment to enhance the transparency to the market, streamline operations and improve compliance.
   - Implemented 3 separate forms of Automation and Validation to help decrease the likelihood of Human Error and increase efficiency.
   - Increasing transparency in the reporting process by exposing the data through Public Extension as well as real-time reporting.
   - Providing Team-Based Recommendations for Process Improvement based upon input from Team Members.

We are working on the next phase of expanding automation, real-time analytics and technological advancements in Swap Data Reporting even further, creating more resilience/ability to comply with changing regulations. We plan to continue to innovate through improvements to our existing processes with the addition of automation and artificial intelligence (AI) to improve exception resolution and comply with current regulations. As well as reduce the manual processes with robotic process automation (RPA), we will be searching into the use of Blockchain and other technology advances for an improved secure method for exchanging data and transparent reporting of trades. Additionally, we will continue to develop real-time dashboards that will monitor compliance and provide immediate regulatory updates. With our current support for so many different Jurisdictions and Global Scalability, the input from our customers and our continued training program will help us create additional improvements in future Releases.

The enhancements that we will add in future phase will ensure the ongoing protection of our swap data reporting system into the future, permitting it to be agile and effective in the ever-changing regulatory environment. The solution offered is a complete automation of the processes used to report on compliance with applicable regulatory regimes and execute swap data reporting in a consistent manner across Regulatory Authorities within Countries. In addition, the use of emerging technologies will ensure that our clients have access to a consistent and scalable approach to compliance as well as much less manual effort and greater operational efficiency. Automated processes were established to verify that trades are collected and confirmed, which eliminates any potential for error in reporting trades or delays in entering trade information into a 3rd party system. In addition, the swap data reporting system provides real-time monitoring capabilities, to do ongoing monitoring of reporting status

and compliance with real-time monitoring dashboards and automatic alerts.

The system was built to be scalable and configurable to meet the compliance needs of various regulatory jurisdictions. The system provides consistent compliance performance via configurable rules and modular architecture. Automating the compliance process allows organizations to use all of their resources and time for strategic initiatives and improves productivity. Automation also allows organizations to respond quickly to changing regulatory requirements and achieve operational excellence through agility and resiliency.

The technology used to automate regulatory compliance has been changed with the introduction of more advanced algorithms and Artificial Intelligence (AI). Automated regulatory compliance relies on the use of advanced machine learning models to discover, review and resolve reports, and to automatically detect anomalies in real time. To detect anomalies, the machine learning models identify missing data and/suspicious patterns of transaction flow the use of analytics to identify and assess the potential impact of anomalies also allows compliance teams to take proactive steps to prevent potential compliance issues from escalating to regulatory violations. Natural Language Processing (NLP) is utilized to review exception logs and analyze regulatory input, provide recommendations for corrective action based on the root causes of the anomalous events. Transitioning from reactive to proactive compliance can enhance an organization's operational resilience by setting a new bar for regulatory compliance, thus enabling companies to successfully navigate through the ever-evolving regulatory universe.

The use of automated solutions to provide greater transparency around the compliance reporting process via the creation of detailed document specifications for each stage of the compliance workflow and establishing a clear audit trail for every task actioned during the process. This ensures that compliance actions can be tracked, verified by regulators and other relevant stakeholders and, in the event of some type of changes made to the applicable regulation(s) will have all compliance activities documented. All compliance reporting activities will be recorded, tracked, and available for audit. These extensive reports for every reporting period will allow organizations to provide evidence of how they adhere to the various regulatory requirements that govern their operations. In addition, as the repositories for this documentation becomes a source of reference for organization’s compliance to the various regulatory frameworks, will allow both internal and external auditors and regulators to collaborate with more efficiency in their compliance reporting activities. Providing this greater access to available information that supports compliance and builds trust with stakeholders and assists in streamlining the audit/inspection processes.

Automated and validated processes improved data quality and accuracy by reducing the likelihood of human error throughout the reporting process by ensuring that only the best quality and compliant report data was collected during each reporting phase. The auditory verification process related to verifying trade information via tradedata exchanges and intermediary service providers not only resulted in improved relationships with the regulatory community but also helped reduce the volatility in the accuracy of trade data and allowed for prompt reporting of trade data more consistently to both stakeholders and the public by using near real-time automated reporting and delivery. Automation of traditional business processes improved the operational efficiency and reduced the latency in reporting; therefore, increasing an organization’s competitiveness to address regulatory inquiries and adapt quickly to shifts in the market and regulations.

