



• • • 2019 IT Audit Benchmarking Study

Today's Toughest Challenges in IT Audit: Tech Partnerships, Talent, Transformation

Assessing the International Leaders in an Annual ISACA-Protiviti Survey

Table of Contents

Introduction

03

Survey Methodology

04

Building Effective Partnerships With the IT Organization

05

IT Audit Engagement With Technology Projects — the More Involvement and the More Agile, the Better

13

Today's Challenges: Topline Takeaways for IT Audit and Business Tech Leaders

25

Cybersecurity, Data and Privacy Remain Key Priorities for IT Audit — and Boards

31

Getting Ahead of Talent and Skills Challenges

39

Appendix: IT Audit Risk Assessments and the Audit Plan

57

About ISACA

79

How the IT Audit Function Is Structured

46

Survey Demographics

75

About Protiviti

79

“Organizations worldwide are focused on transformation. Some, in fact, can find themselves in a determined rush to automate, become more digital and bring in the latest advanced technologies. It is in these instances where IT audit can deliver value by providing a clear point of view on the underlying processes strategic technology projects are serving, and partnering effectively with the IT organization to ensure these projects achieve their objectives not only in terms of performance, but also in terms of appropriate controls, such as security and privacy. But in the process, IT audit must have an agile, ‘next-gen’ mindset and approach.”

— Andrew Struthers-Kennedy, Managing Director — Global Leader, IT Audit, Protiviti

Introduction

Cybersecurity. Privacy. Data management and governance. Building effective partnerships with the IT organization. Dealing with ongoing digital transformation and disruption. Addressing resource and talent challenges.

In assessing findings from the **2019 Global IT Audit Benchmarking Study**, conducted by ISACA and Protiviti, it is clear these are among the top issues IT audit leaders and professionals are addressing as they seek to understand, support and advance business growth and innovation in their organizations.

Specifically, from an IT audit perspective, we see a strong partnership between the IT organization and IT audit function as delivering significant advantages in numerous areas of IT audit processes and practices. We see IT security and privacy as the standout top technology challenge organizations face today. We see data management and governance emerging as a critical challenge, one that has become more significant compared to prior years of our study. We see digital transformation continuing to impact a broad range of areas for IT auditors. And amid these many changes and challenges, we see IT audit functions continuing to grapple with resource, staffing and skills needs, especially as these needs evolve.

In our report, we present the results of our global research and offer commentary on these and other notable issues. We also provide high-level recommendations for IT audit and senior business leaders. And as always, we provide a detailed breakdown of our benchmarking data by organization size, region and more.

We are confident this information will be an asset to IT audit leaders and professionals as they assess their own functions in the organization, identify gaps in their capabilities, move to focus on areas beyond check-the-box compliance exercises, strengthen their partnerships with IT as well as executives and board members, and ensure they are delivering value for the organization.

Finally, we extend our thanks to the more than 2,200 IT audit leaders and professionals worldwide who participated in our study, enabling us to offer the detailed benchmarking data and insights contained in our report.

"It's essential to measure the key challenges that the IT audit community faces — including those related to diversity, skills, budgets, emerging technologies and regulatory compliance. By gaining a more nuanced understanding of these evolving challenges, we can drive meaningful progress in the profession and help audit professionals and enterprises prepare for and better navigate the evolving technology landscape."

— Brennan P. Baybeck, ISACA Board Chair; Vice President, Customer Support Services Security Risk Management, Oracle Corporation

Survey Methodology

ISACA and Protiviti partnered to conduct the 8th Annual IT Audit Benchmarking Study in the first quarter of 2019. This global survey, conducted online, consisted of a series of questions grouped into seven categories:

- Emerging Technology and Business Challenges
- Strategic Technology Project Involvement
- IT Audit in Relation to the Overall Audit Department
- Risk Assessment
- Audit Plan
- Cybersecurity and the Audit Plan
- Skills, Capabilities and Hiring

More than 2,200 (n = 2,252) executives and professionals, including CAEs as well as IT audit vice presidents and directors, completed our online questionnaire. Detailed respondent demographics can be found on pages 75-78.

Since completion of the survey was voluntary, there is some potential for bias if those choosing to respond have significantly different views on matters covered by the survey from those who did not respond. Therefore, our study's results may be limited to the extent that such a possibility exists. In addition, some respondents answered certain questions while not answering others. There is also a disparity in the number of responses from each geographic region. Despite these inherent limitations, we believe the survey results provide valuable insights regarding IT audit practices in organizations today.

Building Effective Partnerships With the IT Organization

The strength of the partnership between IT audit and the IT organization is a significant differentiator in the overall success of IT projects and IT audit effectiveness, our research shows.

We asked CAEs and IT audit leaders and professionals to consider IT audit's role in the organization's strategic technology projects and report the percentage of that role that involved a partnership with the IT function. Based on the results and understanding the value that such partnerships can deliver, we have defined as "Leaders" those IT audit groups responding that 20% or more of their time involved such partnerships. Comparing the survey results of these Leaders to other organizations illuminates a number of interesting takeaways.

