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***The U.S. Securities and Exchange Commission:
Working Smarter to Protect Investors and Ensure
Efficient Markets***

Introduction

On January 26, 2009, Mary Schapiro was confirmed by the U.S. Senate to be Chairman of the Securities and Exchange Commission (SEC), making her one of the first of President Obama's appointments to be confirmed. Only weeks before, Bernard Madoff had been arrested for leading a Ponzi scheme that robbed investors of \$18 billion, the largest financial fraud in U.S. history. The news sent shockwaves through the financial community, and Congress questioned how the SEC had missed such a significant deception. Schapiro's rapid confirmation reflected a growing consensus in Washington that the SEC needed to play a key role in reestablishing the integrity of the U.S.'s financial services industry.

Schapiro, an SEC commissioner in the 1980s, referred to the SEC as a "former gem of government agencies," that had suffered from a loss of legislative support during more than a decade of declining interest in financial regulations:

"When I returned to the SEC in 2009, demands on the agency had been outpacing its resources for several years. Between 2003 and 2009, the

dollar value of trading volume had grown 163%. The number of investment advisors had risen 43 percent and the number of broker-dealer branch offices had shot up 86 percent. Meanwhile, the agency budget had been essentially flat for the four years prior to my arrival.

—Mary Schapiro, Chairman

Schapiro believed that the SEC needed to understand what went wrong in the Madoff case—and fix the root causes. In July 2010, the passage of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) expanded the scope of the SEC's responsibilities¹ and heightened the need for more systematic, repeatable, and targeted compliance and enforcement processes. This meant that the already-taxed SEC needed to gather, store, exchange, and analyze orders of magnitude more data – and to architect, design and implement sophisticated tools and techniques (e.g., analytics, business intelligence) relatively quickly.

¹ The Dodd-Frank law introduced new reporting requirements to try to curb the abuses that led to the financial crisis. The SEC was one of several government bodies charged with implementing the requirements of Dodd-Frank.

Early on, Schapiro committed to transforming SEC processes by hiring new kinds of expertise, nurturing collaboration across division lines, and encouraging an entrepreneurial attitude. Within three years, transformation initiatives had generated visible outcomes. For example, in 2011, the SEC collected \$2.9 billion in fines and returned \$2.2 billion to investors, significantly exceeding any prior year's performance.

But Schapiro was even more enthusiastic about fundamental changes in how the agency was pursuing its responsibilities. In particular, she noted that people were working across division lines to better identify and take action on financial activities that were potentially dangerous to investors. In early 2012, while heading into her 44th Congressional Hearing, Shapiro observed

"Since my arrival at the SEC we've been working to improve performance on two fronts. First, dealing with immediate investor protection and market stability needs and meeting Dodd-Frank deadlines. And second, strengthening the agency's long-term performance – adding institutional capacity to carry out whatever mission becomes necessary as circumstances arise and the markets evolve."

—Mary Schapiro, Chairman²

Schapiro believed that the success of the SEC in fulfilling its mission depended on the ability of people throughout the agency to "work smarter" with the mounds of data they secured through filings, tips, and market data. Not unexpectedly, this was proving to be an extended journey.

The Securities and Exchange Commission (SEC)

The U.S. Securities and Exchange Commission was established under the Securities Exchange

Act of 1934 to restore credibility in the marketplace following the Great Depression. The government agency's mission was to protect investors; maintain fair, orderly, and efficient markets; and facilitate capital formation. This mission required oversight and review of approximately 35,000 entities, which included broker-dealers, investment advisors, mutual funds and exchange traded funds, reporting companies, transfer agents, national securities exchanges, clearing agencies, and statistical rating organizations.

The SEC traditionally delivered on its mission through policy-making, review, and enforcement activities. Each year, the agency conducted over 1,500 examinations to ensure compliance with securities laws and regulations³. Staff investigated approximately 30,000 tips, complaints, and referrals regarding potential securities laws violations⁴. They brought more than 700 enforcement actions against individuals and companies for a variety of infractions, including insider trading, accounting fraud, and providing false or misleading securities-related information⁵. In the process, the SEC amassed large volumes of data.

In 2012, the SEC's 4,000 people were organized into five major divisions and more than twenty offices, located in Washington DC headquarters and eleven regions (see Figure 1). Each of the regional offices pursued cases and conducted exams from their region, which meant that staff in each office needed a broad understanding of SEC work. This requirement limited the development of deep expertise in specialized areas, such as derivatives or insider trading.

Perhaps more importantly, the regional arrangement resulted in locally developed processes and locally maintained information repositories. This meant, for example, that the

³<http://www.sec.gov/news/testimony/2012/ts042512mls.htm>

⁴ <http://www.sec.gov/about/secstats2011.pdf>

⁵ <http://www.sec.gov/about/secstats2011.pdf>

² Interview with case authors, April 11, 2012

agency's thousands of annual tips, complaints, and referrals were handled in many different ways across the agency. Steve Cohen, Associate Director, Division of Enforcement, was charged with investigating how the SEC handled tips, complaints, and referrals in the wake of the agency's failure to pick up on indications of Bernie Madoff's unlawful behavior.

"It turned out that there were 70 or 75 different email addresses where someone might think about sending a tip based on how they interacted with the agency. There were multiple call centers, but there was no centralized place for this information to go – nor policies and procedures around how or when or if a tip should be communicated."

—Steve Cohen
Associate Director,
Division of Enforcement

Furthermore, paper was everywhere. In fact, most work done at the SEC was manual, making information sharing extremely difficult.

"In the past, if there was a violation or deficiency or finding, and anybody else within the agency wanted to see the supporting documentation behind it, they wouldn't have the ability to easily do that because it was maintained in paper files, in a file room."

