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Data Analytics and Financial Compliance: How Technology Is Changing Audit and Business Systems

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Michael P. Cangemi, author and business adviser

William M. Sinnett, COO, Research | FERF
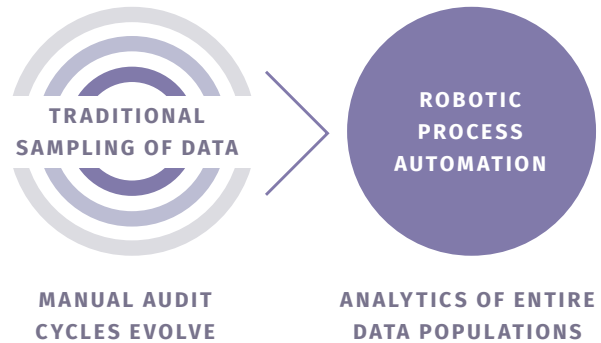
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Executive summary

Financial executives have witnessed a dramatic rise in compliance-related expenses given regulations related to maintaining systems of internal control and the cost of internal and external audits. Members of FEI's Committee on Finance & IT (CFIT) and Committee on Governance, Risk and Compliance (CGRC) believe the use of analytics has the potential to help management, and internal and external audit, improve systems and conduct more effective and efficient audits.

As noted in FERF's 2014 Audit Fee Survey, the top reasons for the increase in audit fees in 2013 for public companies were the review of manual controls resulting from Public Company Accounting Oversight Board (PCAOB) inspections (40 percent) and other PCAOB issues (46 percent). In the 2015 report, review of manual controls and other PCAOB issues dropped to second place, garnering 39 percent of total responses (second to acquisitions at 46 percent).

As a result of PCAOB inspections, external auditors are challenged to provide consistently high-quality audits that meet the board's requirements and pass inspections. At the same time, as reported in the Wall Street Journal (March 8, 2016), audit firms "are enlisting cutting-edge technology to help them review their clients' finances."

Advances in technology, specifically the use of automated analytics, provide opportunities to improve the approach to internal control monitoring and audit verification. One of the significant trends enabled by technology is replacing sampling with automated reviews of entire populations of data. Auditing standards and processes, many written before today's technologies were invented, will have to evolve.

TRADITIONAL SAMPLING OF DATA

ROBOTIC PROCESS AUTOMATION

MANUAL AUDIT CYCLES EVOLVE

ANALYTICS OF ENTIRE DATA POPULATIONS

Another trend is the use of automated monitoring built into companies' operating structures and core internal control systems. As this research report will show, these trends are being promoted by forward-thinking internal and external audit teams that focus not only on controls, but also on business process improvement, providing a more meaningful and cost-justified assurance product.

Ineffective internal controls can result in higher audit fees. The 2015 Audit Fee Survey found 20.6 percent (or 1,460) of SEC filers reported ineffective Internal Control over Financial Reporting (ICFR). The median change for audit fees of companies that disclosed ineffective ICFR was 6.4 percent, which was three percentage points more than the overall median change in audit fees of 3.4 percent, and 4.6 percentage points more than the U.S. Average Producer Price Index for Services of 1.8 percent.

"While it may be a common perception that audit firms want to bill as many hours as possible, we find that most auditors want to work efficiently with their clients. Regardless of regulatory requirements, business structure changes, inflation in the current business environment or other factors that can drive up audit fees, many companies are finding ways to work with their auditors to mitigate fee increases."

MITIGATING INCREASES IN AUDIT FEES, FERF (2016)

The data analytics technology available today permits auditors to look at entire data sets, rather than manually reviewing statistical samples, so external auditors and internal auditors are both using technology to increase audit quality, work smarter and potentially reduce costs. Technology can be used to analyze the population and identify potential exceptions, anomalies and outliers, rather than just those found within a sample. An important question for the regulators and the audit profession is how this might affect the auditor's opinion.

To find out how auditors are using technology, external auditors and internal auditors, as well as technology solution providers, were interviewed for this report. Here are some of the key findings:

Understanding data analytics software solutions

ANALYTICS SOFTWARE VENDORS' VIEWS ON THE USE OF ANALYTICS

- Data analytics solutions provide the means to replace traditional sampling techniques with reviews of entire data populations. The identified potential exceptions and outliers can then be evaluated.

- "Close the loop." Find the problem, and make a sustainable change in the internal control environment to prevent that problem from happening again.

- To manage a process, look at what the outputs are, measure them, appraise them, and make corrections or improvements.

- The analytic output is not the end of the story. The individual consuming these insights needs to respond to them.

- The role of analytics is to pursue the type of issues for which you can't create preventative controls efficiently.

- For regulatory compliance, examine every single transaction, customer and vendor.

- The goal of analytics should be to minimize problems, rather than detecting more.

- Monitoring should be done by the business, as well as by internal audit.

- Analytics software customers want a sustainable improvement in the internal control environment.

- Analytics software customers look for hard-dollar recovered savings. A reduction in duplicate payments or expenses is one metric of success.

- Score-carding can influence behavior by sending people meaningful grades of how they're behaving, with suggestions on how they can improve their grade.

Use of analytics by internal auditors

GOALS

- Audit quality is the primary goal of internal auditors.

- A second goal is to effectively analyze large data samples.

- A third goal is efficiency.

- Detection of duplicate payments is easy with analytics, and can pay for the software.

- Analytics can be used to identify potential business risks, such as fraudulent payments and payroll fraud.

- Some internal auditors choose to partner with the business by providing business insights, rather than just auditing.

THE STAFFING CHALLENGE

- Internal audit needs people who:

  - Know how to audit.

  - Understand work processes.

  - Have expertise in technology or an interest in learning to use new software solutions.

- Staff are best trained in analytics with hands-on experience and workshops. Experienced staff should be encouraged to lead workshops.

THE OPTIMAL INTERNAL AUDIT ANALYTICS PROGRAM

- Identify outliers with analytics technology.

- Follow-up on outliers with interviews.

- Ask the right questions:

  - What are the risks?

  - What are the control objectives to mitigate the risks?

  - What do you need to pull and analyze?

