FINANCIAL SERVICES AND PUBLIC SECTOR KNOWLEDGE BRIEF

LEVERAGING ANALYTICS AND DATA VISUALIZATION TECHNIQUES

Reaping more from technology to meet demands

The Institute of Internal Auditors | Public Sector™ AUDIT CENTER

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Table of Contents

INTRODUCTION

Internal audit is asked to deliver more

Executives and regulators want more from internal audit, and they want it now. Growing demands from boards and senior management include an expectation that internal audit provide deeper insight into the strategic risks that organizations face. Consequently, internal auditors are being challenged to expand their views on the opportunities available through technology; moreover, they are being encouraged to *use* the technology to meet the expectations.

Because of the expanding digital universe, organizations are faced with complex combinations of risks and disruptions. While leading audit departments are adopting any number of analytics and data visualization tools to meet the needs of today's evolving organizations, others struggle to integrate such tools into their work. However, modern internal audit departments must be sufficiently equipped to manage *all* risks and disruptions that can severely impact business functions now and in the future, and the way to achieve that sufficiency is by adopting data analytics.

This knowledge brief examines current expectations of stakeholders, shares leading practices in analytics and beyond for both financial services and public sector internal audit departments, identifies the most common challenges to adopting new technology and how to overcome those challenges, and discusses how intelligent automation is changing the analytics discussion.

EXPECTATIONS ARE CHANGING—AND *FAST*

Stakeholders are more aware of data importance

Leverage technology to create audit efficiencies

Globally, organizations are undergoing digital transformation. Automation and other technologies within business units can create a host of new and exciting possibilities; however, those same technologies can introduce new risks. Given the soaring availability of big data and the tools to analyze them, senior management and boards have become increasingly aware of the importance of using data to make informed and timely decisions about how to manage organizational risk.

Compliance functions are heavily scrutinized, and senior management has expressed heightened expectations with regard to the use of data analytics to enhance compliance programs to meet risk management objectives. Because of the increased awareness, risk managers are feeling the pressure to leverage technology. Similarly, stakeholders have raised the internal audit efficiency bar to provide assurance on the wave of new data — and that bar continues to rise.

Because of this push, internal audit departments need to quickly get on board and adopt technology to meet the heightened expectations, and identify and offer advice about controls, compliance, and risks. If implemented correctly, a sound data analytics program, together with technology advances and traditional automation techniques, can create the audit efficiencies that an organization requires.

Executives and regulators expect:

- On-demand reporting capabilities over all material areas.
- Confidence in data environment, inputs, analysis, reporting, and quality.
- A robust, consistent, and effective compliance management program with validated accuracy and scalability.

Stakeholders are also more interested in asking questions — and getting answers — about the *reliability* of data and the internal controls behind data systems, and have come to expect more robust and timely audits through data analytics in promoting transparency, accountability, and value to the public.

Data analytics is no longer a “nice to have”

In the past, visualization technology and data analytics for internal audit were “nice to have.” Now, however, they are very *necessary* for internal audit departments to function efficiently and add value to their organizations. Stakeholders have identified specific areas of weakness and vulnerability in their

organizations, and they are pushing for internal audit to adopt data analytics and other visualization tools to focus on those areas.

Stakeholder demands include wanting to see more attention paid to, and more resources allocated toward an above-and-beyond approach in internal audit's coverage of regulatory risk areas. To meet these expectations, internal audit's use of compliance technology and data analytics should:

- Enhance and streamline compliance programs to deliver against management, regulatory, investor, and customer expectations.
- Be leveraged by multiple stakeholders, including compliance risk assessments, regulatory/legal inventories.
- Establish an efficient and effective compliance monitoring and testing program to monitor for employee behavior, trading activity, and transactional activity; and create a foundation for compliance programs that evolve and drive toward a target operating model.

As maturity in data analytics and automation grows, traditional "lines of defense" models are challenged and the required skill sets for auditors rapidly change. It is still internal auditing; however, while internal audit has an opportunity to capitalize on innovations and increase the efficiency and effectiveness of its risk management responsibilities, the *traditional role* will continue to be impacted.