—Jane Jarcho,
Associate Regional Director,
Chicago Regional Office

The lack of automation meant that SEC staff did not have a systematic capability to identify suspicious activities. Instead, examiners spent much of their time generating routine reports that had little impact, while enforcement staff frequently found themselves pursuing lengthy cases of uncertain merit or with questionable return on investment.

Transforming to a Smarter Organization

As Schapiro assembled her leadership team in early 2009, she envisioned a transformation

from paper-based, localized operations to a more collaborative environment with specialized expertise and the ability to quickly identify and address activities that threatened financial stability or investor well-being. The transformation required standardizing some core processes, introducing new organizational roles and responsibilities, implementing a modern technology base, and cultivating a new mindset about how to use and share data.

Two core SEC business processes were especially important to this transformation: (1) handling tips, complaints, and referrals and (2) conducting exams. These two processes generated data that Schapiro anticipated could improve oversight and lower risk to both the agency and investors, while increasing staff job satisfaction and lowering administrative costs.

Handling Tips, Complaints and Referrals

One valuable source of information for the SEC was the thousands of tips, complaints, and referrals (TCRs) that individual citizens submitted each year. While a fair number of TCRs were worthless, many others offered potentially valuable insights into risky or corrupt practices. Some people at the SEC believed that if TCRs had been better coordinated, the Madoff scandal could have been identified years sooner. But the TCRs were not consistently funneled to the people who could best use them.

Because the primary concern related to TCRs was their impact on enforcement actions, management could have handed off responsibility for a redesigned TCR process to the Enforcement division. But TCR information had implications across the SEC. For example, a complaint might inform a new policy change, suggest a shift in investor education, or lead to an adjustment in scope for an examination:

"The Office of Investor Education also gets a lot of tips and complaints as well as the Office of Investor Advocacy. So there are other offices around the SEC

that would like to understand what is coming out of the TCR process.”

—Craig Lewis
Director and Chief Economist,
Division of Risk Strategy
and Financial Innovation

To enforce an enterprise-wide view, Schapiro appointed an Executive Steering Committee to oversee redesign of the TCR process. On an as-needed basis, the senior executives on this committee brought expertise from various parts of the agency and multiple organizational levels into the design process.

To further ensure that decisions about managing the new agency-wide TCR system were not exclusively controlled by Enforcement, a newly created Office of Risk, Strategy, and Financial Innovation (RiskFin) was designated as the TCR system owner. RiskFin had been created in September 2009 “to integrate financial economics and rigorous data analytics into the core mission of the SEC⁶.”

“We decided that the system owner ought to be RiskFin because they are neutral. They have an analysis role. They are going to be the folks that can take this information and help other people use it. They will lead quality assurance and process monitoring. We wanted to be able to ask questions like: How do you know the [TCR] system is working? How do you know everybody is doing their part?”

—Steve Cohen,
Associate Director,
Division of Enforcement

The first step in the reengineering of the TCR process was the implementation of a centralized web-based submission process and single TCR repository:

“The problem we wanted to solve the fastest was the basic database one. We didn’t have all our stuff in one place. So, we were able to create a single

TCR system, and we were able to roll out policies and procedures to everybody. The transitional system had limited searchability, but it did two fantastic things very quickly. One, it allowed us right away to get everybody in the agency thinking about sending TCRs to one place. Second, it created one place where everything was located.”

—Steve Cohen

As the largest consumer of TCRs, the Enforcement Division created an Office of Market Intelligence (OMI) to triage all incoming TCRs. OMI employed more than thirty enforcement specialists, including an FBI agent, to identify those tips, complaints and referrals that warranted further attention. During multiple stages of review, OMI could take various actions on a TCR: close it out as not warranting action, refer it to an external agency because it was outside the SEC’s purview, send it to another Office or Division within the SEC either for action or for expert input prior to Enforcement taking action, or send it to an Enforcement Division investigative group. The systematic input from other parts of the SEC on complex issues raised by a given TCR was particularly welcomed:

“Now we’ve broken down the silo. Enforcement is now collaborating with other divisions and offices. And, when we look at the tip again, it’s not just a tip. It’s a tip plus the intelligence we’ve gathered from another part of the SEC.”

—Steve Cohen

The triage process ensured that all TCRs were handled in a standardized way:

“This is a systematic intake where everything that gets considered goes through one window. This closes down the possibility that you could get a Bernie Madoff-type tip in LA, another one in New York and maybe a third in Miami. Those used to come into three different people, and each tip alone

⁶ <http://www.sec.gov/divisions/riskfin.shtml>

might not appear as significant. So they got less attention, less resources. But if all of them flow through one place, and you see three tips referring to the same person, that elevates the TCR to a level that would never happen under the old system. You take a lot of the luck out of the system by forcing it to be systematic.”

—Craig Lewis,
Director and Chief Economist,
Division of Risk Strategy
and Financial Innovation

The SEC had designed an online form (that could also be printed and mailed) to collect tips, complaints and referrals. To encourage citizens to file TCRs, RiskFin staff had deliberately designed the form to accept text responses rather than require selections from menus of predetermined options. Menus would have provided categories that would feed analytics and could ultimately help identify recurring issues or related cases. But specifying options in advance would frustrate any filers who didn't understand the terminology or didn't think the options met their needs. The tradeoff was that many TCRs were incomplete, and the text data complicated efforts to analyze TCR data. RiskFin was constantly reevaluating what fields should be mandatory and what changes would make TCRs more useful:

“If I have lots of garbage in the system, it will be very hard to separate the signal from the noise. So if I could mandate that you had to enter certain fields before it's considered a submission, it would make my task much easier.”

—Craig Lewis

To continuously improve the TCR process, the Executive Steering Committee, OMI, and/or RiskFin proposed new policies and procedures and refinements to pre-existing ones, which were then instituted by SEC units in appropriate ways. For example, Enforcement was encouraged to consider the timeframe for TCR resolution.