- After the audit, schedule a debrief session:

  - What went well?

  - What can we do better?

  - How can we reduce false positives?

  - How can we improve the process?

Use of analytics by external auditors

GOALS

- Audit quality is the primary goal.

- A secondary goal is to deliver more relevant business insights to clients.

- A third goal is efficiency.

CHALLENGES

- It's a competitive environment, and audit firms need to differentiate themselves. Technology and innovation are key differentiators, but audit firms need to have the right talent.

- There is a talent shortage related to audit technologies, so audit firms need to find new ways to attract, and, more importantly, retain, talented professionals.

- Audit firms need to train a different type of auditor, which will require different skills. They need to cultivate an analytical mindset in their audit teams, including competencies around data capture and analytics delivery.

OBSTACLES

- The biggest obstacle is data — how you access data and process it to get an efficient answer. Staff needs to be fully trained on the available technology.

- The AICPA's Audit Data Standard (ADS) project (see appendix) seeks to develop standardized data models that will facilitate the use of enhanced analytics.

- Other obstacles around data capture are whether the CFO will approve the extraction of the data by the external auditor and IT's willingness to support the extraction activity.

- Another obstacle is developing an understanding of the client's business and systems.

THE FUTURE OF ANALYTICS IN AUDIT

- Portions of audits of the future are going to look very different.

- Machine learning and artificial intelligence will help reduce manual audit cycles and free up auditors' time for more meaningful analysis.

- Robotic Process Automation (RPA) may be used for routine audit work.

- External auditors will provide benchmarking services and other business insights, in addition to the traditional audit.

Section 1

Understanding data analytics software solutions

Three of the many data analytics software solutions available today include ACL, CaseWare IDEA and Oversight Systems' Insights on Demand (IOD). ACL and IDEA work in a desktop environment and Oversight's IOD is a SaaS cloud-based offering. We interviewed key officers at each.

Dan Zitting, chief product officer at ACL, explains that analytical engines pull large amounts of data, normalize it, and answer questions. The user can use the engine to look for anomalies, such as duplicate payments, or to ask specific questions. Thus, auditors can use data analytics to look at an entire data set, rather than manually reviewing a statistical sample.

"What we do is make it easier and easier," says Zitting, "with fewer steps involved, and allow audit, finance and compliance professionals to be able to point these tools at any of the data sources in their organization, from traditional systems like ERP systems, to third-party data feeds to operational systems in the business. And then beyond that, you can explore that data and automate it so that it happens automatically in the future. You can move towards a continuous auditing and monitoring approach that drastically reduces the time and cost of being able to look after these risks, and look after these controls, by monitoring the data in real time as opposed to going back manually and retroactively shifting through all of this on a reactive basis."

For example, a key control for compliance with Section 404 of the Sarbanes-Oxley Act is to require all journal entries to be posted and approved by different people. In the past, the external auditor would manually check the signatures on a small sample of journal entries. With analytics, software can check the electronic signatures on every journal entry automatically, and flag any entry that does not have two different signatures. This process allows the external auditor to work more efficiently. But even before the annual audit, the internal auditor can use analytics to continuously monitor all journal entries during the year, to find problem entries before they are discovered by the external auditor.

> Rather than spending time identifying problem journal entries, or exceptions in any data set, auditors can flag and compile all problems and exceptions to be reviewed by the appropriate business process owner.

The auditor, whether internal or external, is thus freed up to spend more time on risk assessment and other higher value work.

Zitting believes that eventually, 80 percent of work involved with Sarbanes-Oxley compliance can be automated with analytics.

Officers at CaseWare and Oversight described the closed-loop function of analytics solutions.

"At Oversight," explains Patrick Taylor, president and CEO, "we apply analytics to business processes as a closed-loop control, which is a technique used heavily in the engineering world. If you really want to manage a process, you need to independently look at what the outputs are, measure those, appraise those, and take that feedback into the process to make any kind of corrections or improvements. That closed loop, that feedback loop control, is critical.

"Our system is based on an artificial intelligence technique called evidential reasoning. For many analytical problems, you're dealing with the gray. So there isn't one black-and-white query that you could run that will find an answer. Instead you have to think like a detective does. You have to look for pieces of evidence, for different clues, and some of that evidence will carry a lot of weight, some will carry a little bit of weight, and some pieces of evidence may actually reduce the confidence you have that you found something. That's what our core analytical approach is based on.

"If it's something that's really straightforward and a black-and-white issue, you probably should be able to construct a preventative control in your application to stop that from happening at all. So the role of analytics is to pursue the type of issues for which you can't efficiently create preventative controls. Depending on what piece of evidence we're going after, we have used a wide range of different analytical techniques. Certainly some of it is your basic Boolean logic, but we make heavy use of statistics and statistical baselines. So for Foreign Corrupt Practices Act issues, to pick a compliance example, it is okay to entertain a politically exposed

person, but it has to be in a way that is normal and customary for the specific environment. So with a rich statistical baseline, we can determine that there is a pattern of entertaining this political official in a way that's more extravagant than is normal in that particular city, state or country."

"The most impressive thing that we're doing with analytics is closing the loop," adds Andrew Simpson, COO of CaseWare Analytics.

It's one thing to find a problem, but it's a whole different thing to put in a sustainable change in your internal control environment to prevent that problem from happening again.

"There are tools that will tell you what is wrong and what is going to be wrong, but unless you create a culture of compliance driven by understanding what went wrong and the associated root cause, then you are going to be right back where you started. Our enterprise technologies focus on staying ahead of control breakdowns and compliance requirements."

Data analytics will detect and identify anomalies, but analytic output is not the end of the story. The individuals consuming these insights need to respond to them. The software will identify potential issues, including false positives, so human judgment and follow-up are required.

"First, you need to prioritize them," advises Taylor. "You have a finite amount of capacity to deal with issues in a given month. So you need to prioritize those issues and address the most important and highest-risk issues first. That process of investigating and remediating becomes its own work flow."

Taylor then provides a travel expense example. "Many people reviewing travel expenses will randomly sample 20 percent of expense reports and manually inspect those. But we find that 10 percent of travelers cause virtually all the high-risk issues. Put another way, 90 percent of the people stick to the straight and narrow. So in that random sample of 20 percent, most of what you're going to see is okay.