In addition to increasing efficiency for organization, the transition to automation has significantly reduced the operating costs incurred by organizations; organizations will no longer be required to use human resources to input, reconcile and report on compliance related data. As a result, organizations have more financial resources to advance technology and improve business processes to continue to grow and maintain a competitive advantage. Moreover, moving to a real-time monitoring of trade data has improved the transparencies of reporting, enables better insights into the transactional data traded between market intermediaries and market participants, resulting in better enforcement capabilities for regulators and facilitating a fair marketplace for the public at large.Increased transparency also strengthened the integrity and trustworthiness of the market so that all stakeholders can be assured of the consistency and accuracy of the data, thereby increasing the overall stability of the financial system.

In order to assess how well an automated reporting (swap data reporting) system performs, the following are examples of several measures that may be utilized: accuracy reflects the accuracy of the reports by showing the percentage of reports free from faults (error rate), timeliness will measures how well the system can meet the regulatory deadlines of having all transactions reported (the average time from the completion of the trade to the time of successful reporting), exception rate identifies instances of irregularities during the period in which a reporting cycle is occurring and determines what improvements are required, cost savings determines the extent to which expenses associated with the process of reporting (manual reporting) have been reduced or eliminated, typically expressed as a percentage of employee compensation, compliance rate shows the percentage of the reports that complied with all the

regulations regarding reporting without receiving a monetary penalty, system uptime/reliability indicator is typically measured by the average number of times the system has failed during a set period (Mean Time Between Failure - MTBF) and the percentage of uptime for an extended period, user satisfaction measure is determined through feedback from each department and all stakeholders, data volume handled measures the size or capability of the system to handle the processing of daily trade reports, completion of audit trails indicator measures the number of reporting activities that have a complete set of audit trails, ensuring there is a level of transparency available to everyone. Together, these indicators provide an overview of how well the system performs, allow for continued improvements to be made to the system, and provide evidence of the value of automated reporting in relation to compliance.

Data provide a structured view of an organization's reporting KPIs over a period of time, allowing an organization to track its progress on all aspects of data reporting. Data are reported on a monthly basis and show a number of metrics related to how well the organization has reported all aspects of its data. Metrics tracked include Completeness, Error Rates, Gaps and discrepancies related to reconciliation, Timeliness of daily reports, Exceptional rates, and Compliance rates. For the example below, for January 2025, the organization's overall Completeness was 98.5%, Error Rates were less than 0.2% and there were a total of 15 discrepancies in the reconciliation of reported data, while the overall Compliance Rate was high at 99.8%. As the months progressed, positive improvements were noted as demonstrated in the following graph (Figure 2) with February demonstrating 99.0% Completeness and a Continuing Decline in Error Rates, this is illustrated below by Figure 2:

