

SEC Technology Transformation Plan

Overview

The past two fiscal years, the SEC has taken significant steps to enhance its effectiveness and oversight of the financial markets. The SEC has invested in modernizing its systems, including a centralized system for tips and complaints, enforcement and examination management systems, risk analysis tools, and financial management systems. To further improve core operations and implement the agency's new responsibilities, the SEC has embarked on a multi-year Technology Transformation Plan called "Working Smarter" which will ensure the SEC's business processes are streamlined, integrated, and implemented with the best technology to reduce costs and increase efficiencies and effectiveness; deliver better services to both employees and the public; and provide greater accountability, transparency, and security. Leveraging modern, reliable, and innovative technologies and predictive analytics will transform the way the SEC performs its mission and provide a proactive view into how technology impacts capital markets. By ensuring people "work smarter," the SEC will derive significant and measurable performance improvements in core operations and increase value through the use of automated processes.

The Technology Transformation Plan supports vital technology initiatives including a Data Warehouse, standardization of enterprise-wide platforms, knowledge management, seamless integration of structured and unstructured data sources, modernization of SEC.gov and EDGAR filer system, advanced search and discovery capabilities, data management, cloud computing, and complex, predictive analytical capabilities.

The new technology tools and platforms will assist with automated triage and early detection of fraud or abuse at the earliest stage and allow access to information with previously unachievable speed and accuracy. The data warehouse will deliver enhanced business intelligence; save time by allowing users to quickly search and access critical data from one place; enhance data quality and consistency; provide historical intelligence by allowing users to analyze different time periods and performance trends in order to make future predictions; and generate a high Return on Investment. Data integration and enhanced analytical tools will allow seamless searches of data sets to examine activity to reveal suspicious behavior in securities fraud and quickly trace the origin. Knowledge Management will eliminate work product redundancy by reusing, and not reinventing legal research. It serves as an enabler by connecting and empowering employees, thus resulting in increased productivity and improved decision-making.

Cloud computing will reduce costs and operational overhead, and provide greater flexibility through an on-demand, scalable model that fits the SEC's need. A recent example is the recent Facebook S-1 filing that caused a 100 percent spike in the SEC's web utilization when it was submitted. Within days, a change was made to offload the SEC website traffic to a cloud provider, and no performance issues occurred when the Facebook S-1 amendment was submitted.

With the deployment of new technologies, the transformation is estimated to produce millions in annual cost savings, desired agility and derive significant and measurable performance improvements in core operations by working smarter.

SEC Transformation

SEC Today

The SEC's Technology Transformation Initiative was launched in response to independent assessments conducted by the Boston Consulting Group (BCG), MITRE and the SEC's Inspector General. Here are two of BCG's recommendations:

- Invest in key enabling infrastructure. Enhance existing technology and develop a new suite of systems to drive internal efficiency (e.g., by deploying workflow tools) and enable critical functionality (e.g., improve the availability of information by deploying a knowledge management system and sharing data across applications).
- Establish a Technology Center of Excellence to institutionalize an awareness of the impact of technology on the securities markets (e.g., the effect of high- frequency trading on market structure), adoption of new technology at the agency (e.g., market data analytics) and deploying advanced technology capabilities that increase the SEC's operational efficiency and effectiveness.

The core mission of the SEC is to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation. Key to the SEC's effectiveness in achieving this mission is its ability to research large volumes of data in order to locate and act upon the proverbial "needle in the haystack" that may provide evidence of wrongdoing. Currently, information is stored in systems that have grown organically over time to meet individual Division or Office business needs. Our systems are independent and siloed. They leverage software tools from multiple vendors that provide similar or identical functionality.

The SEC must also provide the public with easy and quick access to key information about company financial filing data. In the age of 24/7 news cycles and worldwide information that's just one click away, the public demands organizations deliver information quickly, completely, and accurately. The inability to efficiently access information leads to frustration and underutilization of valuable assets.