LEADING PRACTICES USING DATA ANALYTICS IN INTERNAL AUDIT

A strategic path forward to analytics maturity

Analytics maturity requires alignment with enterprise objectives

Internal audit departments using data analytics may be at different points of maturity; it all depends on business requirements, assurance, skill, experience, and budget. To reach analytics maturity, a process and a strategy need to be developed that align with the enterprise objectives and any visualization tools already in place.

Consider:

- ***Strategic analytics vision –*** A guiding strategy to ensure alignment of analytics initiatives to organizational objectives and the right mix of high-value use cases.
- ***Strategic analytics execution –*** Consistent and effective coordination of activities across business units minimizing duplication and maximizing sharing of resources and speed of execution.
- ***Data access –*** A common corporate data layer enabling data sharing within appropriate security controls to facilitate discovery of unknown correlations and business-model innovation.
- ***Data governance –*** A strong data governance framework to support high-quality data and minimize potential reputational risk.
- ***Organization expertise –*** The right capabilities, clear roles, and responsibilities across the business, and a well-defined prioritization and execution model ensuring minimal task duplication.
- ***Organization process –*** An adaptive, agile approach allowing for business-and-correlation-driven development, including consistently applied procedures, rapid prototyping, and effective deployment to production systems.
- ***Technology platform –*** A consistent fit-for-purpose technology platform to ensure maximum scale benefits and operational capability.
- ***Technology interoperability –*** An ability for different business units to share applications and expertise across platforms.

The strategy should also consider the use of data analytics in relation to internal audit's methodology, including a transformation of how audits are planned, executed, and reported to avoid an internal audit *struggle* during implementation.

As internal audit seeks to advance in approach, the use of a maturity model can help benchmark the department, using a few basic characteristics to provide a clear path toward achieving data analytics-enabled and continuous auditing. Even though an audit department may have already added data analytics in the planning, scoping, and execution of audits, they may have done so only in an informal fashion — using one or two technical resources — and may be underutilizing the full potential of the tool.

MATURITY LEVEL OVERVIEW

Data Analytics & Continuous Auditing Maturity Model	Level I	Level II	Level III	Level IV	Level V
	Traditional	**Ad Hoc**	**Continuous Risk Assessment & Continuous Auditing**	**Integrated Continuous Auditing & Continuous Monitoring**	**Continuous Assurance of Enterprise Risk Management**

***Source*:** Transforming Internal Audit: A Maturity Model from Data Analytics to Continuous Assurance

According to The IIA's FSAC Audit Report: Innovation in Continuous Auditing, one of the benefits of continuous auditing is getting to the control issues sooner so that corrective action can be taken quicker. The risks can be seen as the year progresses and as business dynamics change. In addition, an organization will see reduced costs, increased efficiencies, better governance, real-time feedback on the control environment, and an alert system for monitoring.

Data drives the continuous auditing technique. It may be a *continuous risk assessment*, which identifies key risk indicators and monitors changes to the audit plan; or a *continuous control assessment*, which provides opportunity to evaluate the established control population on a continuous basis (e.g., automated or application).

Continuous monitoring provides relevant data and is ongoing. It provides management greater visibility, helping to determine where management should focus its attention and resources to improve the processes, implement corrections, and address risks to achieve its goals.

Stay the course through the challenge to avoid a stall

There will be challenges, such as accessing data and managing privacy regulations. But by starting with the phase of a common internal audit methodology and identifying the characteristics at different levels of maturity, an organization can find logical integration points for data analytics and other related initiatives.

Successfully implementing analytics into internal audit *does* require the right talent. However, part of the success is understanding *where* to begin. Areas where internal auditors are most comfortable with data — account reconciliations, journal entries, payables, fixed assets, or payroll are good places to begin. From there, the audit department can increase the level of education to move from general plans and discussions to advancing and integrating analytics and other digital initiatives into the audit plan (Analytics in Auditing Is a Game Changer).

Although *adoption* (and *planned* adoption) of analytics in internal audit has improved, for the most part, internal audit still struggles to *advance* in the use of analytics for long-term transformation. Maturity levels remain relatively low.