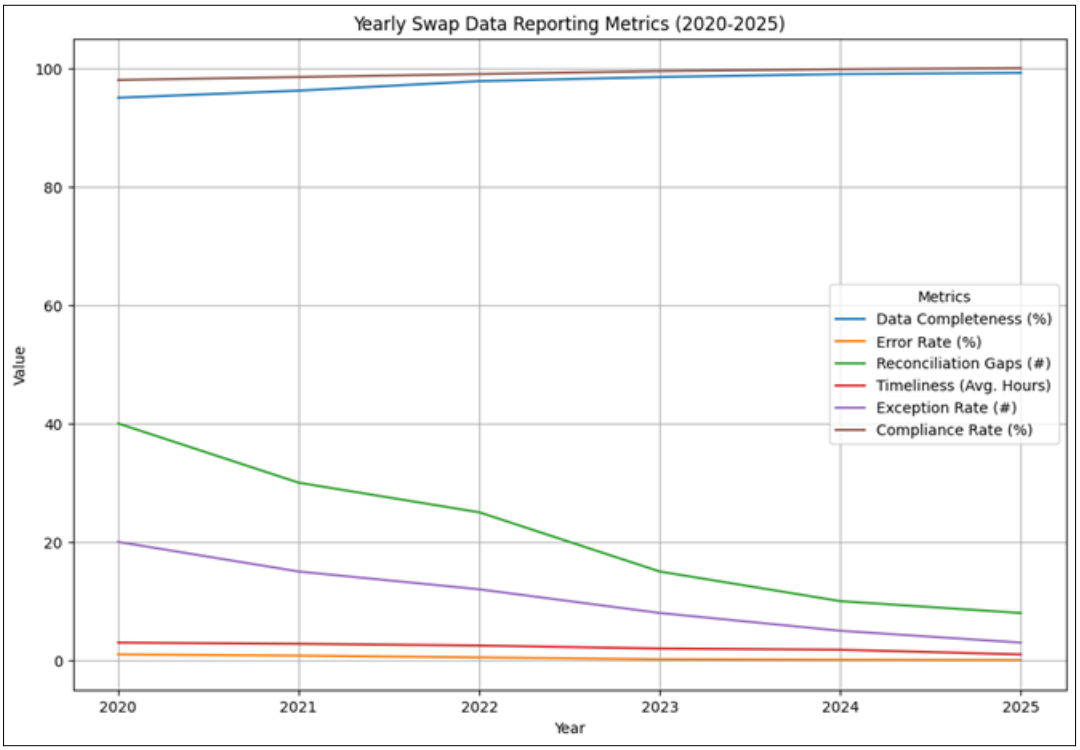

Figure 2: Yearly Swap Data Reporting Metrics

Definitions of KPI for prediction of SDR accuracy issues include: Less than 98% full dataset completeness (completeness threshold), High rate of error (Validation errors greater than 0.5% of original data) Excessive number of reconciliation gaps (greater than 15 mismatches cycle) Moderate number of exceptions (> 8 reported/cycle), Excellent Timeliness (not more than 2 hours turnaround time average) and shown below in table 1 for both the low and mid-range KPIs.

Table 1: KPIs Predicting SDR Accuracy Issues

KPI	Description	Threshold for Alert	Impact on SDR Accuracy
Data Completeness	% of complete records	<98%	High
Error Rate	% of validation failures	>0.5%	High
Reconciliation Gaps	# of unmatched records	>15/cycle	Medium
Exception Rate	# of reporting exceptions	>8/cycle	High
Timeliness	Avg. submission time	>2 hours	Medium

CONCLUSION

The automated data reporting system for swaps is resulting in significant improvements in both the quality of Dodd Frank and EMIR-compliant swap data reported as well as an increase in operational efficiency related to reporting. The automated data reporting system also helps companies meet their regulatory requirements. The automated data reporting system takes advantage of advanced technologies, including Artificial Intelligence, Machine Learning, and Data Analytics, to minimize the risk of human errors and shorten the amount of time it takes to report data. Automated systems for the reporting of swap transactions will also enable firms to establish that their trade data will be accurate and balanced, by assigning a unique identification number (UID) to each swap trade and following a standard method for reporting their trade data. All participants in the swap reporting process may expect to reduce their trading costs through the automated reporting processes, primarily because the uncertainty surrounding the ability to provide verifiable trade data has been greatly reduced, thus eliminating any possibility for reconciliation discrepancies.

As the continued development and growth of the automated swap reporting system continues, the introduction of additional technologies such as Distributed Ledger Technology (DLT) and Blockchain that will provide secure and protected exchanges of trade data will give users of the automated system the opportunity to take advantage of the fully automated reporting functions of these systems. New analytical tools that will provide real-time analysis, and predictive compliance models, will allow for more flexibility to be able to adapt to the ever-changing global regulatory environment. Our strategy for global expansion will also provide us with the ability to service a wider array of regulatory regimes around the globe, with greater efficiency. Our commitment to investing in our staff and their training and innovations in processes will continue to maintain our leadership position in the automated swap reporting marketplace, while providing the highest level of quality and performance in automated swap reporting services. Through a proactive approach to developing, implementing, and delivering regulatory reporting solutions, we will continue to be the leaders in the regulatory reporting arena, both now and in the future.

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