Why is a strong partnership between IT audit and the IT organization so vital? A close collaboration with the IT group enables IT audit to learn about IT projects, particularly major strategic ones, before they happen, rather than during or after. As part of this, IT audit has an opportunity to participate in planning discussions and to deliver an additional, and critical, perspective — e.g., on the identification and mitigation of risk — that can help ensure the project's success.

More broadly, through such partnerships, IT audit can build a better audit plan and more fluidity into periodic risk assessments. Audit plans can be organized less around arbitrary risk assessments of various activities and more around specific projects and activities that



IT audit knows will be moving forward based on its interactions with the IT organization. The same principle applies to periodic risk assessments. By having knowledge of events like new applications coming online or being pushed out, IT audit can be ready to respond in an agile manner to provide meaningful insights as well as identify and communicate risks of which the IT department should be aware. Most importantly, these actions can happen ahead of time, rather than reactively in response to requests or information previously unknown to IT audit.

Finally, with regard to reporting findings and recommendations to the board (including the audit committee) and management (e.g., CEO, CFO, CIO), a strong partnership with IT enables IT audit to deliver better and more meaningful recommendations, tied to strategic technology projects and other major IT initiatives, that can be put into action.

On the other hand, lack of effective collaboration between IT audit and the IT organization creates the potential for a number of issues. These include but are not limited to:

- IT projects “hidden” from IT audit in order to avoid an assessment/audit.
- Gaps in risks and controls that cannot be remediated easily or cost effectively, perhaps resulting in the need for the project to start over or be scrapped.
- Guesswork on the part of IT audit in identifying challenges and risks, creating slowdowns and further frustration among IT leaders and managers.
- Delays in issuing IT audit reports and recommendations, as well as guidance that is not strategically aligned.

All of this said, while a strong partnership between IT audit and the IT organization delivers numerous advantages, it's also important for IT audit to maintain its objectivity as the third line of defense. IT audit must seek to partner and collaborate without crossing the line because they and the IT organization are not always going to have precisely the same objectives or priorities with regard to strategic technology projects.

“Those of us in the IT audit profession recognize the immense value that comes from building strong partnerships with our colleagues in the IT organization. That close connection will help ensure IT audit’s involvement in projects early enough to add full value while also avoiding misalignment that can lead to complications and inefficiencies. With more organizations embracing challenging technology projects on their road to digital transformation, the importance of this collaboration between IT audit and the IT organization has become an even more critical success factor.”

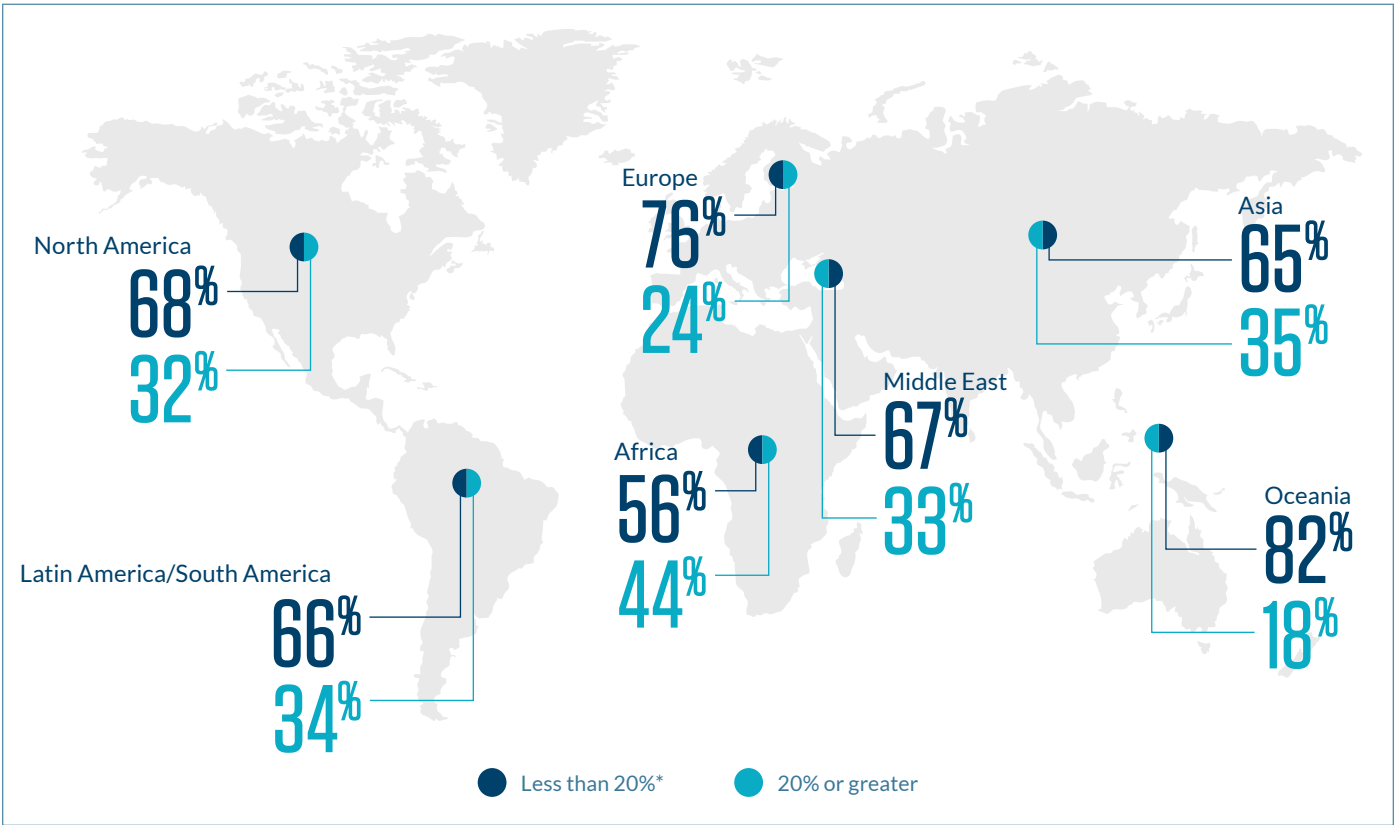
— Greg Grocholski, 2012-2013 ISACA Board Chair and advisor to the CAE and CEO, SABIC