“We did two things in Enforcement to ensure that TCRs were resolved in a timely manner. One, we issued a division policy that TCRs must be resolved within 30 days. That didn't exist before. People had understood it was important to resolve TCRs, but things sometimes were not handled in a timely manner. There was also a risk of TCRs falling through the cracks. Two, as part of our dashboard of manager metrics we added TCR reporting so there is visibility across the organization on who is resolving their TCRs.”

—Steve Cohen
Associate Director,
Division of Enforcement

Six months after Enforcement instituted the TCR resolution policy and accompanying management reporting, unresolved TCRs dropped from 3,500 to 1,200.

Conducting Exams

The SEC's second largest unit, the Office of Compliance Inspections and Examinations (OCIE), had a staff of 900 people responsible for examinations and oversight. OCIE deployed large teams to conduct periodic exams of public companies. The exams were intended to check whether organizations were compliant with federal securities laws, but there were no standards as to how an examiner should approach an exam:

“[The process of conducting an examination] passed from examiner to examiner through verbal discussions. There was always a lot of confusion as to ‘what's the next step?’”

—Emad Elsebaie
Assistant Regional Director,
Investment Management
Examination Program

At the conclusion of every exam an examiner sent a letter to the audited entity summarizing the findings and specifying any significant items that the SEC thought needed to be fixed.

The SEC had no standard template for these letters:

“There was no single standard form letter; 900 examiners potentially would use their own versions of form letters to registrants and store them in disparate locations. We now have one template for each form letter, and all letters/documents are stored in a central database with full text search capability.”

—Abu Khan,

Software Project Manager,
Office of Information Technology

The revised examination process was designed to walk examiners end to end through a standardized examination process – from scoping and preparation to evaluation and reporting. Software supporting the new process provided access to compliance policies and historical filings, and it automatically created deliverables based on fields that examiners completed along the way. More importantly, the software automatically completed some fields to help focus examiner attention on critical concerns:

“One of the steps [of an examination] is scoping out an exam. In the past, the examiners would go in and look at everything, and so the exams would take a long time to do. With the new process the risk areas for a particular kind of business have been specified. So at the start of the exam, the risk areas are automatically populated in the examiner’s worksheet, which helps examiners identify which areas are high risk and which are not. We wanted the priority to shift to high risk areas, so the system helps with that. In addition, we’ve continued to allow examiners to add new risk areas to capture risks that may not be covered by the standard auto-populated ones.”

—Emad Elsebaie

Unlike the top-down approach of the TCR business process redesign, the new examination process (later called TRENDS⁷) was bottom-up. The idea originated with a group of examiners and managers in the Chicago Office who took a grassroots approach to building a new way of conducting exams. This design effort dovetailed with strong national-level support for change, so participation quickly expanded to include selected staff from all the other regions and headquarters who were appointed to a TRENDS Point of Contact committee. The OCIE used a train-the-trainer approach to facilitate roll-out of TRENDS across hundreds of staff members.

TRENDS was similar to TCR in its use of a central repository and workflow support software. It also was built using the same hardware and software platform. TRENDS accelerated the exam process, focused the attention of examiners on high value activities, and enhanced the quality and accessibility of data:

“TRENDS is helping the National Exam Program become more uniform in the way it does its exams – and it’s helping to create a repository for all the documents that examiners collect. The system will record in an electronic web-based form everything from the exam’s purpose and scope to the exam’s findings to the data acquired from the exam.”

—Mary Schapiro,
Chairman

As of January 1, 2012, all OCIE examiners were using TRENDS to conduct exams better and faster. They stored electronically all the information they collected from the start of an exam, pre-exam work, pre-field work, field work at the registrant, post-work, closing the

⁷ TRENDS is the acronym for Tracking, Reporting, Examination, National Documentation system.

⁸ Remarks at the SIFMA C&L Conference, Miami, March 20, 2012

exam – everything OCIE had previously stored on paper was in a single database.

Technology Modernization

Schapiro's vision for the SEC assumed a strong technology base to support automated processes and shared data. The data requirements alone were tremendous. Schapiro knew that the SEC needed to continuously receive and/or retrieve data in a timely fashion and efficiently store massive amounts of data. The storage footprint of a future Enterprise Data Warehouse, for example, was projected to reach 2 Petabytes in the short-term. This data needed to be integrated and consumable by analysts. Experts had to quickly leverage and act on insights. In the past, moving from data to insight to action may have taken weeks, months, or even years to accomplish. In worst case scenarios, it may have been technically impossible to connect the appropriate dots because of limitations stemming from the SEC's technology infrastructure.

Schapiro hired Thomas Bayer to develop the necessary IT capabilities. Bayer had spent the previous decades working in IT leadership positions within private sector companies, including three large financial services organizations. Bayer had deep expertise in leading-edge technologies and IT practices, and he viewed the SEC's IT capabilities as highly problematic.

"When I got there, the technology organization was a mess. It had been failing for about 15 years under a succession of CIOs and interim appointments. Morale was low, and we ranked 37th out of 37 government agencies in innovation. Metrics were abysmal, service levels were horrible, and at times just maintaining the status quo consumed nearly all of the tech budget."

—Thomas Bayer,
Chief Information Officer

Bayer noted that Schapiro had laid out clear expectations for the role of IT:

"Mary had spent years at FINRA⁹ and NASD creating a central data warehouse for the intake of data, manipulation of data, and building of market analytics... The grand plan was to create market analytics, have surveillance capabilities, fraud detection, and leverage our key expertise across the agency."

—Thomas Bayer

To deliver on those expectations, the SEC needed funding from Congress to revamp the SEC's technical infrastructure:

"We had to stick to our internal knitting first. I focused on re-establishing the SEC's core technology foundations – and initially spent much of my time communicating the needs of the IT organization to stakeholders to make sure the Chairman's vision was achieved."

