

Embracing Analytics in Auditing

Internal audit has started the journey toward enabling analytics in audit processes, but there's a long road ahead. Learn why in this report on key findings from Protiviti's 2017 Internal Audit Capabilities and Needs Survey.

Executive Summary

In a digital world, now is the time for internal audit functions to embrace analytics. This is the most significant takeaway from Protiviti's **2017 Internal Audit Capabilities and Needs Survey**, the results of which show that chief audit executives (CAEs) and internal audit professionals increasingly are leveraging analytics in the audit process, as well as for a host of continuous auditing and monitoring activities.

There is growing recognition that an “analog” approach to auditing is not a tenable long-term strategy for advancing the function into a higher-level role helping the organization understand and manage risk. Structured data is plentiful in all organizations — CAEs are feeling a responsibility to find the valuable insights, efficiencies and issues buried within. On the positive side, a majority of organizations are employing data analytics in their audit processes in one way or another and see significant value in its use. Yet as we explore in our special section, most are in the early stages of maturity and competency.

Our Notable Findings:

01

Data analytics is gaining a foothold in internal auditing — Two out of three departments utilize analytics as part of the audit process.

02

Most internal audit shops are still in their “analytics infancy” — A strong majority judge their analytics capabilities to be at the lower end of the maturity spectrum.

03

The more mature analytics capabilities are, the greater value they're perceived to deliver — Organizations with more advanced analytics capabilities in the internal audit department see greater value coming from data analytics.

04

Cybersecurity, cloud, mobile tech and big data are top-of-mind — These and other technology-related risks dominate the priority lists for CAEs and internal audit professionals.

05

Business and digital transformation is drawing more attention — Not only is this a much higher priority compared to prior years, but its effects are infiltrating most audit plans and activities.

Data Analytics and the Audit Process

Key Findings

01

Analytics are gaining a stronger foothold in internal audit functions — a majority employ data analytics as part of the audit process. Not surprisingly, however, most organizations rate their analytics capabilities at the lower end of the maturity spectrum.

02

Internal audit departments with dedicated analytics functions see the highest level of value from their analytics, as do those with designated analytics champions.

03

As internal audit shops embrace analytics and achieve more progress in how they use data, demand for analytics in the audit process is increasing. This underscores the need for internal audit to mature how it is using analytics and build processes, people and technology to handle the growing volume and more sophisticated requests.

04

Although the overall use and maturity of continuous auditing and monitoring remain relatively low, internal audit functions with more advanced continuous auditing and monitoring capabilities are achieving impressive benefits. These include strengthening risk assessments, more effectively tracking fraud indicators and key operational risk indicators, and enabling a real-time view of organizational risk.

When it comes to embracing and enhancing their use of data analytics, many internal audit functions have just begun their journeys. Most of the obstacles hindering internal audit's data analytics progress, such as budget and staffing constraints, are challenging enough, but one hurdle is particularly difficult: Internal auditors may not be fully aware of the benefits such capabilities can deliver.

The findings in this special section should provide helpful insights into these benefits by giving CAEs and internal audit professionals an inside view of the ways those with advanced analytics capabilities deliver value, source quality data, and deploy continuous auditing and monitoring to maintain an ongoing, real-time view of where risk is within the business.

Overview of Current and Planned Adoption

- • • **Does your internal audit department currently utilize data analytics as part of the audit process?**

Base: All respondents

Yes	66%
No	27%
Unsure	7%

- • • **Does your internal audit department have plans to implement data analytics as part of the audit process?**

Base: Respondents whose internal audit departments do not utilize data analytics as part of the audit process

Yes, we plan to do so within the next year	21%
Yes, we plan to do so within the next two years	43%
No, we do not plan to implement data analytics as part of the audit process	36%

In the remainder of this special section, responses shown are those for organizations that use data analytics in the internal audit function, and from survey participants who have a leadership role in the internal audit department or are part of the analytics function in the department.

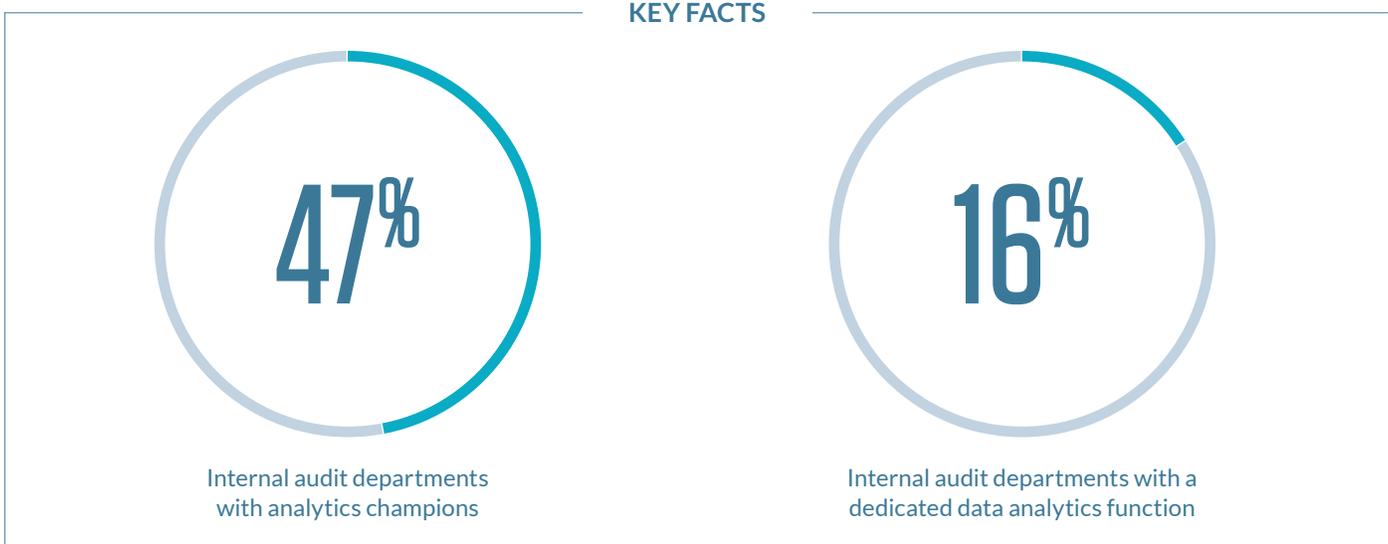
We recognize the power of developing data analytics and the ability to perform testing on 100 percent of a population versus our normal random sample selection of 25 percent. We have added an audit step to each of our audit programs to analyze the use of data analytics, even if it might be a small test.

– Director of auditing, large not-for-profit healthcare provider, North America

Current State of Analytics Capabilities

- • • Which of the following statements best defines the current maturity of your data analytics function?

Initial: Ad hoc processes that are undocumented	40%
Repeatable: Process is documented sufficiently so steps can be repeated	34%
Defined: Process is defined as a standard business process	16%
Managed: Process is quantitatively managed in accordance with agreed-upon metrics	7%
Optimized: Process management includes deliberate process improvement	3%



Please note that throughout this special section, we present selected findings from organizations that have analytics champions and a dedicated analytics function, and that are at the Managed/Optimized level of maturity with regard to their data analytics capabilities.