- • • **What percentage of IT audit’s role in the strategic technology project involves a partnership with the IT function?**

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Less than 20%*	69%	68%	73%	64%
20% or greater	31%	32%	27%	36%

Region



* Includes “Don’t know” responses.



GLOBAL LEADER Africa

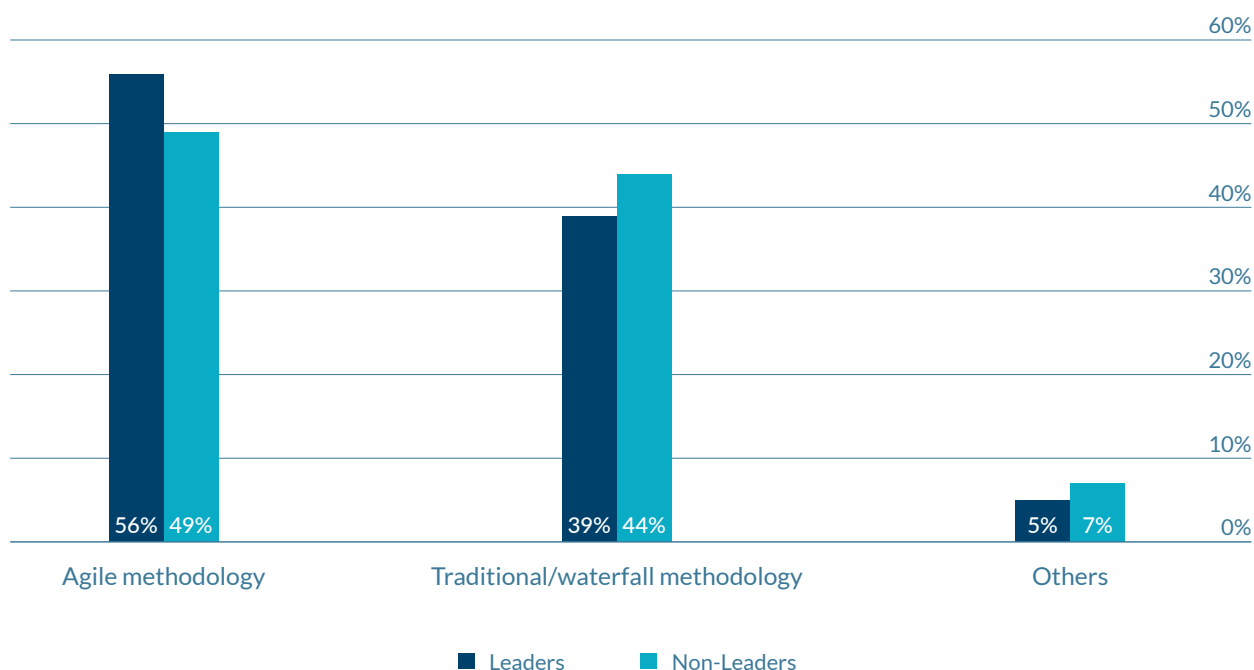
44%

of IT audit groups are in the “Leader” category of partnering effectively with the organization's IT function.