—Thomas Bayer

The IT unit had been building and maintaining homegrown systems, but Bayer encouraged his staff to implement best-of-breed, off-the-shelf solutions. He then led efforts to virtualize the infrastructure, significantly reducing the data center footprint. In the process, he shifted the workforce strategy and crafted IT into a primarily outsourced unit, with 180 employees and 500 specialized contractors.

Once basic IT operations were stabilized, the IT unit set to work building systems to support core SEC business processes. Anxious to accelerate the implementation of new processes, the IT unit increasingly relied on agile development techniques to onboard new capabilities. As an example, Software Project

⁹ FINRA is the largest independent regulator for all securities firms doing business in the United States. The SEC and FINRA often shared data for their independent, but not unrelated, purposes.

Manager Abu Khan, described the development of the application for the TRENDS process:

“I would sit down with the examiners and go over what they wanted, and I would produce a working prototype within a couple of weeks - a little piece of the real system. Every couple of weeks or so, I would produce something. They would review it and give us feedback. It was real-time systems development.”

—Abu Khan,
Software Project Manager
Office of Information Technology

Bayer assigned Division Information Officers to major SEC units to help drive acceptance of technology in the business units while helping the IT unit better understand business unit needs. The Division Information Officers not only ensured that the proper IT was put in place, but they often took charge of business process transformation:

“Why did IT drive the [process transformation] effort? Because our colleagues felt like we were the best suited from a process perspective. These are lawyers and accountants, who are not familiar with business process like those of us from IT.”

—Thomas Bayer
Chief Information Officer

Although Divisional Information Officers initially pushed technology out to business people, they found that, over time, individuals throughout the SEC proactively applied technology to redesign or enhance business processes. Regional Director David Bergers explains the change he witnessed in enforcement work at the Boston Office.

“The change we have seen over the past several years has been dramatic. This change has resulted from using technology differently and using it to a far greater extent than we did

before. In the past, it would have taken us weeks or months to analyze data. This change carries across a number of [Enforcement] areas - the actual conduct of investigations, the management of documents obtained in investigations, and tracking investigations and their progress – what’s happening and how it’s happening.”

—David Bergers,
Regional Director
Boston Office

Institutionalizing Change

As the TCR and TRENDS initiatives were being launched and technology foundations were being established, there was a general recognition across the SEC that the agency was fundamentally transforming:

“[Process redesign] did not happen in a vacuum. TRENDS was one more thing [in a broader context of massive change]. If people weren’t getting the message that we had to back up and rethink and be open to going in new directions, then they were not paying attention.”

—Merri Jo Gillette,
Regional Director
Chicago Office

A variety of new organizational structures facilitated agency-wide collaboration and transparency – and helped institutionalize the changes. Some structures were temporary, such as the TCR Executive Steering Committee and the TRENDS Point of Contact Committee. These were put in place as needed to establish temporary but important communication and decision rights.

Over time, more formal and lasting structures were established. In some cases, entirely new units within the SEC were created, such as Risk Fin and the Office of Market Intelligence – both of which enabled cross-functional coordination. They also housed emerging SEC capabilities, such as analytics and risk-based management.

“Our recently-created Division of Risk, Strategy and Financial Innovation (RiskFin) is working both with the Office of Compliance Investigation and Examination and the Enforcement Division to build data-driven models that help us efficiently target examinations and investigations.”¹⁰

—Mary Schapiro
Chairman

Leaders created roles to nurture the development of specialized expertise and to allow individuals to focus on activities that leveraged their particular talents. In particular, a new leadership role called the Managing Executive, which was, in effect, a chief operating officer role, helped drive internal operational efficiencies. Adam Storch, managing executive in Enforcement noted that the managing executive role allowed people to focus on their jobs:

“What we try to do is let Enforcement staff focus on doing the investigative work and provide them the services and support they need to be most effective. We don't want an attorney spending a significant amount of time trying to figure out contracting and procurement.”

—Adam Storch
Managing Executive of the Division of Enforcement

Managing Executives also worked to institutionalize the changes that were happening within their units:

“Change management is huge. It is constant communication and using quite a bit of managerial resources to make sure we all stay focused on what we're trying to achieve. I spend a lot of time on that.” —Robert Fishman
Managing Executive of the Office of Compliance and Examinations

The Enforcement Division set up specialized units that could work with staff in any region on cases that required unique expertise. This allowed Enforcement to hire specialists:

“One thing we brought to the division that we never had before was industry experts. These are people who were actually working on Wall Street or working in a hedge fund or working creating municipal securities. We brought them in and added them to the specialized units. Beyond the attorneys that are running investigations, we have people who have kind of been there, done that, seen it firsthand who provide significant contributions and strengthen our investigations.”

—Adam Storch,

The Head of Enforcement, Robert Khuzami, noted that the establishment of specialized units allowed the SEC to recruit more unique expertise. Instead of staffing a team of generalist lawyers, Enforcement could hire an equity derivatives trader as a member of a specialized unit focused on market abuse cases. Regardless of the office where he was located, this person would regularly work with the SEC's Trading and Market Division. This kind of regular cross-division interaction built bridges among related subject matter experts located in different parts of the SEC:

“The Asset Management [specialized] Unit, which covers investment advisors and private equity funds and investment companies, now is closely aligned with the Investment Management Division, which is another division of the SEC. While subject matter coordination existed in the past, we have maximized those efforts by creating distinct, specialized units that can more easily coordinate efforts across the Agency.”

—Robert Khuzami,
Director of the Division of Enforcement

¹⁰ Remarks at the SIFMA C&L Conference, Miami, March 20, 2012

Enforcement's Managing Executive Adam Storch noted that these specialized units "allow us to bring a greater number of complex cases. It's quite empowering."