A familiar pattern: *An organization identifies a need for analytics. Internal audit purchases an analytics tool. Then, after getting up to speed, use of the tool to stagnates at a basic level, and the tool is never used to its full potential. The internal audit department struggles to get past the initial wins to the next level of automation*.

COMMON REASONS FOR AN ANALYTICS STALL	
The data scientist fallacy.	**Teams tend to over-rely on specialists. While it is fortunate to have a Ph.D. or software developer on staff, they do not think like an auditor. As such, the advanced skill set is underutilized and often unable to bridge the gap between the business and the science.**
Failure to adopt.	**Teams do not make an impact using the software due to lack of skills and capabilities. Knowing the capabilities of the software does not always mean the team knows how to use it to perform a data-driven audit.**
Not embracing self-service.	**Teams start an analytics program by requesting data from other stakeholders. The team needs to learn how to acquire necessary data without help from IT or others. The long-term goal is to automate data feeds.**
Struggling to collaborate.	**Teams do not fully communicate their intentions and what they are trying to accomplish to key stakeholders. As a result, they do not get the engagement or consensus required to be successful. Other priorities eclipse the business case for compliance and internal audit.**
Asking the wrong questions.	**Teams become curators of "fun facts" rather than actionable insights. Ask "actionable" questions. Align analytics with deep process understanding to ensure outcomes are aligned with practical business decisions.**
Drowning in false positives.	**Teams are unable to determine how to deal with hundreds or even thousands of records that appear to be "out of compliance," resulting in frustration by auditors and auditees alike.**

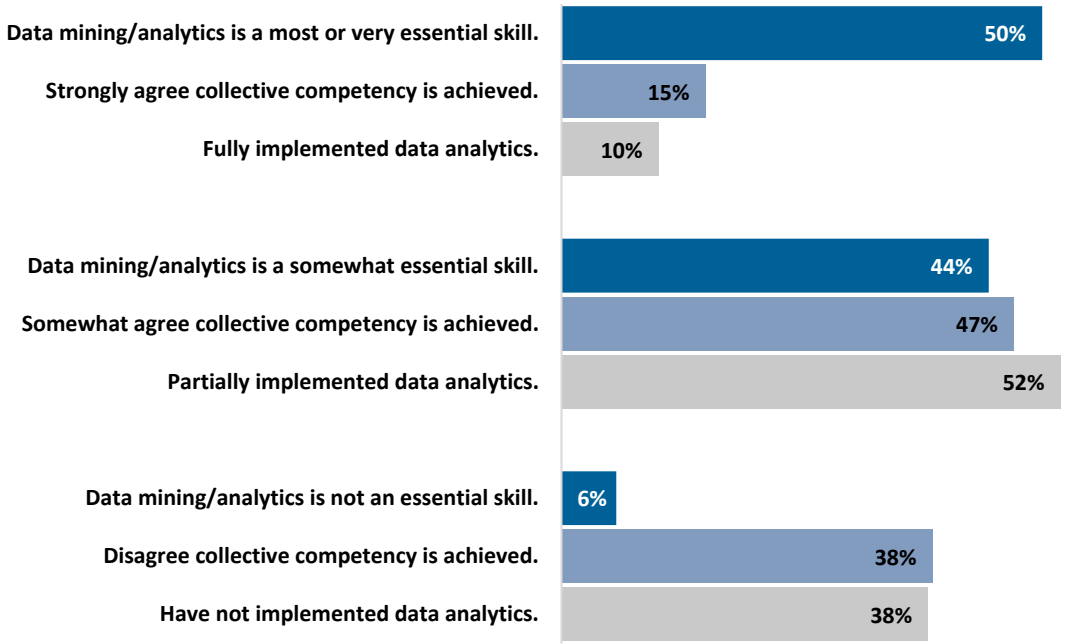
Source: Financial Services Audit Center (FSAC). "Leveraging Analytics and Data Visualization Techniques for Performance and Compliance Analysis in Internal Auditing" (Webinar presented by KPMG, June 7, 2018). Accessed October 4, 2018, https://dl.theiia.org/FSAC/060718-Viewer-Slides.pdf.