"So most of the time, you're wasting your time looking at that 20 percent. But there's a second problem with that. Inherently, you end up with a positive confirmation bias. If most of what you look at is okay, you expect everything to be okay, and so it's easy to miss problems. And there's a third issue with the random sample approach. It's hard to see a pattern that emerges over weeks or months.

You tend to get embedded in expense reports and you can't remember what this particular employee did last month or the pattern of their activity over the past 90 days. Keep in mind that the real evildoers are trying to hide what they're doing. They're going to try to make it hard for you to find them. And so it's important to see that pattern."

"So if this system is actually providing you with any real value," says Simpson of CaseWare, "then it's not just detecting, but it is engaging the business in improving the overall operations that will meet, or the internal control environment, so that you have less and less occurrences and smaller and smaller instances of these things happening. That is what the indicators are supposed to be doing. So if you're using a baseline to start with, then you should be looking at your charts. They should be showing you a decline over a period of time, or a relative improvement in internal control. Those are the type of KPIs that we're looking at when it comes to fraud detection and prevention."

Section 2

Use of analytics by internal auditors

GOALS

The use of technology in the internal audit process continues to grow, but there is room for improvement. A survey of members of the Institute of Internal Auditors (IIA) found the use of software tools for data mining increased by 14 percent among survey respondents from 2006 to 2015. However, fewer than 4 out of 10 chief audit executives (CAEs) worldwide feel their department's use of technology is appropriate or better.[1]

Cangemi asks whether the progress has been enough to keep pace with the expansion of technology. Is the use of IT in internal audit sufficient, or should IA be making expanded use of technology more of a priority? As the report notes: "Responses clearly show that extensive use of technology is the exception, not the rule. For about half of all respondents globally, usage of most technology tools is 'none' or 'minimal'.

Participants interviewed for this report appear to be on the leading edge of internal audit's use of technology to improve performance and efficiency, as well as to enhance business operations.

"On the other hand, if we look at the trends and progress since the 2006 survey there is clearly good growth."[2]

Another survey of internal auditors found that internal auditors continue to focus on improving how the function deploys technology-enabled auditing — statistical analysis tools, in particular — to gain more accurate insights concerning business risks, processes and controls.[3]

Hank Roberts, director of Internal Audit for Shaw Industries Group Inc., a Berkshire Hathaway company, describes the various uses for analytics by internal audit. "We use the Oversight application in four primary areas. We use it in our Purchase-to-Pay area, our T&E, our P-Card, and we just launched it in our FCPA compliance area. We also use ACL software on an ad hoc basis, as needed for specific audits. But for continuous monitoring, we use Oversight for those four areas.

"We started with Purchase-to-Pay in 2007, because we realized that as an audit function, it was very difficult for us to keep up with the volume that we had and the activity that we had. After a few audits, we realized that we had some risk with duplicate payments, duplicate vouchers and duplicate vendors. But we realized that we still needed to do more of a continuous audit because it was somewhat difficult to get the data. And once you got the volumes and volumes of data, you had to make the data usable and to put it in a decent format for us to use it in ACL. It was a cumbersome process to say the least. And so we realized we needed something from a continuous auditing standpoint."

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1   Cangemi, Michael. Staying a Step Ahead: Internal Audit's Use of Technology, IIA Research Foundation, August 2015

2   EDPACS M.P. Cangemi, "Views on Internal Audit, Internal Controls and Internal Audit's Use of Technology," January 2016, Vol.53, No.1

3   Arriving at Internal Audit's Tipping Point Amid Business Transformation, Protiviti, 2016

In this case, using an external software like Oversight IOD, with focused analytics, as well as industry data for benchmarking, solved some of their challenges including acquiring and formatting data and learning to write analytics scripts. Ultimately, this analytics process becomes part of the company's system of internal controls and internal audit is seen as delivering value to the business.

> "The original catalyst from an internal audit perspective was that analytics allows us to be much more efficient in our work."

"But more importantly, we're also more effective with the work that we do," reports Brett Malloy, IT audit manager for Campbell Soup Company. "What I mean by that is we collect so much data here at Campbell, and the data resides in disparate systems. Management doesn't necessarily look at the data across the systems. We've been able to do that and share some impactful insights with the business. I think that has allowed us to be viewed as more of a partner to the business, as opposed to just an auditor who comes in and tells them what they're doing wrong. So, we've been able to build relationships through the analytic work that we've done.

"I was doing an audit and working with some people in our supply chain function. We were looking at inventory and materials management out of SAP. The person I was working with questioned how we were able to run analytics over such large data sets. So just through that conversation, it led us down the path of talking about Smart Exporter and how we're able to connect directly to the production database of SAP and analyze the large data sets in IDEA.

So just being able to do things like that allows us to have conversations with the business, not through an audit but more like a partnership, and helping them build their analytic capabilities helps build Audit's reputation."

One of the earliest, as well as simplest, uses of analytics is for the detection of duplicate payments. "I did an audit last year to look for duplicate payments to some of our vendors," says Malloy. "We pay a third-party company on a contingency basis to do the same. We give them 5 percent of whatever duplicate payments they're able to identify and recover. They did an audit and found duplicate payments. I did an audit a couple of months later and identified $70,000 of duplicate payments that they didn't catch. It's relatively small, but that work was done over a period of one month. So the logic that I used in that analysis is now being used by our AP function so they can independently search for duplicate payments."

Duplicate payments can result from simple errors, but they may also provide evidence of potential fraud. "If someone goes to buy something from Amazon, analytics will actually show what they're purchasing. So we've been able to identify fraud that way. Other fraud work that we do includes payroll fraud. We can compare payroll data to HR data to identify non-employees, ghost employees and duplicate employees on the payroll. I can run searches against potential duplicate Social Security numbers and address information. Then we ask questions like 'Why do we have five people on payroll that have the same address?' For vendor master data, we look for shell companies and other fraud indicators. For procurement fraud, we look at changes to purchase orders that could result in unapproved purchases or potential circumvention of delegation of authorities (DoA)."