- • • **What percentage of total audits utilize some form of data analytics?**

	All organizations performing analytics	Organizations at Managed/Optimized state of analytics maturity
1%-25%	42%	13%
26%-50%	26%	39%
51%-75%	14%	10%
76%-100%	18%	38%

- • • **Compared to one year ago, how has the demand for data analytics services to support audits within your organization changed?**

	All organizations performing analytics	Organizations with analytics champions	Organizations with dedicated data analytics function	Organizations at Managed/Optimized state of analytics maturity
Increased significantly	20%	31%	49%	27%
Increased somewhat	53%	50%	42%	57%
No change	26%	19%	9%	16%
Decreased	1%	0%	0%	0%

Insights

- As expected, a majority of internal audit functions rate the maturity of their data analytics capabilities at the lower end of the spectrum.
- Demand for data analytics services from the internal audit group has increased dramatically across all organizations in the last year, especially among those with internal audit functions that have analytics champions and a dedicated analytics function. It is likely that as internal audit shops embrace analytics and achieve more progress in how they use data, this demand will continue to increase. This underscores

the need for internal audit to mature how it is using analytics and build processes, people and technology to handle the growing volume and more sophisticated requests. Overall, these are positive cultural trends that are shifting away from manual and sample-based audit approaches. Cultural change represents a major obstacle to successful implementation of an analytics function.¹

- All organizations, even those that have very immature analytics capabilities, indicate that a strong level of value is derived from including analytics in the audit process.

¹ *Changing Trends in Internal Audit and Advanced Analytics*, Protiviti, June 2015, www.protiviti.com.

- • • On a scale of 1 to 10, where “10” is a high level of value and “1” is little or no value, rate the level of value that your internal audit department receives from utilizing data analytics as part of the audit process:

All organizations performing analytics	Organizations with analytics champions	Organizations with dedicated data analytics function	Organizations at Managed/Optimized state of analytics maturity
6.9	7.3	7.7	8.1

- Organizations indicating that their analytics capabilities are at a higher state of maturity (albeit a relatively small segment of our survey population) derive notably higher value from integrating analytics into their audit processes compared to organizations whose internal audit functions demonstrate less mature analytics capabilities. This may be because they have people with the right skillsets, unlike other internal audit organizations that are more limited in terms of analytics skills. Another possibility is that mature organizations use analytics more pervasively throughout their audit plans and processes, enabling them to glean more value from these activities.
- Nearly half of internal audit functions with more advanced analytics capabilities utilize data analytics in a majority of the audits they perform — a significantly higher percentage compared to the overall respondent group. This may be because they have larger internal audit functions and thus more analytics personnel hours to dedicate to these audits. It also is possible that these groups have built repeatable or self-service tools that the business can use without internal audit having to be closely involved.
- Of note, many financial services organizations have a requirement that every audit must use data analytics, or the auditors must validate that they reviewed their scope and approach for data analytics use and justify why analytics cannot be used.
- Advancing the organization’s internal audit data analytics capabilities can be a challenge due to several factors, including completion of all typical audit plan activities, budget and headcount constraints, and a lack of knowledge and expertise with regard to advanced data analytics processes, measures, tools and innovations. Often, even internal audit leaders and professionals who desire to elevate their data analytics capabilities and functions to the next level do not know how to go about accomplishing this.
- Overcoming these constraints to build more sophisticated analytics processes requires a longer-term strategy and an implementation roadmap; carefully chosen and well-crafted pilot programs; and clear direction (e.g., investments in skills, tools and expertise) from CAEs and organizational leaders that data analytics represents a valuable facet of internal audit’s services and long-term value.

- • • **Which of the following tasks does the data analytics function currently perform? (Multiple responses permitted)**

Testing of entire populations	77%
Issue/trend analysis	66%
Sample selection	66%
Testing of individual controls	63%
Audit scoping	49%
Development and/or deployment of continuous auditing tools	39%
Risk assessment	39%
Quantification of audit observations	34%
Code review	20%

- • • **Average percentage of time spent by the data analytics function on the following activities:**

Individual audit support	31%
Building/administering monitoring tools	18%
Ad hoc requests	22%
Supporting the organization's data analytical needs outside of internal audit	10%
Administrative activities	9%
Other strategic tasks to advance the analytics function	10%

- • • **Estimated percentage of the total internal audit budget (in terms of dollars) dedicated to the data analytics function:**

0%-9%	25%
10%-19%	41%
20%-29%	23%
30%-39%	7%
40%-49%	1%
50%+	3%

Assessing Analytics Practices

- • • Organizations in which internal audit has its own data warehouse, or a similar dedicated environment, for accessing organizational data:

All organizations performing analytics	Organizations with analytics champions	Organizations with dedicated data analytics function	Organizations at Managed/Optimized state of analytics maturity
28%	36%	47%	55%

- • • Which of the following challenges have you experienced in gaining access to data within the organization? (Multiple responses permitted)

Identification of where data resides	60%
System constraints	56%
Coordination with corporate IT	54%
Data elements not currently captured	52%
Confidentiality/privacy safeguards	31%

KEY FACTS



Percentage of organizations in which the internal audit department has specific and defined protocols for the extraction of data leveraged during the audit process

Our internal audit data analytics program is constrained by the difficulty of gaining access and pulling data from internal data sources and systems.

– Director of auditing, large public real estate company, North America

- • • **Which of the following do the data extraction protocols include? (Multiple responses permitted)**

Base: Internal audit departments that have specific and defined protocols for the extraction of data leveraged during the audit process

Completeness	92%
Conformity	77%
Data quality	88%
Reliability	86%

- • • **How would you rate your organization's quality of available data for analytics purposes?**

	All organizations performing analytics	Organizations with analytics champions	Organizations with dedicated data analytics function	Organizations at Managed/Optimized state of analytics maturity
Excellent	3%	4%	7%	5%
Very good	19%	23%	28%	43%
Good	45%	44%	42%	43%
Fair	29%	28%	20%	7%
Poor	4%	1%	3%	2%

- • • **In terms of the data you utilize in the analytics process, please indicate which of the following you are performing. (Multiple responses permitted)**

Using internal sources only	91%
Leveraging publicly available external sources	22%
Purchasing external data for use	5%