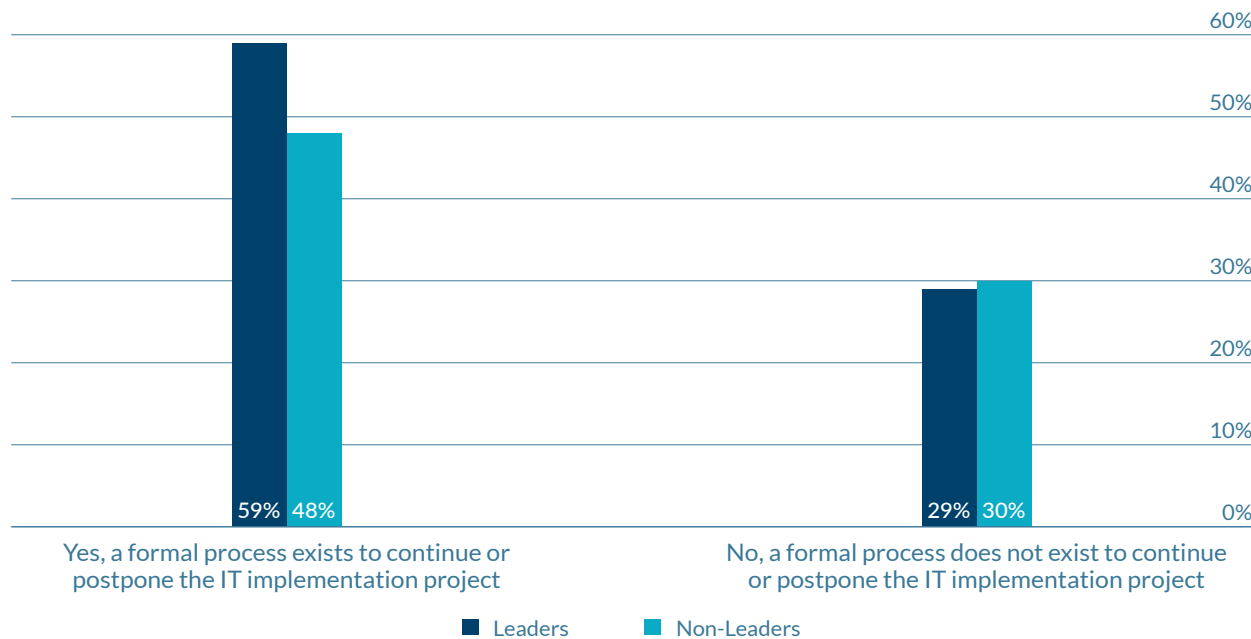
“Every day we see the advantages of strong ongoing partnership between IT audit and IT organizations. From more informed risk assessments to more informed and strategically aligned audit plans to the overall success and ‘on time, on budget’ nature of major technology projects, the enterprise benefits significantly from this collaboration.”

— Ashley Cuevas, Managing Director, IT Audit, Protiviti

• • • Methodologies most commonly used for strategic technology projects

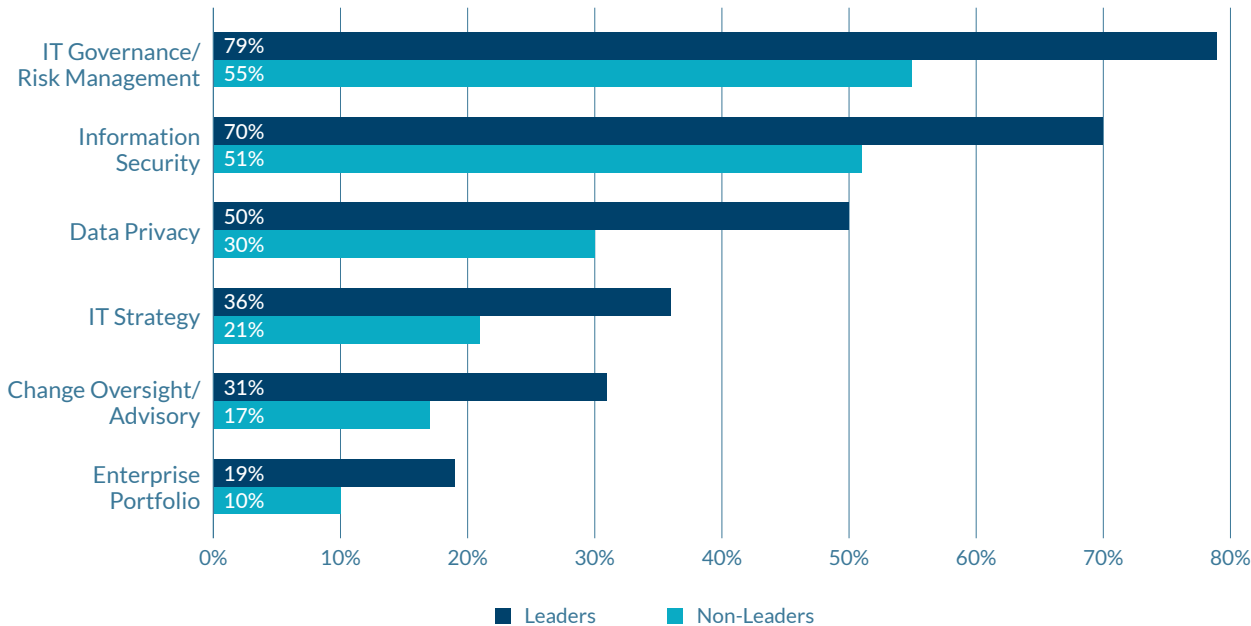


Is there a formal process to determine whether to continue or postpone the strategic technology project if new risks are identified while the implementation process is underway?*