Audit quality is the primary goal of internal auditors as well as external auditors, and analytics are the means. "The key drivers were first, the quality of our work and accuracy of our findings," says David Cronkright, IT audit director for The Dow Chemical Company. "We are increasing our overall confidence in our conclusions because we're able to do full-population testing versus sample testing. Secondly, we were looking for efficiency gains wherever possible. But quality has been a bigger gain than efficiency, because in some cases improved quality has not necessarily reduced time. In some early cases, the use of data analytics actually added some additional work to complete our audits. But as we go through multiple cycles, we're seeing efficiency gains as well.

"Reviewing a full population of data delivers so much more potential than sampling in the identification of outliers and riskier populations."

"Even though this often means that you are working with millions of rows of data, the ability to find the one or two records that may be of concern increases our confidence level."

Randa Saleh, a member of FEI's CGRC, describes the various uses of analytics while she was VP of Internal Audit and chief audit executive at Starwood Hotels & Resorts. "We developed analytics around transactional data. We used analytics in several ways. One was transactional analytics to conduct 'data analytics audits,' where our mining efforts would identify anomalous transactions. A series of scripts were created to flag these transactions, and those anomalous transactions then would be subjected to audit procedures. We were looking at

deep populations that represented the anomalies and getting comfort over more of the suspected population. This allowed us to analyze 100 percent of a population and test the controls around the outliers. In some cases these were used as part of routine audits and in other cases these analytics were designed to highlight red flags for fraud and investigations.

"A second area was to support our internal audit team to be more targeted and risk focused with sample selection and location selection. Data analytics was used to develop a model that identified locations with unusual financial metrics correlated to operational trends, which was used by Internal Audit for further evaluation. The data analytics also identified areas for targeted sample selection to allow for greater audit efficiency.

"The third thing we did was to create analytics for the business to use. One was around what we called a 'balance sheet analytic tool and monitoring tools,' which enabled the business to identify unusual trends and relationships in balance sheet accounts across all of these hotels under management."

THE INTERNAL AUDIT — MANAGEMENT CONUNDRUM

In his EDPACS article referenced above, Cangemi strongly recommends the expanded use of continuous monitoring and analytics by operations, as well as internal audit. "In all cases, audit should and will adjust their audit scope to value CM (Continuous Monitoring) systems built into operations. However, the most important role auditors can serve, with regard to CM, is to recommend its expanded use, thereby leveraging systems efficiency and effectiveness, as well as the overall control environment."

Cangemi also notes that in other IIA survey data, "8 out of 10 chief audit executives worldwide believe assurance of internal controls is one of the top ways to add value. However, many surveys of company management say they want more from internal audit. Yet in the survey of CAEs, only 5 out of 10 also say business improvement demonstrates internal audit is adding value."

In each of these internal audit examples, we see a number of common themes.

Internal audit not only uses analytics software in their work, but they also recommend it to other parts of the business, thereby improving business processes and core systems of internal control.

It is encouraging to hear an internal audit group say they are proud to be a "partner to the business."

THE STAFFING CHALLENGE

As it is for external auditors, finding the right talent can be a challenge for internal audit functions.

"We have a centralized group within internal audit, comprised of me and four other members of my team, three of which are Advanced Data Analytics Analysts," reports ROB VINANDE of Dow. "The fourth member of the team manages the day-to-day operations of our technologies. These four work directly with me as a part of our advanced analytics team."

Cronkright describes these three skill sets as the "three-legged stool." He says, "Finding somebody who has expertise in all three of those spaces is next to impossible. But with a team of five, we have a melting pot of those skills. We do develop those skills further. Somebody may be our IT expert in technology, know the data within SAP, and the design of tables. But that person may be new to auditing, or new to finance work processes, so we develop that skill while they're here. We typically rotate people in and out of Corporate Auditing every three years. We look for their assignment here in the data analytics space to be a little longer than that just because of the expertise that we've developed, which is very difficult to replace."

"In terms of developing our team, we don't invest in trainings over a two-day period," explains Brett Malloy. "We develop them through hands-on experience and workshops. Managers shouldn't be the only ones who could train the staff in using data analytics. I've identified a couple of people on my team who've really excelled at data analytics and now I let them lead the workshops. I think that's powerful because it shows others how quickly someone can become proficient with analytics and it also allows them to showcase their talents to business, which helps them build both their reputation and their network."

THE OPTIMAL INTERNAL AUDIT PROCESS

Technology will help the internal auditor identify outliers, but identification is not enough. There must be investigation and follow up with interviews.

"Because we follow up with those outliers, our interviews and our questions of our audit partners are more accurately targeted towards those outliers versus wasting their time on transactions that are in compliance," explains David Cronkright of Dow. "Once the audit teams and our jurisdiction managers have been through the process and are aware of the capabilities that data analytics provide us, they do a better job of asking the right questions. Because the tools aren't the secret to success — it's asking the right questions like 'What are the risks?', 'What are the control objectives to mitigate the risks?', 'What are the fields of interest that you need to pull and analyze to determine whether those controls are working adequately or not?'"

After each audit, reviewing the process and its results can be valuable.

"After the conclusion of every audit, we have a debrief session," says Vinande of Dow. "We meet with the data analytic resources who were engaged with that particular audit, as well as the audit team, to learn what went well, what can we do better and how we can remove false positives to help iteratively improve the process. That's where some of our gains are going to come from, through the iteration and re-usability of a lot of this capability."

Section 3

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Use of analytics by external auditors

GOALS

While clients might be looking for efficiencies and cost savings, the auditor wants to provide a quality audit with the use of technology.

Craig Sharples, data science principal for PwC, is working on a project that is focused on using technology to innovate in the audit space. "With technology comes an opportunity to really focus on three current areas:

· Quality: How do we do enhance quality in the audit?

· Value: How do we also provide additional insight to the client?

· Efficiency: How do we do a more effective audit? How do we reduce preparing and gathering data and analysis for the client and also reduce the administrative time for PwC on reviewing if the information has been received and is it the right information?

"From an audit firm perspective, our primary driver is quality," explains Sharples. "We have been entrusted by the capital markets with an important duty and quality is essential to fulfilling our obligations to the marketplace. Analytics provides substantial opportunity for us to drive quality and it remains our number one priority."