Insights

- Data quality and availability represent significant barriers to performing analytics. Specifically, the most oft-cited challenge to accessing data in the organization is identifying where the data resides. Further, fewer than one in four organizations rate the quality of data available for analytics purposes to be excellent or good.
- Organizations with a dedicated analytics function, along with those at a more mature state in their data analytics capabilities, judge their data quality to be significantly better than that of other organizations performing analytics work.
- Other challenges to accessing data include system constraints, coordination with corporate IT functions and needed data elements that the company does not capture.
- Given the prevalence of data access and quality challenges, it is not surprising to learn that a relatively small number of internal audit shops that are utilizing analytics — just over one in four — maintain their own data warehouse. Note that those internal audit departments demonstrating more advanced approaches to the data analytics process (e.g., dedicated analytics function, designated champions) are far more likely to maintain their own data warehouse, or a similar dedicated environment, for accessing organizational data.
- With regard to few internal audit shops having their own data warehouse, many likely are pulling data from the same warehouse that the business uses. Having access to the organization's data warehouse often is sufficient, but some internal audit groups lack this access. In addition, a dedicated data warehouse affords internal audit the advantage of being able to manipulate data and conduct testing in a sandbox. That said, not every internal audit group requires a dedicated data warehouse. Each shop should assess its own needs and circumstances.
- Defined protocols and more varied data sources are two areas where there is substantial room for improvement. Just 30 percent of internal audit functions have defined protocols governing the extraction of data used during the audit process.
- More than 90 percent of internal audit functions use internal data sources exclusively in their analytics processes. This indicates a great opportunity to seek out external data sources that can enable benchmarks or other related comparisons that may provide management with a unique perspective not previously considered. Of note, organizations with mature analytics capabilities are more likely to leverage publicly available external data sources, as well.
- Without external data sources, one key element internal audit groups lack is the ability to validate and benchmark against the industry to ensure objectivity. Consider receivables, for example. Having data on the volume of receivables competitors report may tell an organization whether it is carrying more risk than similar organizations. External data enables organizations to benchmark key risk indicators against other companies based on similar size, industry and other factors. Another example is hedging: External data sources can provide historic industry information such as market trends over time, which could help identify risks and issues with the organization's hedging process.

Continuous Auditing

- • • Organizations in which internal audit is employing continuous auditing:

All organizations performing analytics	Organizations with analytics champions	Organizations with dedicated data analytics function	Organizations at Managed/Optimized state of analytics maturity
37%	38%	51%	62%

- • • Which of the following statements best describes your internal audit department's progress in building continuous auditing tools?

Base: Organizations in which internal audit is employing continuous auditing

We have a very mature process with access to usable dashboards, drilldown capabilities, etc., covering many areas of the business	15%
We have built some pilot tools that we have been using successfully and have a specific roadmap for the build/rollout of many others	53%
We have specific plans of what we are going to do, how and when, but we do not currently have something in use	25%
We do not have plans to implement continuous auditing tools in the short term	7%

- • • Which of the following activities is continuous auditing used for? (Multiple responses permitted)

Base: Organizations in which internal audit is employing continuous auditing

Risk assessment input	64%
Audit planning/scoping	61%
Valuation of risk control self-assessments (RCSAs) monitoring key risk indicators (KRIs)	54%

- • • **Which of the following do you currently monitor? (Multiple responses permitted)**

Base: Organizations in which internal audit is employing continuous auditing

Specific areas where there are known issues	62%
Data related to controls in scope for compliance initiatives	60%
Fraud risk indicators	55%
Important KRIs in operational processes	49%
Information used for monitoring and strategic decision-making by management	30%

- • • **Who provided input into determining what continuous auditing tools are being built and/or used? (Multiple responses permitted)**

Base: Organizations in which internal audit is employing continuous auditing

Business area owners	44%
IT auditors	44%
Business process auditors	39%
Analytics team	31%
Compliance	31%
Third-party consultants	14%
Industry peers	10%

- • • **Which of the following individuals/groups provided input into determining what data is being monitored by continuous auditing tools? (Multiple responses permitted)**

Business area owners	52%
Business process auditors	43%
IT auditors	35%
Analytics team	34%
Compliance	33%
Industry peers	13%
Third-party consultants	9%

Insights

- The use of continuous auditing remains surprisingly low — only 37 percent of all internal audit functions that utilize data analytics employ continuous auditing.
- Internal audit groups with dedicated analytics functions (51 percent) and organizations that have attained a Managed or Optimized state of analytics maturity (62 percent) are far more likely to conduct continuous auditing. Having a dedicated data analytics function and moving up the analytics maturity scale go hand-in-hand with continuous auditing capabilities.
- Furthermore, among organizations that employ continuous auditing, just 15 percent deploy “very mature” continuous auditing processes (those with access to usable dashboards, drilldown capabilities and similar functionality) that cover many areas of the business. A majority have built some tools that they have used successfully and developed a specific roadmap for the development and rollout of additional continuous auditing coverage.
- More progress with continuous auditing undoubtedly is needed, but it is promising to see that many internal audit functions are employing continuous auditing to support risk assessment input, audit planning/scoping, and the valuation of risk control self-assessments, along with the monitoring of operational key risk indicators.
- Most audit functions have a significant opportunity to enhance continuous auditing by improving their tracking of operational KRIs, fraud risk indicators and information used in management’s strategic decision-making. These types of advancements can help internal audit develop and/or sharpen two important practices: (1) the ability to maintain a picture of organizational risk (where it resides and its magnitude) on an increasingly real-time basis, and (2) making progress toward a more risk-based auditing approach.
- The most sought-after sources for input regarding what is continuously audited and what tools to use are business owners, although strong opportunities exist to collaborate more consistently with broader sets of stakeholders.

The first step is working with our IT team and business units to improve the quality of the data, then move to incorporate data analytics into audit testing and continuous monitoring.

— Chief audit executive, large public energy company, Asia-Pacific

10 Data Analytics Action Items for CAEs and Internal Audit

1. Recognize that the demand for data analytics in internal auditing is growing across all organizations and industries. This trend is certain to continue as more organizations undergo business and digital transformation initiatives, and as regulators increasingly call for organizations to use analytics.
2. Seek out opportunities to expand internal audit's knowledge of sophisticated data analytics capabilities so that the function has a more comprehensive and precise understanding of what is possible with analytics, what similar organizations are doing with analytics, as well as what progress is needed to advance these capabilities.
3. Understanding that budget and resource constraints, along with business-as-usual workloads, can limit internal audit's ability to optimize its data analytics efforts, try conducting even modest demonstrations of analytics capabilities that can set an influential tone and are positive steps toward building a stronger internal audit data analytics function.
4. Consider the use of champions to lead the analytics effort and, when appropriate, to create a dedicated analytics function. Having champions helps to bridge the gap between the analytics function and operational auditors. It also encourages more analytics use, including basic usage by the whole team. Compared to other organizations, those with analytics champions and dedicated analytics functions in place deliver more value, experience higher demand for their analytics services and obtain better access to higher-quality data.
5. Explore avenues to expand internal audit's access to quality data, and implement protocols (including those related to completeness, conformity, data quality and reliability) that govern the extraction of data used during the audit process.
6. Identify new data sources, both internal and external, that can enhance internal audit's view of risk across the organization.
7. Increase the use and reach of data-based continuous auditing and monitoring to perform activities such as monitoring fraud indicators, KRIs in operational processes, and information used in the leadership team's strategic decision-making activities.
8. Leveraging continuous auditing, develop real-time snapshots of the organization's risks and incorporate results into a risk-based audit approach that is adaptable and flexible enough to focus on the highest areas of risk at any point in time.
9. Seek ways to increase the level of input stakeholders provide when building and using continuous auditing tools and when determining what data should be monitored by these tools. It is important that the effort is focused on building tools that internal audit can leverage to monitor risk in the business. Many different stakeholders have important insights to help determine areas of focus.
10. Implement steps to measure the success of your data analytics efforts, and also consider the most effective ways to report success and value to management and other key stakeholders. Internal audit groups that can successfully demonstrate tangible value will build a stronger business case for increased budgets and resources dedicated to a data analytics function, as well as underscore throughout the organization the importance of analytics and, in the process, boost internal audit's reputation internally.