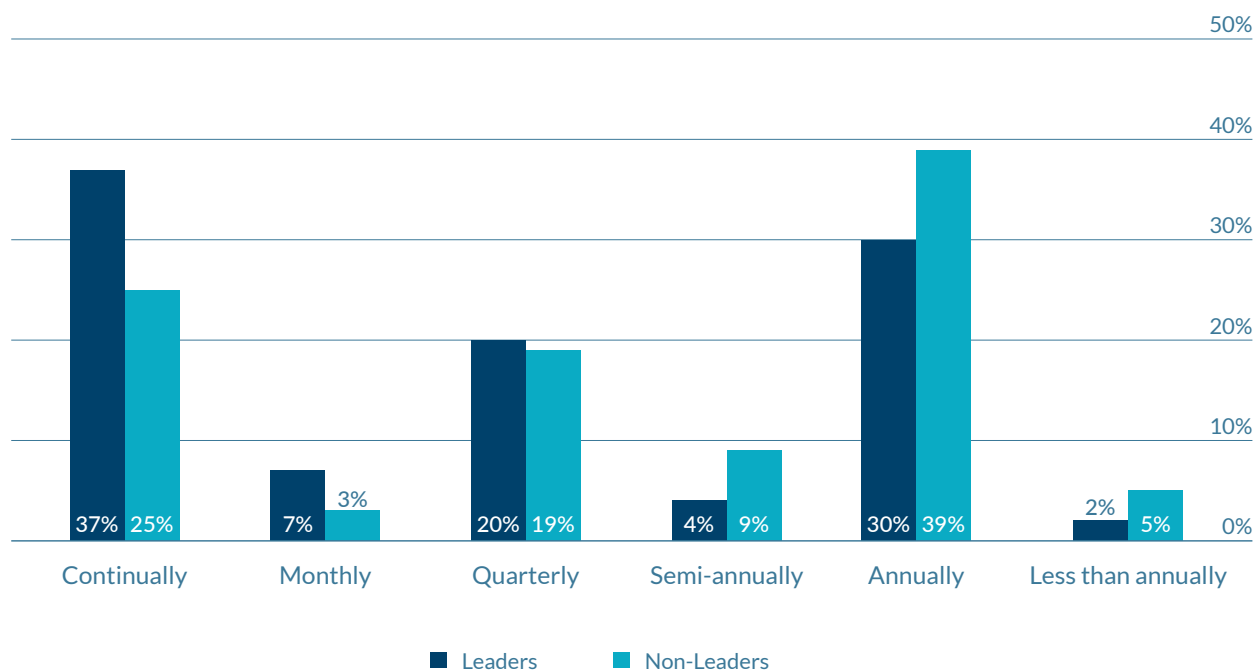


* Not shown: "Unsure" responses

Committees/working groups in which the IT department invites IT audit to participate (Multiple responses permitted)



Frequency of the process to identify and assess technology risk within the organization



Has recent press coverage on cyberwarfare and/or cybersecurity affected your interest in, and focus on, the subject of information security? (Shown: “Yes” responses)



Leaders



Non-Leaders

- • • Cybersecurity is included in the audit plan



- • • Which of the following frameworks does the audit function use in performing assessments of the organization’s cybersecurity posture/maturity? (Multiple responses permitted)

	Leaders	Non-Leaders
NIST Cybersecurity Framework	64%	56%
COBIT	53%	52%
ISO 27000	47%	41%
NIST 800-53	24%	19%
CIS Top 20	12%	14%
FFIEC Cybersecurity Assessment Tool	15%	11%
AICPA Trust Service Criteria	10%	5%

- • • **What cyber-related audit activities have been performed? (Multiple responses permitted)**

	Leaders	Non-Leaders
Security program assessment/framework gap analysis	73%	67%
Privileged access management	64%	63%
Technical assessments (vulnerability assessment, penetration testing, “red team”)	52%	49%
Data loss prevention (identification of “crown jewels”)	51%	44%
Security incident response – simulation/tabletop	48%	38%
Social engineering	35%	25%
Cyber breach kill chain	16%	11%

- • • **How are cybersecurity audits typically resourced? (Multiple responses permitted)**

	Leaders	Non-Leaders
Exclusively with in-house (IT audit) resources	46%	47%
In-house resources with support from technical IT/information security resources	41%	31%
Co-sourced using external SMEs	32%	27%
Outsourced	16%	15%

“Just as operational effectiveness is continually assessed, IT auditors must establish and evolve ongoing partnerships across the organization with IT and business teams and leadership. These dynamics are more important than ever, given the pace of change, opportunities and competition. Fostering these essential, healthy relationships builds critical paths to being looped into new projects as well as getting feedback from the organization.”