Implementation of analytics not yet mature

While data analytics has been embraced by a number of organizations and internal audit departments, the maturity level could be, and should be better. Consider the responses to the 2018 North American Pulse of Internal Audit survey. While data mining/analytics was identified as a "most or very essential skill" or a "somewhat essential skill" by as many as 94 percent of the responding CAEs, only 62 percent said that they have partially or fully implemented data analytics into their audit function. This means nearly 4 in 10 (38 percent) have not implemented data analytics at all.

Consistent with the 2018 North American Pulse results, 31 percent of participants in the IIA Financial Services webinar identified "team does not have the necessary skill set" as their biggest analytics challenge, followed by 24 percent who identified "process change and adoption" as the biggest analytics challenge.

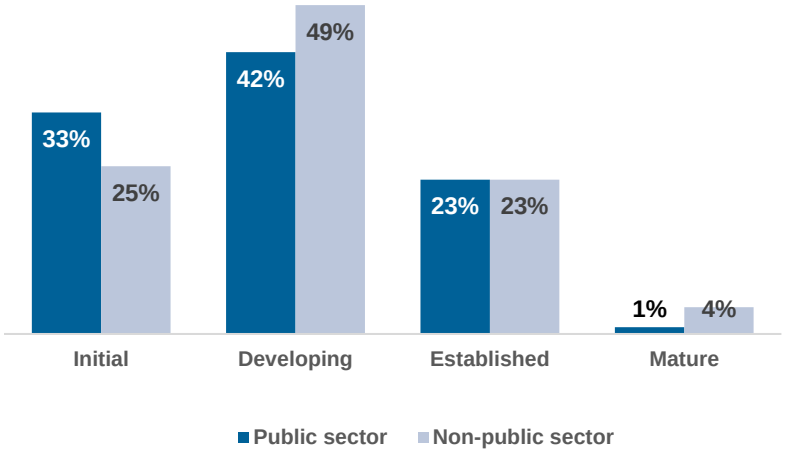
CAE PERSPECTIVES ABOUT DATA MINING/ANALYTICS IN INTERNAL AUDIT FUNCTIONS



Note: North American Pulse of the Profession 2018 survey, Q54: Please indicate the degree to which the following skills are essential to your audit function's ability to perform its responsibilities [topic: data mining and analytics]. *n* = 636. Q19: Please indicate your level of agreement that your audit team collectively possesses the knowledge, skills, and other competencies needed to perform in each of the following areas. *n* = 618. Q32_2: What best describes the degree to which your internal audit department has implemented data analytics. *n* = 636.

Further, when isolating responses specifically from public-sector CAEs, despite all of the focus on data analytics, as many as 75 percent report that organizational maturity for data analytics is less than established. Only 1 percent consider it mature. Public-sector CAEs have consistently identified analytics as one of the three top skills they focus on when recruiting; however, they report that it is extremely or very difficult to recruit this skill.

Few public sector CAEs report established/mature data analytics



Note: Pulse 2018 survey, Q21: How would you rate the average level of maturity of your organization's data analytics efforts (not internal audit, but your entire organization)? *n* = 142 for public sector. *n* = 480 for non-public sector.

Overcome challenges by embracing and leveraging new technology

Rather than accepting challenges as ongoing limitations, internal audit should embrace new technology and anticipate the opportunities and advancements it will provide. Put the tools to work, start small, and then build. Consider where the audit department currently stands, and where it wants to be. Creating a set of metrics or goals, and identifying achievable measures of success are two good places to start. Then track for capability, approach, skills, insight, understanding the business, continuous auditing and continuous monitoring.