Methodology

In each of the following sections (General Technical Knowledge, Audit Process Knowledge, and Personal Skills and Capabilities), respondents were asked to assess, on a scale of 1 to 5, their competency in different areas of knowledge important to internal auditing, with “1” being the lowest level of competency and “5” being the highest. For each area, they were then asked to indicate whether they believe their level of knowledge is adequate or requires improvement, taking into account the circumstances of their organization and industry. The areas of knowledge under consideration are listed in each section, along with perceptual maps that visualize comparisons of “Need to Improve” versus “Competency” ratings.



General Technical Knowledge

Key Findings

01 Technology-related risks – particularly those related to cybersecurity, cloud computing, mobile technology and big data – dominate the priority lists for CAEs and internal audit professionals.

02 A number of technology-centered internal audit and accounting standards rank as the top areas cited for improvement, specifically the AICPA’s Criteria for Management’s Description of an Entity’s Cybersecurity Risk Management Program (Exposure Draft); the Cloud Computing Accounting Standard from FASB; and GTAG – Auditing Smart Devices: An Internal Auditor’s Guide to Understanding and Auditing Smart Devices.

03 In the past year, internal audit’s focus on business and digital transformation has increased significantly.

04 Other notable priorities include emerging technology-related issues such as cloud computing, big data and business intelligence, cybersecurity risk/threat, the NIST Cybersecurity Framework, mobile applications, ISO 27000 (information security), and the Internet of Things.



• • • Overall Results, General Technical Knowledge

"Need to Improve" Rank	Areas Evaluated by Respondents	Competency (5-pt. scale)
1	AICPA's Criteria for Management's Description of an Entity's Cybersecurity Risk Management Program (Exposure Draft)	1.9
2 (tie)	FASB Cloud Computing Accounting Standard – (Accounting Update 2015-05 – Intangibles – Goodwill and Other – Internal-Use Software (Subtopic 350-40): Customer's Accounting for Fees Paid in a Cloud Computing Arrangement)	1.8
	GTAG – Auditing Smart Devices: An Internal Auditor's Guide to Understanding and Auditing Smart Devices	1.9
3	Cloud computing	2.3
4 (tie)	Big data/business intelligence	2.4
	Cybersecurity risk/threat	2.6
5	Business/digital transformation	2.2

Insights

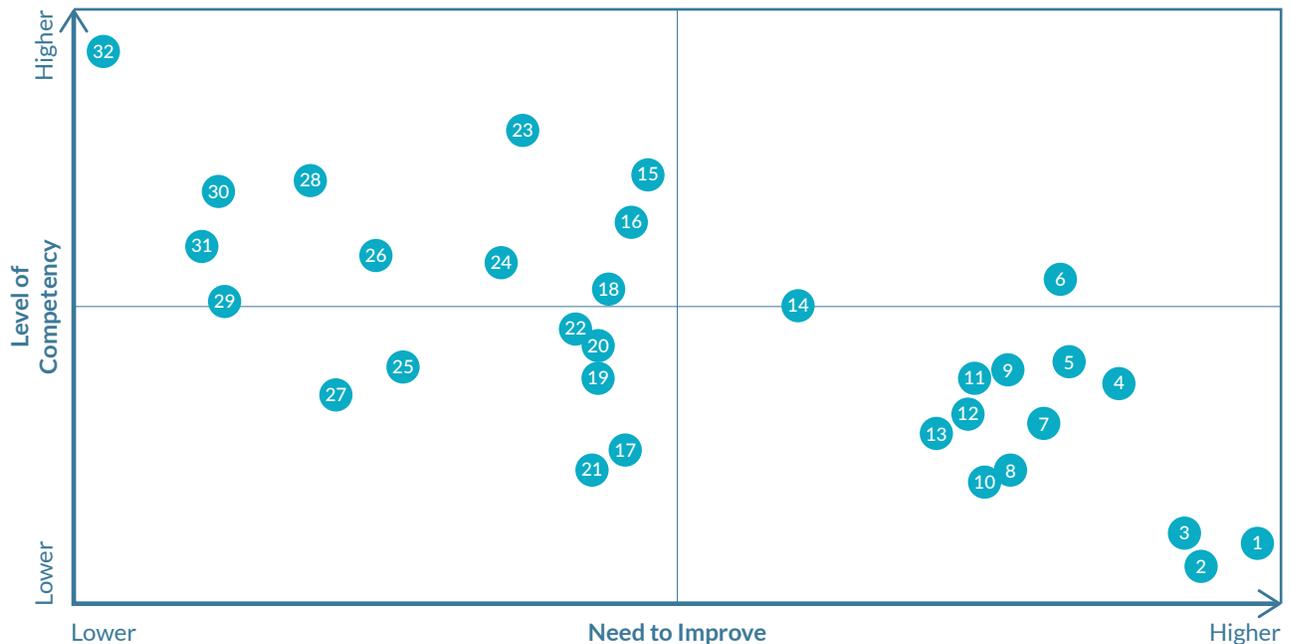
Each of the top five priorities identified this year is technology-related. These focal points include new standards related to cybersecurity, cloud computing and mobile technology (i.e., smart devices), as well as a range of issues related to the organization's growing reliance on data, analytics, business intelligence systems and related applications. Further down the list (see page 20), data and technology challenges pervade higher-ranked priorities, which include cybersecurity risk/threat, business/digital transformation, the NIST Cybersecurity Framework, mobile applications, ISO 27000 (information security), and the Internet of Things.

Of note, business/digital transformation has increased significantly in priority this year compared to our 2016 survey results, in which it ranked in the middle of the pack (specifically, 18th). This shift reflects the widespread pursuit of digital transformation by many organizations, as well as the intention of internal audit functions to keep pace with digital transformation. Doing so, however, will be difficult. Digital transformation can permeate every area of the organization and frequently drives fundamental overhauls to business models, workforces and other organizational structures. It is up to internal audit to determine the extent to which organizational risk oversight and internal controls are adapting to these major changes. Fulfilling that mandate requires a broad range of organizational knowledge and technical expertise, in addition to close collaboration with senior management and key leaders throughout the organization.