— Robin Lyons, Technical Research Manager, ISACA

IT Audit Engagement With Technology Projects — the More Involvement and the More Agile, the Better

IT audit faces a new dynamic today with regard to technology projects in the organization. Increasingly, such projects are not 18- to 24-month endeavors progressing under a traditional waterfall approach. Rather, the IT organization is leveraging agile methodologies to deliver projects. As a result, not only does it benefit IT audit to be involved, but they must also do so in an agile manner, employing “next-generation” audit methodologies to support the project and deliver value.



The nature of technology projects — specifically, how they are managed and their overall timing — has changed. Fewer technology projects are being undertaken on a grand scale over multiple years. IT projects are progressing rapidly and, in many cases, on an ongoing basis.

As this occurs, it is easy for IT audit to struggle to keep up. And if they do fail to maintain pace with the

project, they can lose the ability to view it from a risk perspective, as they can more easily do when IT is employing a more methodical waterfall methodology. Compounding this challenge, when IT audit does lose that risk perspective, it becomes even more difficult to catch up given the pace at which IT projects are moving forward, and it becomes especially difficult for IT audit to go back and make corrections.

For instance, in this new dynamic, IT audit needs to position itself from the outset of an IT project to consider risks such as security and build the necessary controls and processes into the project from day one. This has not been the typical approach for IT audit, but it is becoming more important with rapid IT development cycles. The fact is that controls are not always top of mind for IT. Gaps in these projects are common, particularly as the use of agile and DevOps becomes more prevalent.

IT audit can provide a needed point of view on the underlying technology processes the project is serving and also assess, among other things, whether these processes are appropriately aligned given emerging technologies that may be available. A good example of this is robotic process automation (RPA). There can be a tendency to apply this technology in order to build in greater efficiencies, but RPA will not achieve this objective if the process itself is poorly designed.

This goes directly to why it is highly advantageous for IT audit to be involved in technology projects early and often. In the mad rush to automate with new technologies, there is still a vital need to pause to look at the underlying process thoughtfully and deliberately, which IT audit is ideally suited to do.

So the value IT audit can bring to the project by being involved early is apparent. But IT audit’s involvement won’t be automatic, particularly if the IT audit group is not in a position to keep pace with an IT project moving forward with an agile or DevOps approach. The IT audit function must be prepared and skilled to perform its audit and assessment duties in a highly efficient and agile manner. This underscores the need for IT audit to embrace a next-generation mindset and to employ the type of governance, methodologies and enabling technologies necessary to support today’s highly dynamic, fast-moving organizations. This represents the future of IT audit.¹

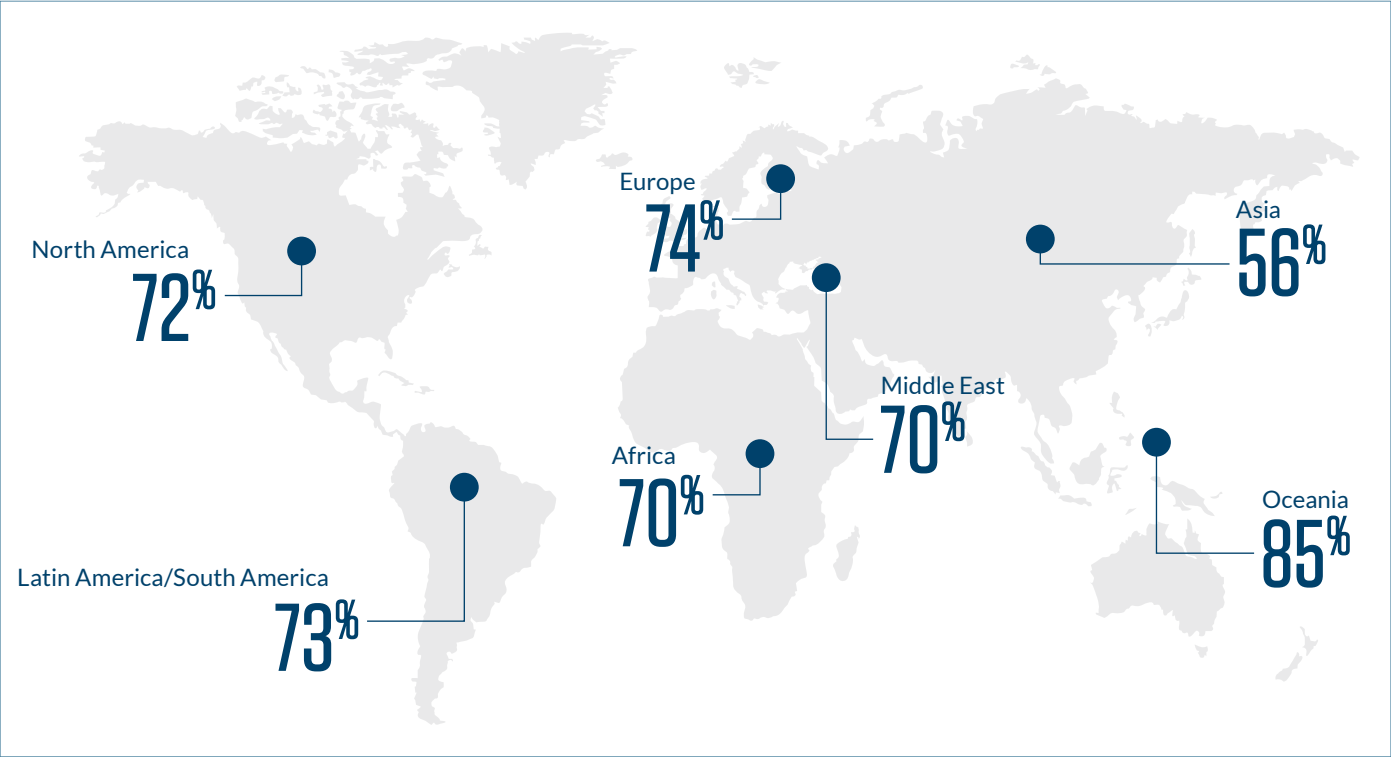
• • • **Has your company implemented an IT system or application in the last three years?**