Working towards Working Smarter

By 2012, the SEC was using digital information to fundamentally change how people worked. In addition to process changes introduced by TCR and TRENDS, the SEC was applying technology to improve investigations of potential wrongdoing.

For example, Sofia Hussain, Senior Forensic Accountant, introduced a new visualization tool within the Boston Office to support fraud analysis of market data (see Appendix 1). This tool could be used for many purposes; one was converting spreadsheet data of buyers and sellers into a picture showing all the trades initiated from specific computers and the people who used those computers:

"That picture showed us that there were often times when that one computer was being used by two different people to make the same trade. It was the same evidence we had before, but being able to see it in a different format allowed it to be understood by a wider audience."

—Sofia Hussain
Senior Forensic Accountant

The visualization tool offered significant benefit to the Enforcement Division's insider trading investigations.

"Historically, we were alerted to potential insider trading cases by the NY Stock Exchange or FINRA and others. They track trading and, if a stock moves more than 20% beyond its baseline, it gets kicked out of the system as an exception. They do a little bit of work, and then shoot it over to us [if it] looks suspicious. With this much more holistic approach—by looking at all the trading for an issuer—you can decide who looks like they're trading in

tandem and you can better establish patterns and relationships." —Robert Khuzami

Innovative uses of technology were encouraged and supported by top management – and then communicated and promoted as agency best practices.

"We have held monthly staff meetings where Sofia and others have talked about their success stories... technologies utilized, time saved, and results obtained. Other staff members have in turn begun to incorporate these new tools into their investigative approaches."

—David Bergers
Regional Director
Boston Office

Sophisticated analytics also were being employed. The SEC brought actions against four hedge fund advisors identified through an analytical approach called aberrational performance analysis. The aberrational performance initiative allowed the SEC to find anomalies in hedge fund returns that indicated potential Ponzi schemes (see Appendix 2).

As the SEC applied more sophisticated tools for analyzing data, it developed a growing appetite for data. In July 2012, the SEC contracted for a system that collected order, quote and trade data from all 13 US stock exchanges and the Options Price Reporting Authority. This would give the SEC access to data as quickly and reliably as sophisticated market participants. Analysts from Trading and Markets, RiskFin, and the OCIE all intended to use this data to help identify potential market abuses. A longer term objective was a project called Consolidated Audit Trail that would allow regulators to monitor an order's life cycle, including information circulated before an order was placed or cancelled. Investigators felt this additional information would provide insights into—and evidence of—market abuses.

The SEC was constantly enhancing its capabilities for using its growing pool of data. For example, RiskFin's Office of Quantitative

Research was working with IT to develop an Accounting Quality Model that established rules for automatically detecting anomalies in business financial reports. The Accounting Quality Model would use internally and externally available information to develop risk profiles for each filer. These risk profiles would allow the SEC to more effectively allocate investigative resources to the highest risk cases. Similar models could help allocate examination resources.

There were tactical challenges to address before the SEC could fully take advantage of its data. In order to integrate data collected from outside sources with TCR, TRENDS and other internal data, the SEC needed to determine unique identifiers for key data items, such as a company, broker, or specific trade:

“There is no universal identifier to link data together. So we get data in from a registrant or a firm, and it has identifier tags on it. If we get data in from a third party like Bloomberg, they don’t have those data tags on it. If we get a tip or complaint about a firm, that’s just someone writing in a word document. This requires somebody to go into different systems and know the connections and make those connections.” —Robert Fishman
Managing Executive of the Office of Compliance and Examinations

Working smarter meant much more than the adoption information-based tools and techniques. The SEC was attempting to use data to focus resources on the most meaningful pursuits and complete their work as efficiently and effectively as possible:

“It isn’t just with one piece of software here or another piece there. The Enforcement Division overall thinks from a broader perspective, and staff think about not just what tools they need but what work they have. And, what they need to do that work more

efficiently. They ask, ‘What would I like to get from this information?’ and ‘If I can’t get the answer with what is available, then how do I get a tool that will allow me to do it?’”

—Sofia Hussain

Senior Forensic Accountant

But it was not always easy to get people with entrenched habits to use the data in new ways:

“These tools represent new ways of working that are not yet in everyone’s comfort zone. To take full advantage of these tools we may need to change our approach, staffing and working relationships. At a number of different levels this creates challenges as well as opportunities for creativity, which will take some time for people to get their heads around.” —Harvey Westbrook

Assistant Director,
Office of Quantitative Research
Division of Risk, Strategy and
Financial Innovation

The SEC partly addressed this challenge by recruiting people with a wider range of skills. Traditionally, the SEC was staffed primarily with lawyers, but the opportunities presented by data analytics led to the hiring of financial analysts and quantitative experts. RiskFin had a team of Ph.D. economists culling the growing pool of market data. Regardless of profession, SEC leaders felt that better tools, data, and processes were helping staff achieve the agency’s mission. In a 2012 internal employee awards ceremony, many of the awards recognized employees who were using technology skills to work smarter.

Matching the right people with the right data, analytical models, and business processes was an ongoing effort. But early successes and visible progress in achieving Schapiro’s vision for a more effective SEC was giving staff confidence that the agency would identify the next Madoff-type scheme much faster—and perhaps avert scandal altogether:

*“We are better at identifying wrongdoing that is difficult to detect, including that which involves complex products, transactions and markets. And because we have more business insight, we are able to move faster and more efficiently than we were able to in the past. But the real Holy Grail in enforcement is to identify wrongdoing as early as possible, hopefully before more investors have been victimized, the money’s been lost and the perpetrators have covered their tracks or slipped away altogether. The result is that we might bring fewer “headline” cases because we stop the fraud before it metastasizes, but that is the truest definition of success in the enforcement effort.” —Robert Khuzami
Director of the Division of Enforcement*