Action Items for CAEs and Internal Auditors

- As organizations become more digital and data-driven, internal audit must keep pace on two fronts: 1) building knowledge of a wide range of emerging technologies and their effects, both short- and long-term, on risk management and internal controls, and 2) ensuring that the function — and the organization — are aware of and understand new standards and rules related to these emerging technologies.
- There is an interesting dynamic with regard to data management advancement and new rules and standards. Technology advancements typically outpace standards and rules, so internal audit must keep pace on both counts and understand where the gaps exist between regulations and standards, on the one hand, and effective risk management on the other.
- Big data/business intelligence is an interesting priority because it involves the protection of data (inside and outside the organization) from a security and privacy perspective, as well as the use of that data within business intelligence applications. Internal audit should focus on how data is protected and used — activities that give rise to distinct risks and controls challenges.

• • • General Technical Knowledge – Perceptual Map



- • • **Areas of General Technical Knowledge**

1	AICPA'S Criteria for Management's Description of an Entity's Cybersecurity Risk Management Program (Exposure Draft)	17	Lease Accounting Standard – Accounting Standards Update (ASU) No. 2016-02, Leases (Topic 842)
2	FASB Cloud Computing Accounting Standard – (Accounting Update 2015-05 – Intangibles – Goodwill and Other – Internal-Use Software (Subtopic 350-40): Customer's Accounting for Fees Paid in a Cloud Computing Arrangement)	18	Country-specific enterprise risk management framework
3	GTAG – Auditing Smart Devices: An Internal Auditor's Guide to Understanding and Auditing Smart Devices	19	Practice Guide – Talent Management
4	Cloud computing	20	Revenue Recognition Standard (Financial Accounting Standards Board (FASB) Accounting Standards Update No. 2014-09)
5	Big data/business intelligence	21	Six Sigma
6	Cybersecurity risk/threat	22	COBIT
7	Business/digital transformation	23	Fraud risk management
8	NIST Cybersecurity Framework	24	Practice Guide – Internal Audit and the Second Line of Defense
9	Mobile applications	25	International Financial Reporting Standards (IFRS)
10	ISO 27000 (information security)	26	Practice Guide – Audit Reports: Communicating Assurance Engagement Results
11	Internet of Things	27	Going Concern Standard – Update No. 2014-15 – Presentation of Financial Statements – Going Concern (Subtopic 205-40): Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern
12	Agile risk and compliance	28	IIA International Professional Practices Framework (IPPF) (updated, effective January 1, 2017)
13	GTAG – Assessing Cybersecurity Risk: Roles of the Three Lines of Defense	29	Corporate social responsibility
14	Auditing corporate culture	30	Reporting on Controls at a Service Organization – SSAE 16/AU 324 (also known as SOC 1, 2 or 3)
15	Enterprise risk management – aligning risk with strategy and performance (COSO Enterprise Risk Management Framework)	31	Foreign Corrupt Practices Act
16	Vendor risk management	32	2013 COSO Internal Control – Integrated Framework

- • • Overall Results, General Technical Knowledge – Three-Year Trends

2017	2016	2015
AICPA'S Criteria for Management's Description of an Entity's Cybersecurity Risk Management Program (Exposure Draft)	ISO 27000 (information security)	GTAG 16 – Data Analysis Technologies
FASB Cloud Computing Accounting Standard – (Accounting Update 2015-05 – Intangibles – Goodwill and Other – Internal-Use Software (Subtopic 350-40): Customer's Accounting for Fees Paid in a Cloud Computing Arrangement)		
GTAG – Auditing Smart Devices: An Internal Auditor's Guide to Understanding and Auditing Smart Devices	Mobile applications	NIST Cybersecurity Framework
Cloud computing	NIST Cybersecurity Framework	Mobile applications
Big data/business intelligence	GTAG 16 – Data Analysis Technologies	Practice Advisory 2320-4 – Continuous Assurance
Cybersecurity risk/threat	Internet of Things	The Guide to the Assessment of IT Risk (GAIT)
Business/digital transformation	Agile risk and compliance	

Focus on Chief Audit Executives

The top priorities for CAEs mirror the overall findings, with two notable differences. Internal audit leaders rank the Internet of Things and mobile applications notably higher as priorities compared to the overall respondent

group. CAEs recognize the transformational impacts that the Internet of Things and mobile applications are exerting throughout the organization, including but not limited to the cybersecurity risks that these technologies introduce to the organization.

• • • CAE Results, General Technical Knowledge

"Need to Improve" Rank	Areas Evaluated by Respondents	Competency (5-pt. scale)
1	AICPA'S Criteria for Management's Description of an Entity's Cybersecurity Risk Management Program (Exposure Draft)	2.0
2 (tie)	GTAG – Auditing Smart Devices: An Internal Auditor's Guide to Understanding and Auditing Smart Devices	2.1
	FASB Cloud Computing Accounting Standard – (Accounting Update 2015-05 – Intangibles – Goodwill and Other – Internal-Use Software (Subtopic 350-40): Customer's Accounting for Fees Paid in a Cloud Computing Arrangement)	1.9
3	Cloud computing	2.5
4 (tie)	Big data/business intelligence	2.6
	Internet of Things	2.4
5 (tie)	Mobile applications	2.5
	Business/digital transformation	2.3

- • • CAE Results, General Technical Knowledge – Three-Year Trends

2017	2016	2015
AICPA'S Criteria for Management's Description of an Entity's Cybersecurity Risk Management Program (Exposure Draft)	Big data/business intelligence	NIST Cybersecurity Framework
GTAG – Auditing Smart Devices: An Internal Auditor's Guide to Understanding and Auditing Smart Devices		
FASB Cloud Computing Accounting Standard – (Accounting Update 2015-05 – Intangibles – Goodwill and Other – Internal-Use Software (Subtopic 350-40): Customer's Accounting for Fees Paid in a Cloud Computing Arrangement)	ISO 31000 (risk management)	Mobile applications
Cloud computing		
Big data/business intelligence	ISO 9000 (quality management and quality assurance)	GTAG 16 – Data Analysis Technologies
Internet of Things	GTAG 17 – Auditing IT Governance	The Guide to the Assessment of IT Risk (GAIT)
Mobile applications		
Business/digital transformation	Auditing corporate culture	ISO 27000 (information security)

Audit Process Knowledge

Key Findings

01

Data analytics dominates the priority lists for internal audit functions. As detailed earlier in our report, internal audit continues to focus on improving its use of data analytics – data manipulation and statistical analysis tools, in particular – to enhance technology-enabled auditing capabilities such as continuous auditing and continuous monitoring.

02

Not surprisingly, two related areas of auditing IT (new technologies and security) rank among the top priorities at a time when cybersecurity continues to score high in most organizations' risk assessments.

• • • Overall Results, Audit Process Knowledge

"Need to Improve" Rank	Areas Evaluated by Respondents	Competency (5-pt. scale)
1	Data analytics	2.9
2	Data analytics tools – data manipulation	2.7
3	Data analytics tools – statistical analysis	2.7
4	Auditing IT – new technologies	2.6
5	Continuous auditing	2.9



Insights

As organizations become increasingly data-driven, internal audit functions are integrating more data management analyses, approaches and tools into their work. Top priorities this year, for both overall respondents and CAEs, involve the internal audit function's use of data analytics.