	Current	2017
Yes	70%	90%
No	14%	7%
Unsure	16%	3%

¹ For more information, read Protiviti’s white paper, *The Next Generation of Internal Auditing – Are You Ready?*, and other information on this topic, available at www.protiviti.com/auditnextgen.

• • • **Has your company implemented an IT system or application in the last three years?**

Region (“Yes” responses)



• • • **What was the primary purpose of the strategic technology project?***

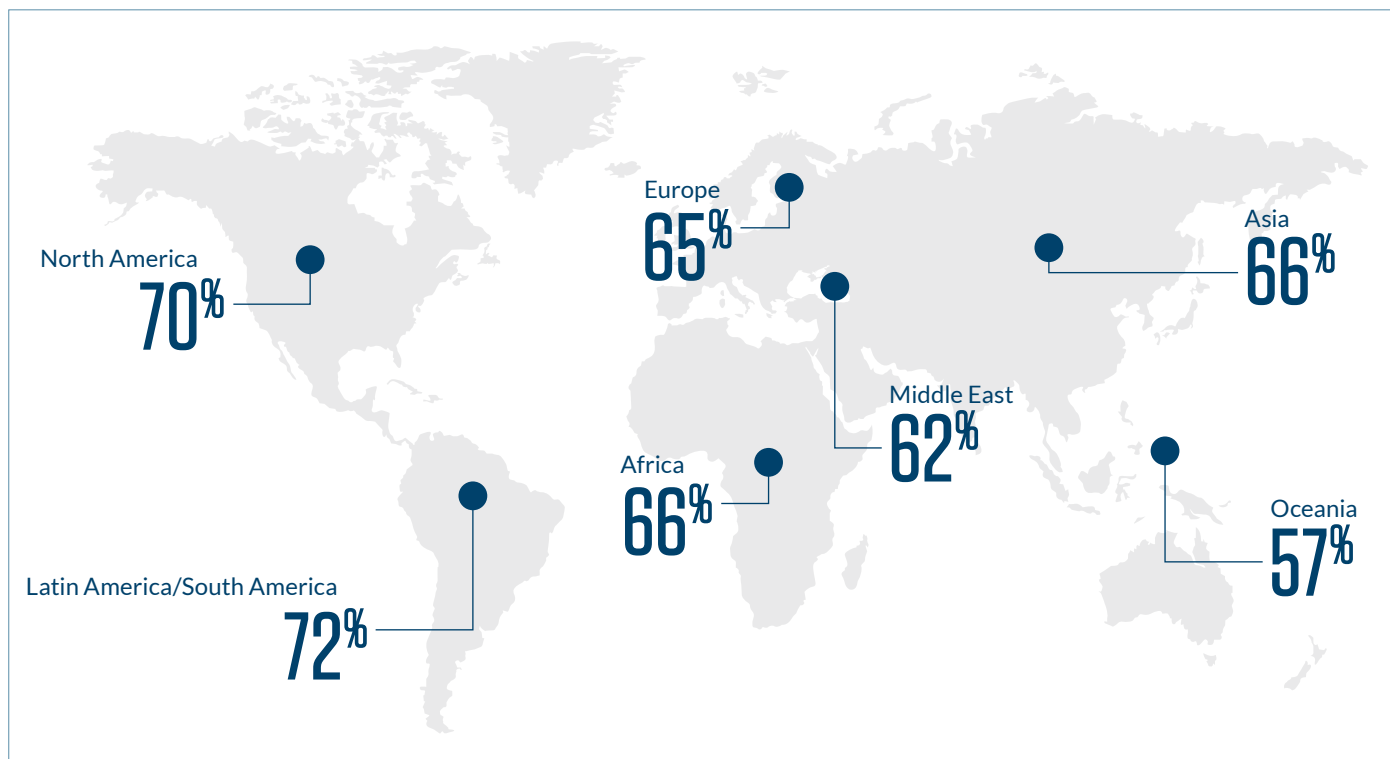
Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Modernization of legacy infrastructure	20%	14%	25%	13%	20%	36%	36%
Operational performance improvement	42%	24%	23%	26%	18%	29%	32%
Digitization of products and services	28%	33%	35%	28%	32%	15%	16%
Business intelligence	6%	20%	7%	18%	14%	6%	9%
Customer engagement	4%	10%	7%	11%	8%	9%	5%