"Enhancing audit quality is our primary objective," says Roshan Ramlukan, principal, Global Assurance, for Ernst & Young (EY). "We want to deliver a higher-quality audit and that has been central to our audit transformation program. We recognized a long time ago that a traditional sample-based approach to substantive testing was not necessarily the most effective, although it is statistically relevant. We think that there is a better way to do it, by using data and analytics more effectively within the audit."

The technology available today allows the auditor to look at a complete population of audit-relevant data, rather than using traditional statistical sampling methods.

Jim Bourke, partner at Withum, describes the benefits of looking at all of the data. "When we look at 100 percent of the data, if it's done the right way, I honestly believe that we end up with a better quality audit, as long as you're not a traditional auditor that gets buried in informational paralysis, because this can be very dangerous. Big Data could really paralyze auditors who never know when to bring closure to a job in a sample world. Going from a sampling world to 100 percent data testing will be a huge learning curve for auditors. They need to understand how to do it with the right tools to take it to the next level.

"I'd rather have a better quality audit, knowing that my license is not to be on the line, knowing that I'm not going to miss something. Traditionally, we sample. And then we draw a conclusion from that sample regarding the population as a whole. And that's proven that works. But again, it's not 100 percent. What happens if there is something that you didn't sample, that you didn't look at? Yes, our professional standards say that's all good, we didn't have to. Now, I feel very comfortable about an audit job where I've looked at 100 percent with the right tools and drew the correct conclusions."

A secondary goal of the external auditor is to provide relevant business insights. "Our clients are looking for more value from the audit than just a basic audit opinion," says Ramlukan of EY. "They expect relevant business insights as a byproduct of the time incurred conducting the audit".

"Given the way an (external) audit is structured, and the time pressures that audit teams are under, the insights tend to be secondary. But we recognize that insights are very important, and we are focused on conveying these insights more effectively. We have found that more effective analysis of available audit-relevant data can provide us with a deeper understanding of our clients' business, their operations, their flow of transactions, their approach to recording and accounting for the various transactions."

The third driver is efficiency, but it's not necessarily efficiency to cut out hours. Ramlukan uses the auto mechanic as an analogy. "To get maintenance done on your vehicle 25 or 30 years ago, the mechanic walked around, kicked the tires, opened the hood, checked the oil, performed a test drive, listened to some noises, and then diagnosed it, and then charged a fair fee for the service. Today, the mechanic plugs your vehicle into a diagnostic system that downloads and analyzes a ton of data, and the mechanic is able to interpret that data."

"So today, you need a higher skilled mechanic to be able to interpret and leverage that information, and you need more investment in technology that needs to be update on a regular basis. So you're getting potentially more efficiency, because you are more targeted, but your cost model isn't necessarily going down. I believe that efficiency is important so that we can leverage the time saved to focus on the right audit risk areas to deliver higher quality and more value, rather than just for the purposes of taking cost out."

Mark Mayberry of BDO's Assurance Office of Tomorrow describes their uses of analytics. "We were looking at the use of analytics as a way to leverage the advances in technology over the years to audit differently. We're using the volume of data that is coming at us, both financial and operational. We'll get social data as well to enhance our risk assessment procedures, so we may use that to identify anomalies or areas that we want to focus on as part of our product risk assessment procedures."

"We're also using analytics as a way to replace traditional sampling techniques with 100 percent tests and just focus on the exceptions to the data. So one driver was efficiency, because we were looking to audit differently, and we get time savings by auditing differently."

"But analytics can also be more effective because they help us refine our strategies and our approaches to a particular audit. And it gives us better insight into the data and makes it much easier for us to look at the transactions that are outside the normal process. If I was going to commit fraud, for example, I wouldn't want to alter hundreds or thousands of documents. It's just too much work through the normal process and other people would probably pick it up. It's easier to put a few entries in there through a normal process. Those are actually easier for us to pick up on with our analytics.

"On the client-facing side, we're already presenting our clients with additional insights that they weren't aware of within their financial or operational records. And that's continuing to be a key focus to provide those insights to our clients. For many of our clients, their accounting systems may not be robust enough to pick up all those things that they need to help them run their business. So we can provide some nice analytics to present to them, whether that be industry-focused or showcasing our deep knowledge of their particular business."

Craig Sharples of PwC sums up the benefits of technology: "You have a greater ability to learn things about your client and their business and how they do their business in a more efficient way. I think we could always have done this previously without technology, but the quality was inversely related to efficiency. Now, technology allows you to drive both quality and effectiveness at the same time. That's one of the wonderful things about technology."

CHALLENGES

With differences in external audit methodologies difficult to discern, a primary challenge for external auditors is differentiating themselves in a highly competitive environment. "Delivering a quality audit is core to our business, and we are always looking to deliver additional insights for our clients. We believe an audit is so much more than a commodity if done properly," says Sharples.

"Audits today in the marketplace are commoditized," agrees Jim Bourke of Withum. "So we want to make sure that we do as efficient job as possible with the right tools and leverage technology as much as we possibly can."

Roshan Ramlukan of EY describes the current environment: "As long as an audit remains a commodity, clients will always be looking to reduce the cost. The obligation is on the audit profession to deliver more value as a natural byproduct of the audit. The use of data and analytics are merely enablers to transforming the audit. Technology and innovation is being used by the profession as a key differentiator in delivering audit services."

But applying technology effectively requires talent. Sharples of PwC explains the problem: "As we evolve into this data-enabled world, the occupation that we call the data scientist today didn't exist as it does today, five years ago. And now it's one of the hottest commodities in the market, sought after by Uber and LinkedIn and Google. They're all hiring very smart data people. There's a talent shortage out there, and everybody's trying to hire them and develop them."

Ramlukan of EY describes the importance of an analytical mindset in audit teams. "We hire really bright people, we put them through rigorous training programs, a combination of classroom as well as on-the-job training, but much of which has been very procedurally orientated. Analytics forces you to think differently. So the primary challenge is getting auditors to be more comfortable and confident analyzing larger data sets and interpreting analytical dashboards with drill-down analysis, so they can make the right decisions about risk and audit quality of audit evidence."