Technology-enabled auditing — which includes data analysis, continuous auditing and monitoring, and the use of computer-assisted audit tools (CAATs) — remains a top priority. A focus on data analytics is crucial today, especially given the relatively immature state of data analytics capabilities within internal audit functions. As we detailed earlier in our report, of the two-thirds of internal audit shops that are utilizing data analytics as part of the audit process, most rate themselves to be in the lower stages of maturity. There is recognition that most internal audit shops have substantial room for growth and improvement in their data analytics capabilities.

In addition to enhancing their use of data analytics and related forms of technology-enabled auditing, internal audit remains dedicated to addressing fraud. While not among the highest priorities this year, monitoring, detecting and investigating fraud still rank among

the top 10 areas for improvement cited by internal auditors. The ability to prevent and detect fraud is strengthened by mature data analysis capabilities, which provide a quantifiable and more complete method for assessing and monitoring fraud risk.

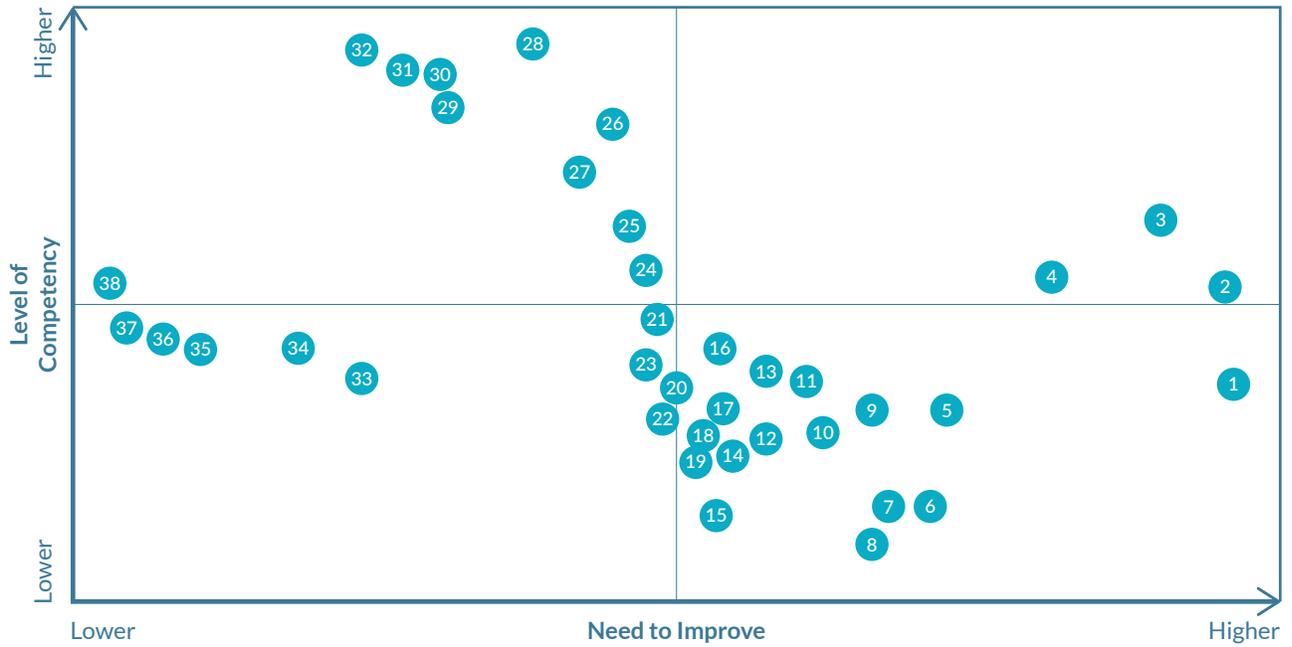
Auditing the IT environment is also a key area of focus. The abundance of new technologies entering the organization in recent years and the daunting nature of cybersecurity risks are forcing internal audit to adapt continually and improve IT auditing capabilities. Of course, these capabilities must be applied well beyond the IT department as more functions and business units deploy new technologies or enter into arrangements directly with service providers.

Finally, it is interesting to see that The IIA's Quality Assurance and Improvement Program (Standards 1300 and 1311) appears to be much less of a priority this year compared to our 2016 results, in which it ranked among the top five areas in the category. Last year, the overall results suggested that there were concerns about the requirements for passing the quality assurance review (QAR). The fact that this concern has lessened is good news; however, internal audit functions of all sizes should embrace quality assurance as an ongoing priority.

Action Items for CAEs and Internal Auditors

- With regard to auditing various IT systems and processes, keep in mind that this priority is enterprisewide. Most functions and business units have adopted new technologies and tools. Some functions, like marketing in many industries, have become major buyers of new technology — and in many cases, the CIO may not even be involved. When auditing technology risks, the internal audit function needs to focus beyond the traditional IT function.
- Consider the role of third-party vendors in the organization's growing use of cloud technology — specifically, tools, data and controls that may now reside with vendors.

- • • **Audit Process Knowledge – Perceptual Map**



Data analytics is a good way to credentialize our findings. It provides specific examples of process and control failures.

– Chief audit executive, midsize public manufacturing company, North America

- • • **Areas of Audit Process Knowledge**

1	Data analytics	20	Quality Assurance and Improvement Program (IIA Standard 1300) – Periodic Self-Assessments (IIA Standard 1311)
2	Data analytics tools – data manipulation	21	Auditing IT – continuity
3	Data analytics tools – statistical analysis	22	Auditing IT – computer operations
4	Auditing IT – new technologies	23	Fraud – fraud risk
5	Continuous auditing	24	Auditing IT – IT governance
6	Fraud – monitoring	25	Operational auditing – effectiveness, efficiency and economy of operations approach
7	Data analytics tools – sampling	26	Quality Assurance and Improvement Program (IIA Standard 1300) – External Assessment (Standard 1312)
8	Continuous monitoring	27	Auditing IT – change control
9	Auditing IT – security	28	Self-assessment techniques
10	Fraud – fraud detection/investigation	29	Assessing risk – process, location, transaction level
11	Assessing risk – emerging issues	30	Top-down, risk-based approach to assessing internal control over financial reporting
12	Enterprisewide risk management	31	Assessing risk – entity level
13	Fraud – management/prevention	32	Presenting to senior management
14	Fraud – fraud risk assessment	33	Operational auditing – risk-based approach
15	Marketing internal audit internally	34	Report writing
16	Fraud – auditing	35	Audit sampling principles
17	Quality Assurance and Improvement Program (IIA Standard 1300) – Ongoing Monitoring (IIA Standard 1311)	36	Audit planning – process, location, transaction level
18	Auditing IT – program development	37	Audit planning – entity level
19	Operational auditing – cost effectiveness/cost reduction	38	Audit scoping

- • • Overall Results, Audit Process Knowledge – Three-Year Trends

2017	2016	2015
Data analytics	Data analysis tools – statistical analysis	Auditing IT – security
Data analytics tools – data manipulation	Auditing IT – security	Computer-assisted audit tools (CAATs)
Data analytics tools – statistical analysis	Auditing IT – continuity	Data analysis tools – data manipulation
Auditing IT – new technologies	Fraud – fraud detection/ investigation	Marketing internal audit internally
Continuous auditing	Quality Assurance and Improvement Program (IIA Standard 1300) – Ongoing Reviews (IIA Standard 1311)	Fraud – monitoring
	Auditing IT – program development	

Focus on Chief Audit Executives

The survey results for CAEs suggest that internal audit leaders and their teams are aligned on their technology-related auditing priorities. This harmony is important given the ways in which technology is

transforming organizations, elevating cybersecurity risks, and presenting internal audit functions with highly valuable opportunities to increase their efficiency and effectiveness via technology-enabled auditing approaches. CAEs also remain highly focused on fraud prevention, monitoring, detection and investigation.