Figure 1: U. S. Securities and Exchange Commission Organizational Chart¹¹

SEC Divisions
Corporate Finance
Enforcement
Investment Management
Risk, Strategy, and Financial Innovation
Trading and Markets
SEC Offices
Office of Acquisitions
Office of Administrative Law Judges
Office of the Chief Accountant
Office of the Chief Operating Officer
Office of Compliance Inspections and Examinations
Office of Credit Ratings
Office of Equal Employment Opportunity (EEO)
Office of the Ethics Counsel
Office of Financial Management
Office of the General Counsel
Office of Human Resources
Office of Information Technology
Office of Inspector General
Office of Interactive Disclosure
Office of International Affairs
Office of Investor Education and Advocacy
Office of Legislative and Intergovernmental Affairs
Office of Public Affairs
Office of the Secretary
Office of Support Operations
Office of Minority and Women Inclusion
Regional Offices reporting to both Division of Enforcement and Office of Compliance Inspections and Examinations
New York Regional Office
Boston Regional Office
Philadelphia Regional Office
Atlanta Regional Office
Miami Regional Office
Chicago Regional Office
Fort Worth Regional Office
Denver Regional Office
Salt Lake City Regional Office
Los Angeles Regional Office
San Francisco Regional Office

¹¹ <http://www.sec.gov/about/orgtext.htm>

Appendix 1: Using Visual Data Analysis as an Investigative Tool

Note that the following example does not contain real data.

The mock data used to create the following graphics consists of over 30,000 phone calls for six different individuals and entities. With the goal of identifying calls between individuals and entities key to the sample investigation, an Excel spreadsheet of the calls was imported into a visual data analysis tool. Figure 1A shows the results of the import of the mock data, with a bottom left portion of the graphic contained in a box. Figure 1B enlarges this portion. This enlargement shows the connections between three of the individuals within the mock data. Figure 1C shows the result of eliminating the majority of the calls by filtering for all of the instances where one phone number communicated with more than one other phone number within the data.

Figure 1A:

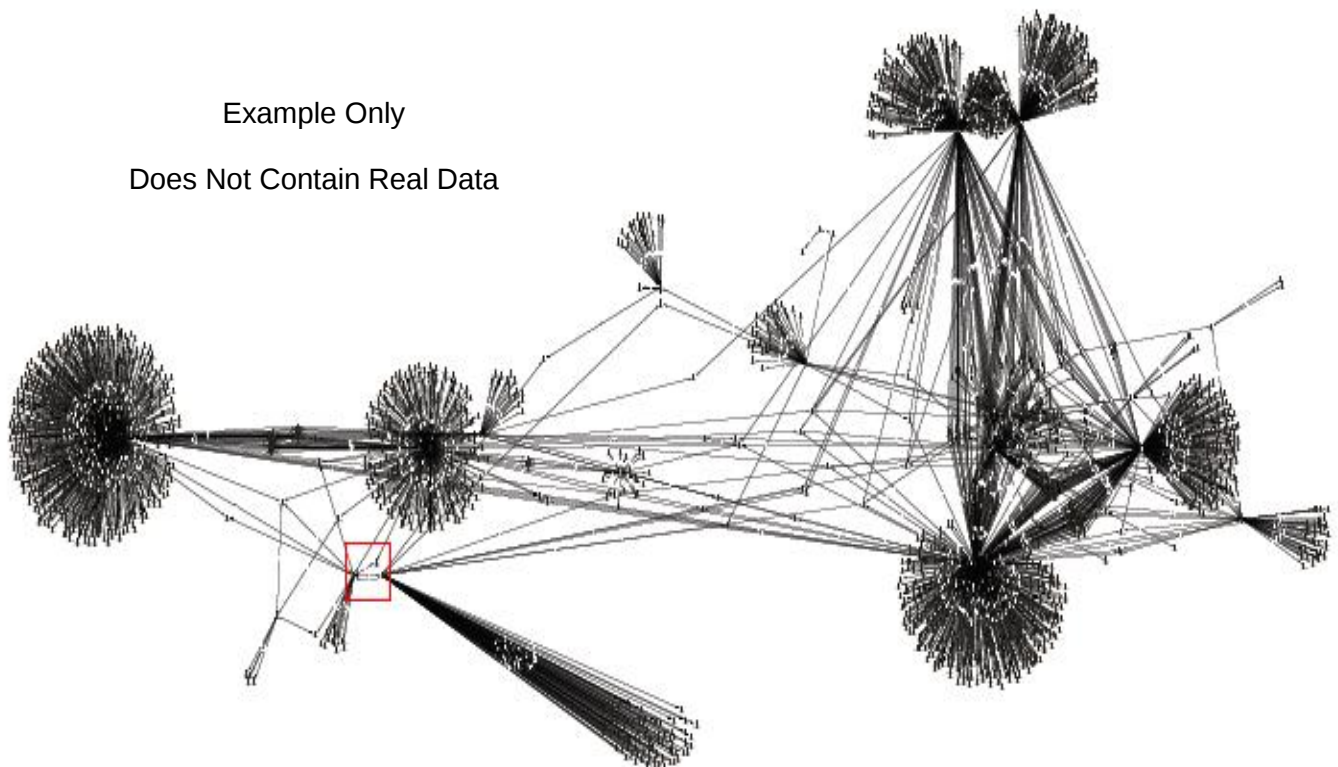


Figure 1B:

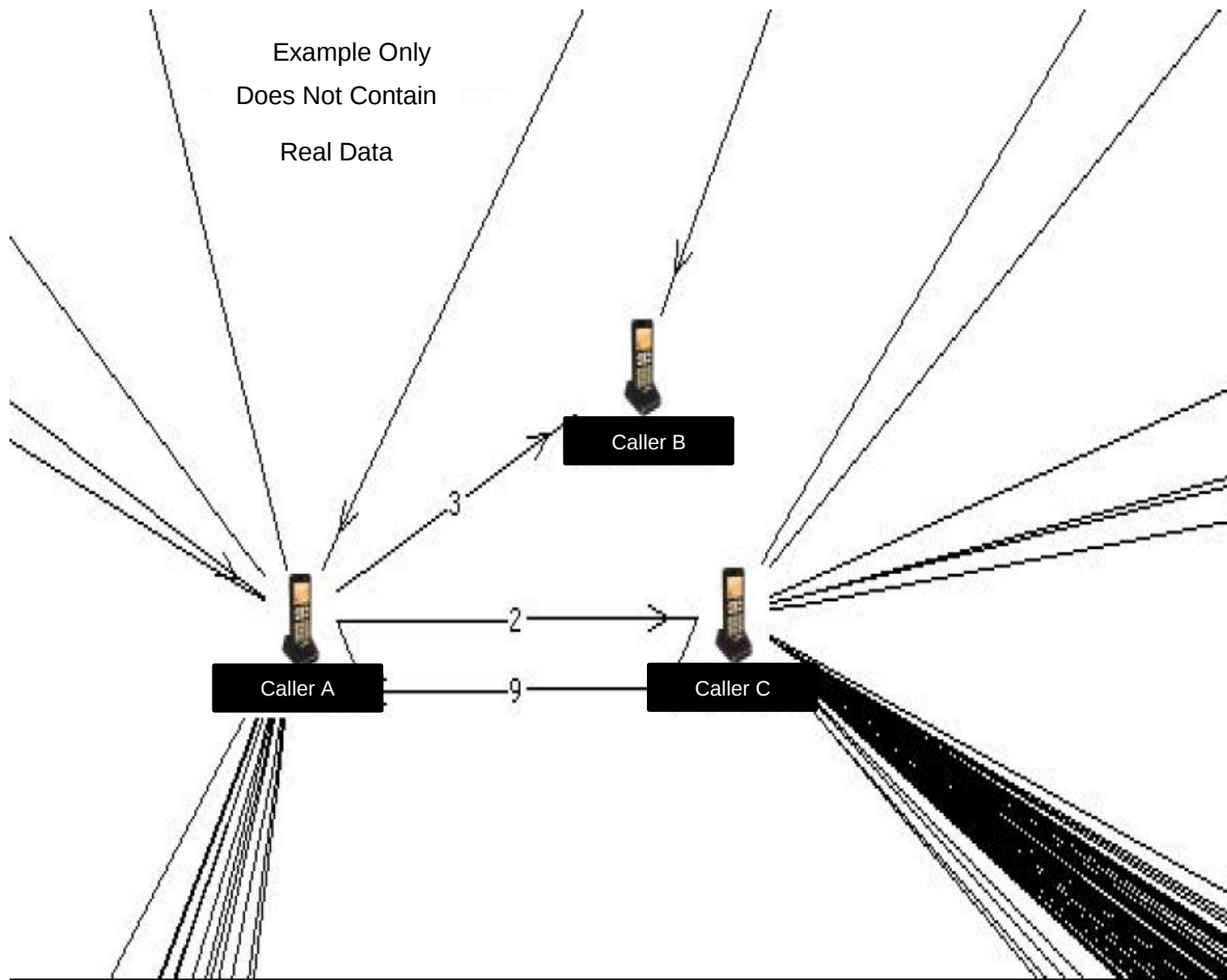
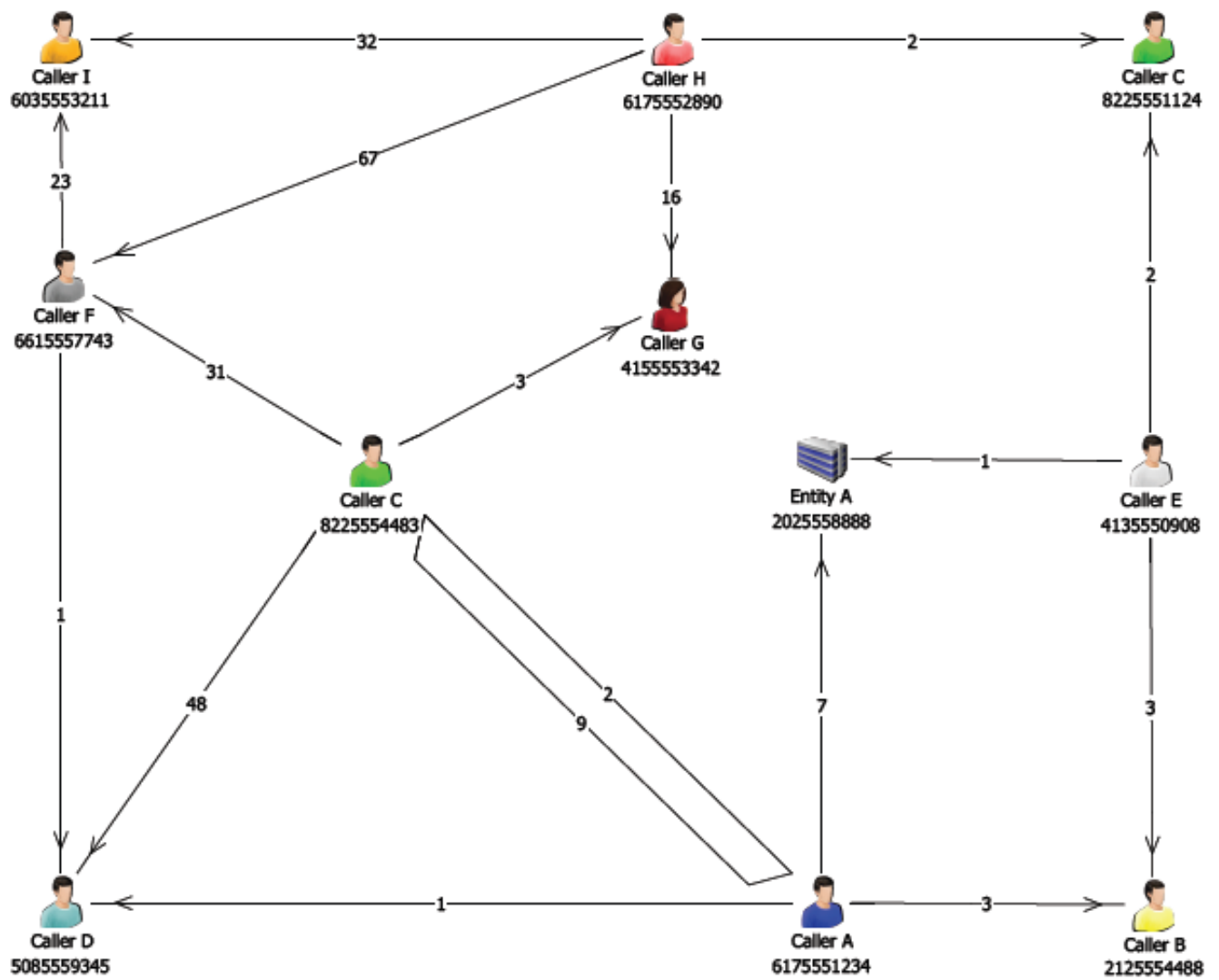