> **"Part of the challenge is getting an auditor to be comfortable and confident interpreting a series of analytical dashboards together with drill-down analysis, so they can make the right decisions about risk and assessment of audit quality of audit evidence."**

Training on new technology is very important to Jim Bourke at Withum. "When we deploy analytics software here, whether it's ACL or whether it's IDEA, every firm is training on one of those two, so there's a cost of the technology, a licensing cost and that's X dollars. I would argue you need to spend the money on the training. The training component is so much more critical than the actual license piece. And all too often firms negotiate with the vendor on the training piece."

"The shortcoming with analytics is that sometimes staff is not trained 100 percent on all the different unique things they can do. Today, we have very focused training. We have about two weeks of training that we put our annual new hire classes through. I'm looking for tech-savvy individuals.

"The most important thing for our clients is having the right talent at their fingertips," says Sharples. "So to differentiate yourself, you need to make sure you have the right talent and the best talent. And this talent isn't just technical talent, that's one component, but also business talent to help understand what a data analytics program should be solving for. Creating huge data lakes, or massive data stores, is not helpful if you cannot extract the right information and gain insights out of it."

"One of the big challenges is data," says Sharples. "Clients invest hundreds of millions of dollars in ERP systems, building complex BI (Business Intelligence) systems, complex management reporting systems and complex analytics programs. Generating and managing data are complicated.

"Where it really impacts the audit firm is that we need to make sure that the data is complete and accurate.

> **"Getting data, managing this data, storing this data, securing this data, protecting this data, processing that data, are all challenges that need to be addressed with an analytics-based program."**

And while the challenges are solvable, you have to solve it efficiently, otherwise the cost exceeds the benefit. Running an analytics program isn't as easy as pushing a button, and like many things in technology, the efficiency is when you hit repeatability."

"Data capture, the ability to access client data on a timely and efficient manner, is the number-one obstacle," adds Ramlukan of EY. "Data capture is often viewed primarily as a technical challenge, where we don't know how to get the data. Actually, the issue with data capture is more around what we as auditors intend to do with the data, and whether the CFO will approve us getting the data."

"And then more importantly, once the CFO approves it, IT's willingness to actually support the extraction activity. So, we find that the whole data capture process tends to be pretty drawn out. It's not technically difficult, it just takes a lot of elapsed time. Not much incurred time, but a lot of elapsed time between when you request data and when it is provided."

Mark Mayberry of BDO experienced similar client resistance. "At first there was some resistance by those in the finance and the IT groups, because we've never asked for that before. They're not quite sure what we're trying to do. They don't really want to get the data out of their systems, so that was a typical response that we get whenever we ask for this for the first time. But we work through those issues on a client-by-client basis, giving them some comfort that their data's still going to be secure, and that we're going to be able to do some more powerful auditing with that data.

"Once we get through that speed bump, the clients are more receptive, especially when we bring back good insights and recommendations either through the management letter recommendations or presentations to the audit committees. So that's been positively received once we get over that initial hurdle of asking for and getting the data. Because we've been doing this for a number of our clients, the questions become a little bit easier to address with the clients. We've been through the security issues with many of our clients."

Another requirement for an analytics program is developing an understanding of the client's business and systems. "While the client may install an off-the-shelf package such as SAP or Oracle," explains Sharples of PwC, "those packages usually take many years to implement and are heavily configured and customized. Clients customize them and configure them differently. That impacts the data that is stored, which then impacts the analytics. Understanding your clients, their businesses and their applications becomes a challenge. Even clients sometimes do not fully understand all of the things that they have done as usually those changes are pervasive across business units over a long period of time. Understanding all these pieces requires a complex combination of skill sets that not a lot of people have."

Section 4

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The future of analytics in audit

So what is the future of analytics in auditing? Roshan Ramlukan describes a Netflix analogy: "Netflix started their business with a DVD-by-mail model, where they shipped DVDs to people's homes, because compression technology was not available to support online streaming. More importantly, most people didn't have high-speed broadband connections into their homes, so Netflix couldn't deliver online streaming.

"The auditing profession is still in that DVD-by-mail model. We go to our clients, extract data and transfer that data to EY. But our vision is to stream the relevant analytics from our clients, and make it available to us whether it's sitting at EY or sitting within a client environment.

"We want to run our audit analytic apps within the client's environment. That would give us the opportunity to adjust the timing of our audit procedures. There is a lot of activity around the quarters and at year-end. So our ability to use analytics in an on-demand fashion would give us the ability to smooth the cyclical nature of audit work."

Craig Sharples of PwC agrees the audits of the future are going to look very different. "Look at where the firms are starting right now: They are starting to get client data, analyzing those populations of data, and then targeting their follow-ups rather than asking for traditional manual request lists with a broader variety of client prepared deliverables. However, I see this continuing into using artificial intelligence (AI) and machine learning both within that data set,

and hopefully across client data sets, to drive further efficiencies and insights for our clients."

Sharples elaborates on the potential of AI. "Right now, we are scratching the surface on data analytics. Machine learning and AI will continue to help reduce manual testing cycles in routine, volume based areas and free up time for meaningful analysis and insightful conversations."

Robotic Process Automation (RPA) will be another wave of innovation in auditing.

"The work performed by an auditor can be categorized into routine and non-routine work," explains Ramlukan of EY. "The routine work tends to be transaction-based, in large volumes. The non-routine work tends to be more knowledge-related activity. By apply automation to routine audit work, we can gain efficiencies that allow auditors to spend their time on the more complex areas of the audit."

Ramlukan then provides an example of termination testing using RPA: "Today, an auditor will start with a request to HR for a list of terminated employees. The auditor will then select a random sample of those terminated employees, and then confirm whether their network and SAP access was terminated appropriately. If any exceptions are identified, additional testing is done to determine whether any transactions on SAP occurred after the termination date and if those transactions had a financial reporting impact. This process is performed for each employee in the sample population."