- • • CAE Results, Audit Process Knowledge

"Need to Improve" Rank	Areas Evaluated by Respondents	Competency (5-pt. scale)
1	Data analytics tools – data manipulation	2.7
2	Data analytics	3.1
3	Data analytics tools – statistical analysis	2.8
4	Auditing IT – new technologies	2.8
5	Continuous auditing	3.0

- • • CAE Results, Audit Process Knowledge – Three-Year Trends

2017	2016	2015
Data analytics tools – data manipulation	Continuous monitoring	Auditing IT – security
Data analytics	Marketing internal audit internally	Computer-assisted audit tools (CAATs)
Data analytics tools – statistical analysis	Quality Assurance and Improvement Program (IIA Standard 1300) – External Assessment (Standard 1312)	Data analysis tools – data manipulation
Auditing IT – new technologies	Fraud – management/prevention	Continuous auditing
Continuous auditing	Auditing IT – continuity	Data analysis tools – statistical analysis
	Auditing IT – new technologies	

Personal Skills and Capabilities

Key Findings

01 Using and mastering new technology and applications represents the top internal audit personal skills priority, reflecting the gap between existing skills in the internal audit function and what is needed.

02 Developing other board relationships (beyond the audit committee) also marks a top priority, followed by strategic thinking, presenting (small groups) and negotiation.

03 For CAEs, perhaps the most notable priority is working across generations and multigenerational workforce management.



- • • Overall Results, Personal Skills and Capabilities

"Need to Improve" Rank	Areas Evaluated by Respondents	Competency (5-pt. scale)
1	Using/mastering new technology and applications	3.1
2	Developing other board committee relationships	2.8
3	Strategic thinking	3.2
4	Presenting (small groups)	3.3
5	Negotiation	3.1

Insights

There are substantial changes in the top personal skills priorities for internal auditors compared to our prior year findings. The overall results show that internal auditors are committed to mastering new technology and developing relationships with board committees (in addition to the audit committee). Neither of these cracked the top 10 list in our 2016 results. This significant shift is another reflection of the impact of new technology on increasingly data-driven organizations (and on business risks), as well as the growing need for deeper collaboration between internal audit leaders and the board of directors.

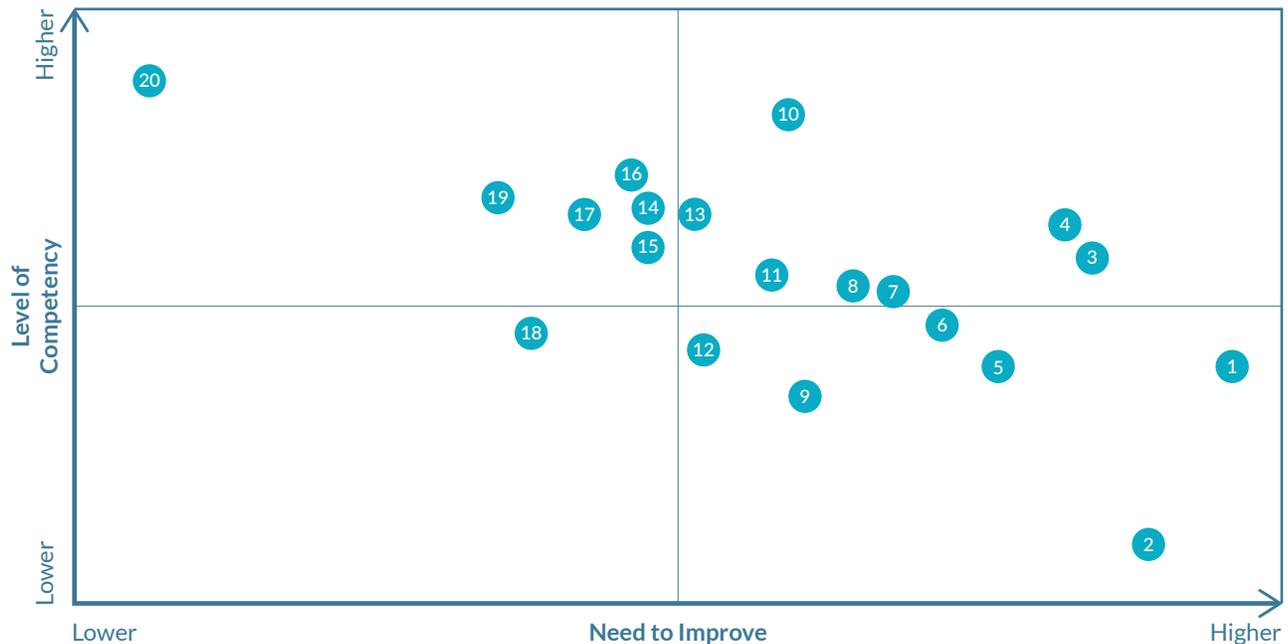
While CAEs have consistently worked to broaden their strategic expertise by improving their own relationships with other board committees, this year’s findings show that the internal audit function as a whole also is working to help CAEs achieve this objective. The fact that all respondents identified strategic thinking as a top priority provides further evidence of a function seeking to work in unison with its leadership to apply its expertise at a strategic level.

By focusing on presenting to small groups and on building their negotiation skills, internal auditors recognize the need to more effectively — and more proactively — influence their business partners on matters concerning risk oversight and internal controls.

Action Items for CAEs and Internal Auditors

- Consider how to focus skills development and trainings on strategic thinking, as well as new technologies and presenting effectively. There appears to be growing recognition that boards and management are seeking more than a checklist auditing approach. Key takeaways and learnings from the 2015 Global Internal Audit Common Body of Knowledge (CBOK) Stakeholder Study conducted by the The IIA Foundation and Protiviti underscore this point.³ In addition to prioritizing the foundational elements of internal auditing (which remains critical), boards and management want their internal audit teams to focus on strategic risks along with operational, financial and compliance risks, and to evaluate and communicate key risks to the board and management. The skills and capabilities noted among the top priorities in this category can support the achievement of these objectives.
- Given their concerns about working with and managing a multigenerational workforce, CAEs should consider how they might participate in the organization’s talent management strategy. This could both enhance their knowledge base as managers and make them aware of differing preferences and tendencies among generations that could create risks to the organization if neglected.