The SEC has embarked on a multi-year program to reduce technology-related complexities. Standardization will improve the SEC's ability to carry out its core mission and lead to greater customer satisfaction

Today at the SEC, investigators have volumes of data at their fingertips. However, they lack efficient mechanisms to search and identify correlations within and between the various systems. For example, to review a company's filings, an investigator could spend significant amounts of time poring over numerous individual filings pulled from the over 21 million records currently found in the EDGAR filing system in order to identify a potential discrepancy. When the investigator wants to review whether the public has entered any tips regarding a particular

company, they log into another system that tracks Tips, Complaints, and Referrals and searches for that company. If the investigator discovers that one or more tips were entered that resulted in an investigation, he or she would then need to log into yet another system to view the details of that investigation. The investigator may also need to review additional data from external SEC sources during the course of their investigation.

Casual and professional investors rely on the SEC as a protector of fair markets and as a key data source when determining whether to invest in a particular company. Easy and quick access to accurate information about a particular company is essential to the research performed by the investor. Currently, the technology that powers many of the SEC's core systems lags what consumers have grown to expect. For example, when a consumer initially logs onto the SEC.gov website, there is not a search box to enter search criteria. The consumer must first click a link on the site before being prompted to enter search data. Next, the consumer is presented with three different search options depending on the type of information he or she is seeking. Furthermore, if he or she would like to perform a full text search of EDGAR filings, the consumer has to click on a link to go to yet another search page where ultimately, they are only able to search the last four years of filing data. A key part of the SEC's transformation roadmap is to simplify and enhance the individual investor experience with SEC.gov.

The plan to migrate internal systems to a single data platform will allow users to more efficiently locate the data they seek. This standardization across the enterprise will also result in significant cost savings. For example, if a single search engine can be leveraged across the enterprise, the SEC will avoid paying multiple vendors for several search tools that basically perform the same functions. Additionally, standardizing on a single database platform will allow the SEC to lower hardware costs, lower data center space requirements, and reduce support staff. Accounts payable and contract management become more streamlined with the elimination of redundant technologies from multiple vendors.

Allowing users to perform a single search across the various SEC systems is merely the first step to providing better data access. Standardization on a single database platform also sets the stage to build a Data Warehouse to maintain all the pertinent company-related data the SEC collects. Finally, by utilizing commercially available analytics tools, the SEC will be able to build reports and predictive dashboards that unify data from disparate data sources and present it in a single view, thus saving hours, days and potentially months of research into multiple data sources.

SEC Transformation

Key Initiatives

TCR

Description

The TCR system contains tips, complaints, and referrals received by the Commission from March 14, 2011 to the present. The current TCR Intake and Resolution System has two main components (1) Intake and (2) Resolution. TCR allows the public and SEC internal users to submit complaints, tips, and referrals and to upload attachments. TCR tracks the receipt, routing, and disposition of each TCR, and allows SEC users to create notes in individual TCRs reflecting their analysis. The purpose of the TCR system is to consolidate the collection (intake) of tips, complaints, and facilitate distribution and tracking of TCR's through resolution.

Business Case

The SEC conducted a comprehensive review of its business processes for receiving, recording, tracking, and taking action on TCRs. The SEC analyzed the sources of TCRs and the way they are processed through a number of different systems in a number of offices and divisions at several locations throughout the organization. As a result, in 2009 the SEC determined that it needed a centralized system to support the intake and resolution of TCRs. In order to manage tips, complaints, and referrals the SEC implemented the TCR Intake and Resolution system.

Benefits

- Centralized collection of TCRs enhances the staff's ability to more effectively identify potential violations of the federal securities laws and to ensure appropriate and timely responses to allegations of wrongdoing.
- Enhanced the Commission's ability to cut across silos, share information and be more efficient and effective in protecting investors.
- Enhanced integration leads to better examination and enforcement efforts and provides analysts with a comprehensive view of information that may be relevant to an investigation or topic area.
- Every Region, Division and functional Office is now connected and can both access and share information about TCRs.
- Allows for more robust and comprehensive searching and can aid the Commission in its work to identify risk patterns and trends to help focus limited resources in Enforcement and Exams/Inspections.