The 2018 North American Pulse report recommends pathways to embrace innovation:

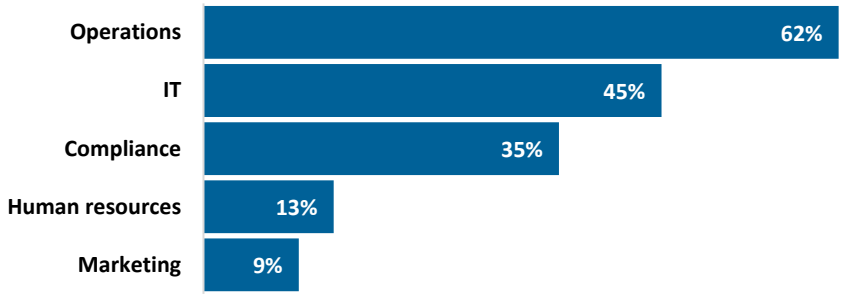
- Recognize the need for self-assessment, and challenge how objectives are being accomplished.
- Embrace technological advances.
- Do not blame the failure to innovate on the lack of resources.
- Develop and communicate the case for internal audit to actively pursue innovation.

Communication and collaboration are key to successful implementation

Communication and collaboration are crucial. As organizations evolve, and the expectations of internal audit continues to grow, technical skills alone are not enough. Auditors should identify key issues and risks, and develop the capabilities needed to assist stakeholders in addressing them. For example, seeking areas that

are good candidates for innovation and areas where the organization is already innovating with new technologies should be a collaborative effort between internal audit and stakeholders to ensure understanding of control measures and monitoring.

CAES IDENTIFY BEST CANDIDATES FOR ANALYTICAL COLLABORATION



Source: Polling question from the FSAC webinar, Leveraging Analytics and Data Visualization Techniques for Performance and Compliance Analysis in Internal Auditing (Presented by KPMG, June 7, 2018). Question 3: Which departments in your organization are the best candidates for analytical collaboration? Select all that apply. *n* = 150.

Communication and collaboration can make or break a mission to implement an analytics program. When attempting to implement:

- Thoroughly explain goals to relevant parties.
- Acquire sponsors, departments, and/or stakeholders to make the case.
- Understand and address others' concerns.
- Piggyback on existing projects when possible.
- Consider existing tools.
- Get quick wins to build confidence and trust.

Further, commit to developing an *innovation-driven* mindset, as opposed to a compliance-driven mindset. Pilot projects can build a case for internal audit initiatives, and considering structured approaches to internal audit innovation provides greater insights and value into processes (see The Innovation Imperative).

Prior to investing in technology, internal audit should provide an innovation-driven point of view in key areas:

- Analytics-driven continuous risk assessment.
- Dynamic audit planning.
- Data and analytics-enabled audit work plan.
- Data and analytics audit scoping and planning.
- Data and analytics-enabled audit execution.
- Enhanced dynamic reporting.

"The changes in technology and expectations surrounding analytics have created a lot of opportunities for our audit organization, including being able to more frequently collaborate and partner with various city staff and agencies that own and use the data systems. Such changes in expectations have also impacted the way that our audit organization conducted some of our work, particularly the quick-turnaround work for our continuous audit programs, while still adhering to government auditing standards."

Mark de la Rosa
Audit Deputy Director,
Office of the Controller
City and County of San Francisco

INTELLIGENT AUTOMATION IS CHANGING ANALYTICS DISCUSSIONS

Internal audit will play a critical role in the change

Audit leaders are paying attention

Intelligent automation is gaining interest from CAEs and audit leaders, creating both challenges and opportunities for internal audit. While it can completely transform an organization and increase efficiencies through improved business processes, one challenge has been internal audit's inability to keep pace with its evolving nature. This is especially true as it relates to the various *types* of automation tools involved and how they can be leveraged to improve auditing function and achieve a balance between human professionals and non-human automation.

Several tools and technologies can be used in audit and compliance programs. These tools and technologies can be broken into three general solution classes — robotics process automation, enhanced process automation, and cognitive automation. Internal audit should consider these solutions when reviewing the technology and data analytics component of a compliance program.

Robotic Process Automation (RPA)

Innovative internal audit groups are applying RPA to repetitive tasks that internal auditors perform such as filling in forms, making calculations, extracting structured data from documents, and accessing web and enterprise applications. When coupled with cognitive technologies and machine learning, future RPA will free internal auditors to spend more time developing insights and advising stakeholders (see The innovation Imperative).