• • • Personal Skills and Capabilities – Perceptual Map



³ 2015 Global Internal Audit CBOK Stakeholder Study, <https://na.theiia.org/iia/f/Pages/Common-Body-of-Knowledge-CBOK.aspx>.

- • • **Areas of Personal Skills and Capabilities**

1	Using/mastering new technology and applications	11	Working across generations/multigenerational workforce management
2	Developing other board committee relationships	12	Creating a learning internal audit function
3	Strategic thinking	13	Leadership (within your organization)
4	Presenting (small groups)	14	Dealing with confrontation
5	Negotiation	15	Leadership (within the internal audit profession)
6	Developing outside contacts/networking	16	Coaching/mentoring
7	Persuasion	17	Developing rapport with senior executives
8	High-pressure meetings	18	Change management
9	Developing audit committee relationships	19	Leveraging others' expertise
10	Time management	20	Presenting (public speaking)

- • • Overall Results, Personal Skills and Capabilities – Three-Year Trends

2017	2016	2015
Using/mastering new technology and applications	Developing audit committee relationships	Using/mastering new technology and applications
Developing other board committee relationships	Presenting (public speaking)	Persuasion
Strategic thinking	Developing outside contacts/networking	Developing other board committee relationships
Presenting (small groups)	Strategic thinking	Strategic thinking
Negotiation	High-pressure meetings	Time management
	Dealing with confrontation	

Focus on Chief Audit Executives

The findings from CAEs are comparable to the overall response, with one notable exception: Internal audit executives rate working across generations/multi-generational workforce management among their top priorities. This emphasis reflects a recognition of the workforce’s rapidly changing demographics — a shift that in most cases will accelerate as large numbers of baby boomers retire in the coming years.

This workforce transformation challenges CAEs on two fronts. First, it requires their leadership teams to develop and deploy recruiting, training and management approaches that align with millennials’ unique preferences. Second, it requires internal audit functions to recognize how different generations respond (both positively and negatively) to workplace controls. According to a recent Protiviti white paper, some organizations have discovered that traditional strategies for educating staff about health and safety, loss prevention, data security and privacy, and other critical topics are failing to engage millennials.⁴

⁴ Millennial Communication 101: Adapting to the Mindset of a Rapidly Growing Generation in the Workforce, Protiviti: www.protiviti.com/US-en/insights/millennial-communication-101.

- • • **CAE Results, Personal Skills and Capabilities**

“Need to Improve” Rank	Areas Evaluated by Respondents	Competency (5-pt. scale)
1	Using/mastering new technology and applications	3.1
2	Developing other board committee relationships	3.3
3	Working across generations/multigenerational workforce management	3.3
4 (tie)	Strategic thinking	3.4
	Presenting (small groups)	3.5
5	Developing outside contacts/networking	3.3

- • • **CAE Results, Personal Skills and Capabilities – Three-Year Trends**

2017	2016	2015
Using/mastering new technology and applications	Developing outside contacts/networking	Using/mastering new technology and applications
Developing other board committee relationships	Strategic thinking	Developing other board committee relationships
Working across generations/multigenerational workforce management	Dealing with confrontation	Persuasion
Strategic thinking	Developing audit committee relationships	Strategic thinking
Presenting (small groups)	High-pressure meetings	Leveraging others’ expertise
Developing outside contacts/networking	Change management	

Methodology and Demographics

More than 900 respondents (n = 906) completed questionnaires for Protiviti's Internal Audit Capabilities and Needs Survey, which was conducted online in the fourth quarter of 2016.

The survey consisted of a series of questions grouped into four divisions:

- Data Analytics and the Audit Process
- General Technical Knowledge
- Audit Process Knowledge
- Personal Skills and Capabilities

Participants were asked to assess their skills and competency by responding to questions concerning nearly 200 topic areas. Respondents from the manufacturing, U.S. financial services and U.S. healthcare industries

were also asked to assess industry-specific skills (these findings are available upon request). The purpose of this annual survey is to elicit responses that will illuminate the current perceived levels of competency in the many skills necessary to today's internal auditors, and to determine which knowledge areas require the most improvement.

Survey participants also were asked to provide demographic information about the nature, size and location of their businesses, and their titles or positions within the internal audit department. These details were used to help determine whether there were distinct capabilities and needs among different sizes and sectors of business or among individuals with different levels of seniority within the internal audit profession. All demographic information was provided voluntarily by respondents.



- • • **Position**

Chief Audit Executive (CAE)	19%
Director of Auditing	10%
IT Audit Director	2%
Audit Manager	20%
IT Audit Manager	3%
Audit Staff	23%
IT Audit Staff	6%
Corporate Management	3%
Other	14%

- • • **Size of Organization (by gross annual revenue)**

\$20 billion +	12%
\$10 billion - \$19.99 billion	10%
\$5 billion - \$9.99 billion	12%
\$1 billion - \$4.99 billion	31%
\$500 million - \$999.99 million	13%
\$100 million - \$499.99 million	12%
Less than \$100 million	10%

- • • **Industry**

Financial Services (U.S.)	18%
Government/Education/Not-for-profit	10%
Manufacturing	9%
Healthcare (U.S.) – Provider	9%
Insurance (excluding healthcare payer)	6%
CPA/Public Accounting/Consulting Firm	5%
Technology	5%
Energy	4%
Retail	4%
Financial Services (Non-U.S.)	3%
Services	2%
Healthcare (U.S.) – Payer	2%
Telecommunications	2%
Hospitality	2%
Real Estate	2%
Utilities	2%
Distribution	2%
Life Sciences/Biotechnology	1%
Media	1%
Healthcare (Non-U.S.)	1%
Other	10%

- • • **Certification**

Certified Public Accountant (CPA)/Chartered Accountant (CA)	38%
Certified Internal Auditor (CIA)	34%
Certified Information Systems Auditor (CISA)	21%
Certified Fraud Examiner (CFE)	12%
Certification in Risk Management Assurance (CRMA)	11%
Certified Financial Services Auditor (CFSA)	3%
Certified Government Auditing Professional (CGAP)	1%

- • • **Type of Organization**

Public	47%
Private	30%
Not-for-profit	12%
Government	9%
Other	2%

- • • **Organization Headquarters**

North America	89%
Europe	3%
Asia-Pacific	3%
Africa	2%
India	1%
Latin America	1%
Middle East	1%

ABOUT PROTIVITI

Protiviti is a global consulting firm that delivers deep expertise, objective insights, a tailored approach and unparalleled collaboration to help leaders confidently face the future. Protiviti and our independently owned Member Firms provide consulting solutions in finance, technology, operations, data, analytics, governance, risk and internal audit to our clients through our network of more than 70 offices in over 20 countries.

We have served more than 60 percent of *Fortune* 1000® and 35 percent of *Fortune* Global 500® companies. We also work with smaller, growing companies, including those looking to go public, as well as with government agencies. Protiviti is a wholly owned subsidiary of Robert Half (NYSE: RHI). Founded in 1948, Robert Half is a member of the S&P 500 index.

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