Timeline

- 2010: Requirements, Design, and Development
- 2011 – 2012: Implementations & Maintenance
- 2013 – 2014: Enhance & Improve

TCR Triage

Description

The automated triage solution will automatically receive new tips, complaints, and referrals and determine the characteristics and risks based on a set of defined business rules. It would assess each TCR against previously processed TCRs to determine if enough similarity exists to establish a match between the TCRs. Based on the TCR characteristics/risk assessment and matching process, the triage solution will derive a base supplemental risk score, an initial organization assignment for resolution, and will provide sufficient information to the work item management process to create a new work item or modify an existing work items. The triage solution will be integrated with the current TCR Intake and Resolution System.

Business Case

In January of 2010, the Office of Market Intelligence (OMI) was created to be the central point of intake for all intelligence received by the Commission. OMI conducts “triage” initial, preliminary investigations that “kick the tires” on allegations and gets information related to ongoing investigations to the relevant investigative groups and sends new leads to traditional investigative groups and the Specialized Units for their consideration. While the current TCR System provides the SEC staff with ready access to TCRs received by the Commission, the staff needs ways to automate initial assessment, grouping and risk ranking of the TCRs received.

Benefits

- Enhance the SEC’s ability to use investigative resources more intelligently and provide the staff with timely information on potential violations of the federal securities laws to ensure appropriate and timely responses to allegations of wrongdoing.
- Provides a consistent and automated way of linking and ranking TCRs that may be relevant to an investigation or topic area.

Timeline

- 2012 – 2013: Requirements, Design, and Development
- 2013 – 2014: Implementation & Maintenance

TRENDS

Description

TRENDS will create a uniform National Exam Program (NEP) process and document repository for all OCIE examinations that will record in an electronic web-based form each exam's purpose, scope (and scope changes), risk assessment, findings and appropriate documents and data.

Additionally, TRENDS will be a singular database in which all significant exam statistical and reporting needs will be captured. TRENDS also has the potential to serve as a Commission wide repository for contacts and information about Commission registrants. It would also allow automated requests and collection of pre-exam work materials shared among OCIE, Enforcement and the Policy Divisions to facilitate information sharing.

TRENDS captures each exam's purpose, scope, risk assessment, findings, and appropriate statistical data. In addition, TRENDS serves as a singular database that can maintain all examination work papers in electronic format thereby reducing the physical requirements of maintaining such work papers. TRENDS also creates a uniform exam documentation process for the NEP and replaces STARS, the NEP's outdated reporting system.

Business Case

TRENDS was created to improve the NEP's efficiencies given the limited resources and constraints placed on the Commission. Those efficiencies include the following, among others:

- 1) Ability to focus on exam areas of high risk.
- 2) Ability to track scope changes and know what stage of the exam changes occur.
- 3) Ability to allow for management review and sign off electronically.
- 4) Ability to provide limited and concise explanations concerning exam scope, exam report, and deficiencies noted.
- 5) Ability to reduce redundancies by entering information once and automatic population of such information, as necessary.
- 6) Ability to upload relevant work papers and documents and associate these with specific deficiencies noted or specific risk areas.
- 7) Ability for each examiner and manager to maintain organization of all examinations on which they participate.

Timeline

- 2012 – 2013: Requirements, Design, and Development
- 2013 – 2014: Implementation & Maintenance

SEC.gov Modernization

Description

SEC's public website provides the public with information about the SEC's mission, activities, and effectiveness, and disseminates decisions and rule interpretations. With more than 148,000 static web pages and 21 millions company filings, the web site provides a comprehensive overview of the SEC and its rules and regulations. The site is used by millions of users every month and gets more 450 million hits per month, making it one the most visited government sites.