"The testing of this process can be automated by an auditor by using RPA software to create a robotic personal assistant ('bot'). The bot is designed to review the employee termination list and test the status of the user's network and SAP access of each employee. If any exceptions are identified, the bot queries the SAP system to capture all transactions performed by the user post termination date. The bot automatically records the each step of the testing, generating the relevant evidence of testing, and produces a work paper that can support the audit conclusion. This approach enables the auditor to test the entire population instead of sampling, and is more efficient than the traditional manual approach."

"RPA technology is designed so that you don't need IT specialists to program or train the software robots, auditors can use these types of technologies to automate their traditional work steps. Once auditors get the hang of using this technology, they will find creative ways to automate repeatable processes that they do on a day-to-day basis."

Another opportunity afforded by an analytic program could be benchmarking services, another way to drive insights and value for clients. "There will be business and regulatory challenges," admits Sharples, "but if the clients will allow their data to be compared across others in the industry, clients could get some high-quality benchmarking and insights."

Jim Bourke of Withum provides his vision of the future of the profession. "Not that the audit is going to go away, but the audit is all about yesterday's numbers.

"But what the future holds for the profession is all in the data. It's about how auditors can now help their clients to take their businesses to the next level, and to me it's about analytics and that massive amount of data.

"So, I see auditors entering a new world. They will continue to give assurance for what happened yesterday, but they can become a partner with their clients and use data to help their clients run their businesses more profitably."

But what form would the audit of the future take? "An audit is an expression of trust based on an existing model of financial reporting," explains Ramlukan of EY.

"New technologies like Blockchain have the potential to introduce a fundamentally different trust paradigm that would impact nature and extent of the audit as we know it. So we're at a very critical juncture around disruption in business in general and we, as a profession, need to navigate that."

"I don't think there's any clear answer just yet, but I believe that our profession is going to change in the next 10 to 15 years more than it's ever changed in the last 100 years."

Appendix: the AICPA'S audit data standard

The AICPA's Assurance Services Executive Committee's Emerging Assurance Technologies Task Force established the Audit Data Standard (ADS) working group to develop a standardized data model that facilitates the acquisition of data and the use of analytics.

One of the challenges management and auditors face is obtaining accurate data in a usable format following a repeatable process. As a result, this working group has developed voluntary, uniform audit data standards that identify the key information needed for audits and provide a common framework covering:

1. Data file definitions and technical specifications.

2. Data field definitions and technical specifications.

3. Supplemental questions and data validation routines to help auditors better understand the data and assess its completeness and integrity.

Amy Pawlicki, director of Business Reporting, Assurance and Advisory Services at the AICPA, provides some background on the ADS project:

"Many years ago, the firms came together in recognition of the fact that it's really hard for firms to get data from clients in a consistent format, which is surprising to many, but not to those who work in the profession. When they go in to gather data for the purposes of the financial statement audit, even for the same client from period to period or from division to division within a company, they're getting data in different formats. It's inconsistent, it might

be coming from the IT team one time, it might be coming from the finance team another time, or the accounting team. CPAs were struggling with acquiring the data for the purposes of the audit, spending a lot of time cleaning the data and getting it in a consistent format, so that they can actually use it for the purposes of performing the audit.

"And so that was the catalyst for starting the project. It was started a number of years ago under the Center for Audit Quality, but the project was temporarily put aside. We felt it was important to bring the project back, because we saw that audit data standards are the critical foundation for future work that auditors were going to be doing in terms of using analytics in the audit. We also wanted to solve the problem of data acquisition, even independent of that longer term vision around analytics.

"So we brought it back under the auspices of the AICPA Assurance Services Executive Committee, and have been working on it ever since. The end game here is not the data standards themselves. The end game is the ability for firms to efficiently acquire and analyze data from clients. We feel that the audit data standards are critical to enabling that. They're the facilitator for data acquisition and analysis."

Pawlicki then provides a status report on the ADS: "We've published a base standard, which is to be used in conjunction with each of the other standards, which encompasses common concepts that go across each of the standards so that we're not repeating them in each of the other standards.

"We also have a general ledger standard and an order-to-cash sub-ledger standard, which replaces the old A/R sub-ledger standard. We also have a procure to pay process sub-ledger standard.

"There is also an inventory sub-ledger standard currently out for public exposure. Comments are due back on that by August 15th, at which point the final document will be published to our website sometime in the early fall, along with all the other already published standards that I just mentioned.

"We also have a fixed asset sub-ledger standard, currently under development. We plan on publicly exposing that for a 60-day period sometime in the early fall."

Professionals interviewed for this report

Vendors

Andrew Simpson is chief operating officer of a specialist division of CaseWare called CaseWare RCM, which focuses on enterprise technologies that examine international crime management, financial crime and risk management.

Patrick Taylor is the president and CEO of Oversight Systems and one of its co-founders.

Dan Zitting is chief product officer at ACL.

Internal Auditors

David Cronkright is an audit director within the corporate audit department at Dow Chemical Company. One of his responsibilities is oversight for the advanced data analytics team that Rob Vinande manages.

Brett Malloy is IT audit manager at Campbell Soup Company.

Hank Roberts is director of Internal Audit at Shaw Industries Group Inc.

Randa Saleh is VP & chief audit executive, Internal Audit at Starbucks Coffee Company (and previously at Starwood Hotels & Resorts).

Rob Vinande is a data analytics manager within the Corporate Audit department at Dow Chemical.

External Auditors

James C. (Jim) Bourke, CPA, CITP, is partner at Withum.

Mark Mayberry is director, Assurance Office of Tomorrow, at BDO.

Roshan Ramlukan is principal, Global Assurance and Analytics Leader at EY.

Craig Sharples is data science principal at PwC.

AICPA

Amy Pawlicki is director, Business Reporting, Assurance and Advisory Services of the AICPA.

Bibliography

STAYING A STEP AHEAD: INTERNAL AUDIT'S USE OF TECHNOLOGY

Michael Cangemi
IIA Research Foundation, August 2015

Technology continues to evolve, and in some cases, surprise and upset many business models. In every business sector, technologies are changing the way businesses operate — from adding productivity to creating disruptions that revolutionize existing business and create new business segments. In the same way, the use of technology by internal auditors is under pressure to change and adapt to the new environment.