Figure 1C:

Example Only

Does Not Contain Real Data



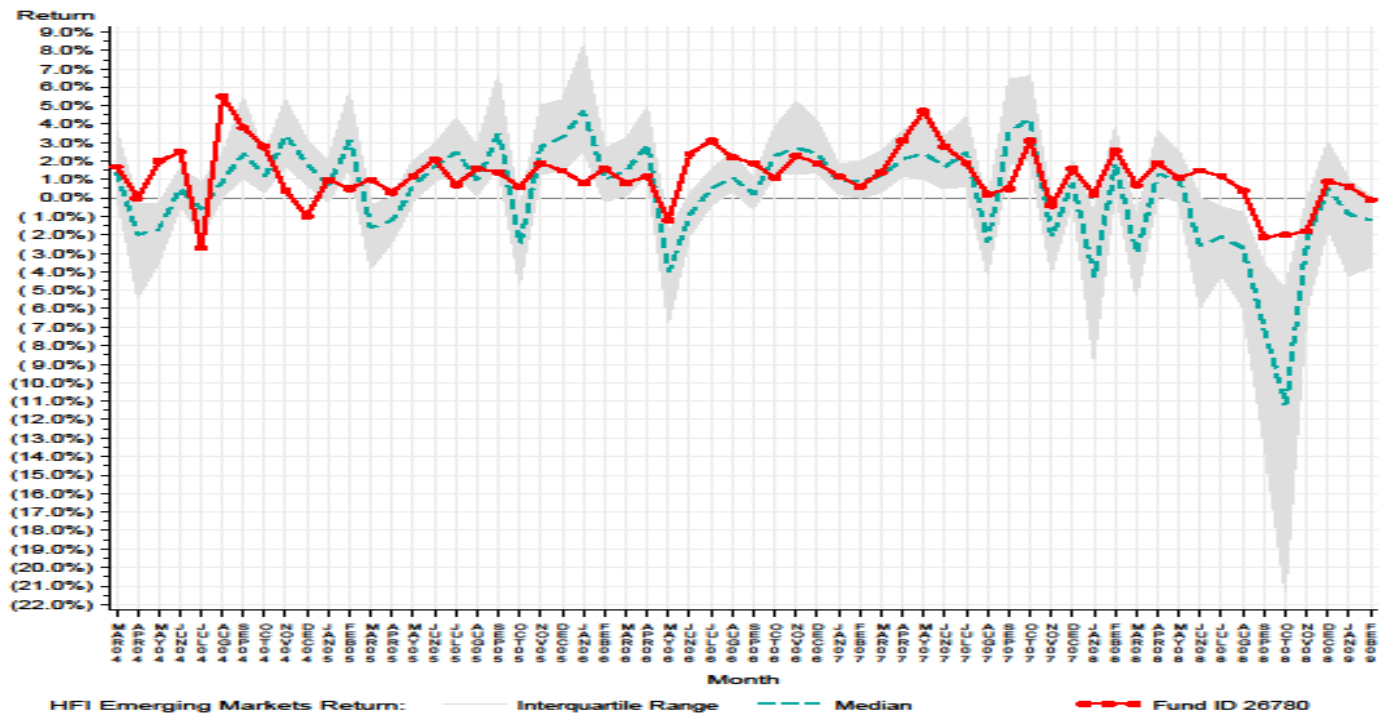
Appendix 2: Aberrational Performance Analysis

The SEC had to solve the following business problem: How do we harness available performance data to identify hedge funds for further inquiry? The agency decided to use proprietary analytics to identify outliers based on inconsistencies in the data.

Hedge fund performance data is reported to commercial data vendors for marketing purposes, but data often are incomplete. Thus, RiskFin developed a proprietary model to analytically categorize and rank hedge funds. Every month, the model estimates risk metrics for over 45,000 fund observations across 8 data vendors, and results are delivered via graphical, user-friendly reports. The reports are used to gather and verify information regarding particular funds or advisers, and the reports generate new leads for referral to Enforcement and OCIE.

The formal program, called Aberrational Performance Inquiry, launched in June 2009 and prompted six enforcement actions by 2012, with more anticipated. It generated referrals throughout regions and to other regulators and identified a wide variety of fraudulent conduct. Figures 2A and 2B show how a particular firm's aberrational performance is identified – its performance falls outside of the expected performance as compared to funds in its peer group.

Figure 2. Monthly Returns Over Time (HFI Peer Group vs. Fund ID 26780)



The Reality: Actual vs. Reported Returns