Business Case

The current SEC website is an incrementally built custom coded solution that was initially started in mid 90s. Serving its primary role of data dissemination, SEC.gov is primarily a static web site with limited interactive features that are common to today's websites. The infrastructure that supports SEC.gov is 15 years old and the cost to maintain the obsolete, archaic infrastructure continues to increase every year.

Benefits

- Decrease the operational and maintenance cost by than more than 45%
- Near real-time dissemination information to public and investment community.
- Help prevent fraud and increase compliance through improved dissemination of enforcement activities and regulatory initiatives
- A simple interchange between filers and the SEC to reduce filer burdens
- Resolves long standing system issues and redundancies
- Improves current technology, methodology, and licensing (including costs)
- Prevent and avoid operational and security risk of critical system that is used by investors all over the world
- Ability of users to search the content quickly and effectively
- Improved user experience based on the new look and feel, improved navigation and ability to incorporate social media outlets, blogs, videos and photos.

Timeline

- 2012: Requirements, Design, and Development
- 2012 – 2013: Implementation and Support

EDGAR Filer Modernization

Description

The EDGAR Filer System allows companies and individuals to file periodic reports and information to the SEC and allows SEC staff and the public to search the filings. The investor community relies on the EDGAR Filer System to search and gather information about public companies and make investment decisions. The system stores the last 15 years of filings, which total more than 21 million records.

Business Case

EDGAR Filer System was developed in mid 1990s and was partially modernized in 2001. The system suffers from numerous issues such as multiple filing formats, complex file numbers, hard coded OMB dates, cumbersome hard copy fee processing punch lists and structured data problems. There is significant need to incorporate business processes that do not exist within the current system, such as: mergers and acquisitions, enforcing entity data upkeep and a single enterprise data repository where data resides and is managed from one place.

Benefits

- Reduce filer burden by providing a professional path and a novice path based on filers knowledge
- Improve ability to meet Commission requirements in real time vs. current quarterly release approach
- Decrease the operational and maintenance cost by than more than 45%
- Automated and Analytical Tools to support the SEC review processes
- Improve data capture by moving to more structured formats for form types

Timeline

2012: Requirements, Design, and Development

2013 – 2014: Implementation

Consolidated Data Warehouse

Description

A consolidated SEC data warehouse will be developed over a two year period and will allow internal and external users to access the “right data at the right time”, perform analysis, and aid them in their day-to-day job functions. The data warehouse will combine data from multiple and varied sources into one comprehensive and easily manipulated database.

Business Case

The SEC currently has many systems containing disparate sets of data that exist in “silos”. This requires internal and external users to traverse multiple sources to access desired data. This takes time and often results in an inability to locate the data being sought. This mode of operation makes it very difficult to share data across internal systems, much less with other agencies and external users. An enterprise-based data warehouse system will facilitate collaboration across users, groups, and agencies. Many companies have turned to building a data warehouse for trend analysis and forecasting to effectively and efficiently track information. The implementation of the data warehouse will allow the SEC to eliminate multiple standalone databases resulting in significant cost savings. Currently, the SEC stores multiple copies of the same data. The data warehouse will allow the SEC to have one “single source of truth” and eliminate large amounts of data storage that also translates to large cost savings.

Benefits

- Allow advanced search and discovery capabilities, enable enterprise-wide knowledge management, and seamlessly integrate data sources
- Allow individuals to access the “right data at the right time”
- Provide a central area for the SEC to verify, cleanse, and merge disparate data
- Allow for the application of analytical tools to perform simple and sophisticated data analytics to identify relationships for enforcement cases, identify risk patterns and trends, and conduct predictive analysis
- Allow business users to quickly access critical data saving time and money
- Searching will require little or no support from IT which will lead to more cost savings.