This report is part of the 2015 Global Internal Audit Common Body of Knowledge (CBOK) Practitioner Study series currently in development. The survey drew more than 14,500 responses from internal audit practitioners and those involved in the profession around the world.

The survey data shows that internal audit use of technology in the audit process continues to grow, but there is room for improvement. For example, the use of software tools for data mining increased by 14 percent among survey respondents from 2006 to 2015. However, fewer than 4 out of 10 chief audit executives (CAEs) worldwide feel their departments' use of technology is appropriate or better.

THE BENEFITS OF CONTINUOUS MONITORING

Michael Cangemi, Sridhar Ramamoorti and William Sinnett
FERF, June 2011

COSO, the Committee of Sponsoring Organizations of the Treadway Commission, included "ongoing monitoring" in its original Internal Control-Integrated Framework, first released in 1992. COSO's 1992 framework forms the basis for internal control at many companies today.

This research report examines Continuous Monitoring (CM): "Continuous monitoring enables management to continually review business processes for adherence to and deviations from their intended levels of performance and effectiveness."

CM is "an automated, ongoing process that enables management to:

- Assess the effectiveness of controls and detect associated risk issues.

- Improve business processes and activities while adhering to ethical and compliance standards.

- Execute more timely quantitative and qualitative risk-related decisions.

- Increase the cost-effectiveness of controls and monitoring through IT solutions."

The research team identified a number of key findings from this research:

- CM Deployment: Leading companies recognize the importance of Monitoring, and are effectively deploying CM across functions and departments. They recognize how CM can be a precondition for achieving superior corporate performance as well as governance outcomes.

- Resourcing CM Initiatives: Continuous Monitoring programs require a company focus and a commitment of resources. Some companies mentioned the need for return on investment (ROI) estimates, but others look beyond monetary justifications and focus instead on operational effectiveness and risk reduction.

- Need for CM Champion: Continuous Monitoring programs need a Champion, preferably at a senior executive level, because resources will be required.

- Internal Audit as Evangelists: Although CM is a business operations issue, internal auditors (IAs), due to their familiarity with Continuous Auditing (CA), often become the champions of CM programs.

MONITORING INTERNAL CONTROL SYSTEMS AND IT

ISACA, 2010

"Technology can be important to the monitoring of internal controls in two related but very different ways. It is both an enabler of effective monitoring and, as an important part of many internal controls, a key area that must be monitored in its own right.

"Currently, technologies provide management with the opportunity to improve monitoring and oversight of business processes and controls. For example, the growth and complexity of enterprise resource planning (ERP) systems, the increased use of networks and speed of processing, and the globalization of business have driven the development of more intelligent software tools. These tools can now help management to better capture and analyze key data for strategic and operational decisions and trigger alarms when unusual transactions or patterns occur.

"Apart from enabling monitoring, technology is often an integral supporting component for internal controls and must itself be subjected to rigorous oversight. For instance, technology-based systems — many of them automated — are often the source of information used by auditors and risk managers to answer two critical questions: what to monitor

and how to monitor it. Inaccurate or incomplete information can lead to a breakdown in governance and misguided risk management strategies and outcomes.

"The monitoring of information technology (IT) controls and automation of the monitoring process can offer substantial benefits. These include:

- Earlier identification and timely corrective action of breakdowns in processes and internal control deficiencies.

- Leveraging of processes to monitor controls to also monitor business performance. Information used for one can often be used for the other and vice versa. Emphasizing to boards the value-add of monitoring business performance and early warning systems is often the best way to justify the investment in monitoring tools and technology.

- Provision of more accurate, decision-relevant information through reliable financial and operational reporting.

- Better access to real-time data and, by extension, increased speed and quality of management decision making.

"Automation can significantly increase efficiency and decrease the cost of operations. When many key systems and control processes within an enterprise rely on information technology, an effective way to perform monitoring is often to automate the monitoring process. In some situations, it is neither cost-effective nor desirable to monitor automated processes and controls without using IT.

About the authors

Michael P. Cangemi, CPA retired, CGMA, an author and business adviser, is the former president, chief executive officer and director of Etienne Aigner Group, Inc., a leading designer of women's accessories (Aigner, 1991-2004) and president and chief executive officer of Financial Executives International (FEI 2007-08). He currently serves as president of Cangemi Company LLC, which he founded, and through which he serves as senior advisor and director to various companies and manages his other business interests.

Cangemi has a significant focus on technology for business and specifically continuous monitoring and analytics for GRC and business process improvement. He is a senior fellow at and serves on the Rutgers Continuous Auditing and Reporting Lab Advisory Board. Mr. Cangemi is a senior advisor to Oversight Systems (CM & Analytics) and CaseWare RSM (CA & CM Analytics); he is an investor in and periodic advisor to Solink Corp (Video & Contextual Analytics). He has served on the Approva Corporation advisory board and numerous corporate and not-for-profit boards.

He currently serves on FEI's Committee on Finance & Technology (CFIT) and their GRC Sub Committee; the EDPACS Editorial Advisory Board, EY Alumni Council; and the ISACA Governance Committee. He actively publishes and makes presentations on technology trends and the use of analytics in the financial and GRC verticals.

His experiences as a CAE were published in his second successful book, "Managing the Audit Function". The book, now in a third edition, was featured in the business section of the Sunday New York Times in August 2002 and translated into Chinese in 2005 and Serbian in 2013.

Contact information:
Phone: 732.548.9563
Email: mpcangemi@msn.com

William M. (Bill) Sinnett is chief operating officer, Research, for Financial Executives Research Foundation, Inc. (FERF), the research affiliate of Financial Executives International (FEI). He also supports FEI's Committee on Finance & IT (CFIT).

Sinnett joined FEI as accounting manager in 1985, and became manager of Research in 1989. He was promoted to director of Research in October 2005, senior director in October 2011, and chief operating officer in July 2015. Prior to his positions at FEI and FERF, Bill was employed by Carnegie-Mellon University and Mellon Bank in Pittsburgh. He has an M.B.A. from the University of Pittsburgh.

Contact information:
Phone: 973.765.1004
Email: bsinnett@financialexecutives.org

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