63%

of participants in an IIA webinar said RPA and intelligent automation have not been widely discussed within their audit teams.

Less than

7%

have a pilot or proof of concept trial in place for RPA.

Characteristics:

- Working with structured data and within well-defined parameters, virtual robots can complete tasks autonomously.
- The tools sit at the presentation layer and do not infiltrate the IT system.
- Solutions are easily designed, quickly tested, and implemented with relatively low investment or expenditure.

Enhanced Process Automation

Enhanced process automation enables recognition of unstructured data and aids in adapting it to the business environment. With built-in knowledge and natural language processing capable of analyzing unstructured data, this machine-learning software is designed to support customer onboarding, transaction monitoring, and fraud prevention by identifying patterns in behavior that could indicate fraudulent payment activity (see Accelerating Automation).

Characteristics:

- Enables the capturing of process knowledge and applies the knowledge to instruct how the process should run.
- Based on evidence, defined process outcomes are generated and consistently carry a high probability of the desired output.
- Speeds up human analysis to drive the right decision.

Cognitive Automation

Cognitive automation — a subset of artificial intelligence — is the most recent entry into the digital labor space. It includes cognitive machine learning, language processing and big data analytics, and is creating sophisticated cognitive technologies that think and learn like humans (see Accelerating Automation).

Characteristics:

- Can be used for sophisticated cognitive hypothesis generation/advanced predictive analytics.
- Is costly to develop and implement, and generally requires a long lead.
- Reduces human error, but does not take humans out of the equation.

Audit Focus

1220.A1 – Internal auditors must exercise due professional care by considering the:

- Extent of work needed to achieve the engagement's objectives.
- Relative complexity, materiality, or significance of matters to which assurance procedures are applied.
- Adequacy and effectiveness of governance, risk management, and control processes.
- Probability of significant errors, fraud, or noncompliance.
- Cost of assurance in relation to potential benefits.

1220.A2 – In exercising due professional care internal auditors must consider the use of technology-based audit and other data analysis techniques**.**

1220.A3 – Internal auditors must be alert to the significant risks that might affect objectives, operations, or resources. However, assurance procedures alone, even when performed with due professional care, do not guarantee that all significant risks will be identified.

1220.C1 – Internal auditors must exercise due professional care during a consulting engagement by considering the:

- Needs and expectations of clients, including the nature, timing, and communication of engagement results.
- Relative complexity and extent of work needed to achieve the engagement's objectives.
- Cost of the consulting engagement in relation to potential benefits.

CLOSING THOUGHTS

Internal audit must be in position to keep pace

Technology is progressing rapidly; there is no turning back. Organizations are becoming more data-driven, placing internal audit at a critical point of decision — a *crossroads*. Without the use of data analytics, the probability of effectively identifying and evaluating risks in the digital age is very low. Data analytics provides a way to substantiate key risk areas, gives internal auditors the ability to perform control and transaction-based testing, and provides flexibility and a measurable way to make plans in environments that change time and time again (see Internal Audit: Driving enterprise value through data analytics).

Globally we see, and can expect to see more, internal audit hours spent using technology to identify and mitigate operational and strategic risks. This is where internal audit can add the most value. This change shows how internal auditing is multi-faceted and multi-disciplinary. Fully embracing analytics will advance internal audit along the maturity continuum; whereas, not embracing it could raise the risk of organizations succumbing to known and unknown risks.

It is exciting to see the impact technology has had, and will continue to have, on internal audit. Given the significant changes in stakeholder expectations, internal audit must position itself to keep pace and stay knowledgeable about technology and digital transformation, go as far as necessary to add data analytics to its tool set, and get ahead of the coming trends.

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The Financial Services Audit Center (FSAC) is a specialty offering of The IIA for financial services auditors. FSAC was established to provide financial services auditors with targeted high-quality professional development; networking opportunities for knowledge sharing among financial services stakeholders; and ongoing, timely, and relevant reporting on trends, benchmarking, and thought leadership in the internal audit profession. For more information, visit www.theiia.org/FSAC.

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