Timeline

2012: Requirements, Design, and Development

2012 – 2013: Implementations

2014+: Enhance & Improve

Market Data Analytics

Description

The SEC is adding analytical capabilities by extending data collection to real-time feeds in ways that allow a fuller analysis of trading. The Market Data Solution includes available, operational and well-tested data services and related database solution that are designed to, or can readily be configured to, load market data (e.g. trades, quotes and orders) from publicly and commercially available equity and equity-option exchange feeds. The feeds include the following:

- Consolidated Tape System (CTS)/Consolidated Quotation System (CQS) feeds
- UTP Trade Data Feed (UTDF)/UTP Quotation Data Feed (UQDF)
- Options Price Reporting Authority (OPRA)
- New York Stock Exchange (NYSE), Archipelago Exchange (ARCA), American Stock Exchange (AMEX)
- Nasdaq Stock Market (NASDAQ), Boston Exchange (BX), Philadelphia Stock Exchange (PSX)
- Bats (BATS) Exchanges BZX, BYX
- Direct Edge Next Generation Exchange Platforms EDGA, EDGX
- National Stock Exchange (NSX)
- Cayman Islands Stock Exchange (CSX)
- Chicago Board Options Exchange (CBOE)

Business Case

Currently, the Divisions primarily use daily trade and quote data for monitoring and analyzing intraday equity transactions. This data is limited to top-of-book orders at each trading venue, and provides a view of the markets as seen from the consolidated tape. The complexity of analyzing and reconstructing the “flash crash” of May 6, 2010 demonstrated the SEC’s need to further augment its data gathering and analysis capabilities with tools specifically designed to quickly collect and analyze large quantities of market data.

Benefits

- Store trade executions, orders, modifications, and cancellations, as provided to market participants using the exchange feeds, with the time of occurrence measured to the same accuracy as provided by those feeds.
- Aggregate the data with identifiers that preserve the original trading venue where the event occurred and any supplemental information related to the trade or order, such as order type, when available.
- Provide a data structure that allows the data to be accessed quickly and efficiently for analysis. Allow this to be done in specified intervals, such as in by the millisecond, by-the-second, and by-the-minute snapshots.
- Provide historical data in a form suitable for historical analysis (for example, snapshots that are second-by-second) with the ability to drill-down into raw data when needed.
- Allow for the replay and reconstruction of specific market events over the course of a day or over multiple days.
- Scale to accommodate additional data as it becomes available from the venues, or non-

equity data provided by the venues.

- Provide a means for other types of market data that, if made available to the SEC, can be securely stored and analyzed using this solution.
- Graphically represent the order book for any given security (or collection of securities) in real-time, near real-time, and historically.
- Create custom screens to analyze trades and order book data and to highlight specific sets of transactions according to market venue, size, time, or any other applicable combination of filters and variables.
- Create custom aggregate analyses for large quantities of data across many securities and over time representing order-book flow, bid-ask spreads, trade executions, and other statistical measures based on sector, market venue, order type, volume, capitalization, and other current or future factors.
- Allow the creation of metrics of varying complexity.
- Produce reports on user-definable markets statistics.

Timeline

2012 – 2013: Requirements, Design, and Development

2012 – 2014: Implementation

Data Search

Description

The SEC is consolidating the numerous search engines to a single provider that will provide results that are relevant to the unique demands of the Commission's users at an overall lower cost.

Business Case

Users expect to be able to search for content at work the same way that they search at home, through a single search engine that returns the most relevant results to them with sub-second speed. Currently, the SEC uses multiple search engines that search content individually based on what data source is being queried. These search engines must be actively managed by a team of contractors and SEC employees, which increases the cost of ownership.

Benefits

- Reduce the costs of owning and managing multiple search tools
- Improve user satisfaction and lead to an increase in site traffic
- Reduce the amount of time internal users spend searching for content, thus improving productivity

Timeline

2013: Implementation and Support