* Not shown: “Other” responses.

- • • From the perspective of the board of directors or senior management, was the strategic technology project successful in advancing organizational objectives?

Region ("Yes" responses)

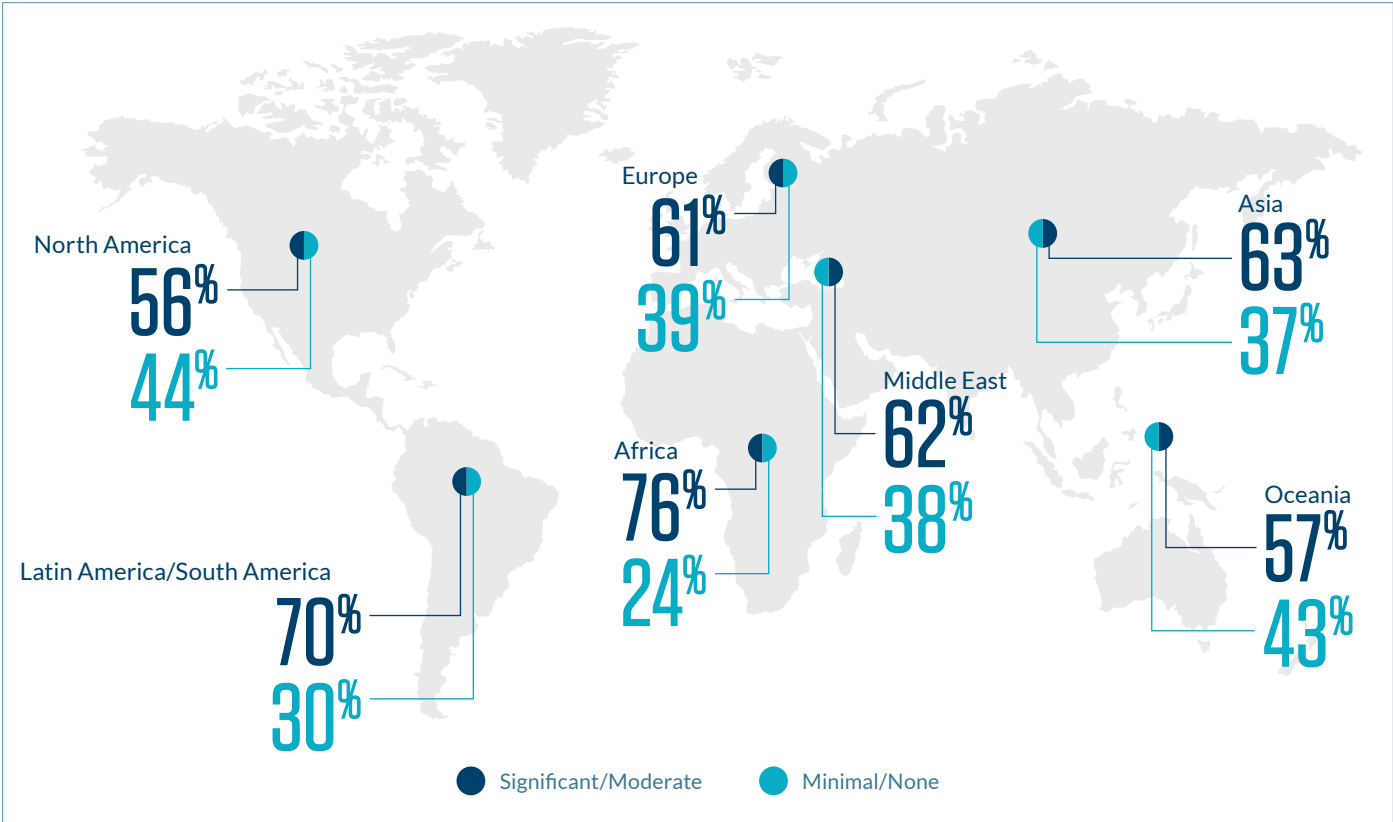


• • • What level of involvement does IT audit have in significant technology projects?

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Significant	17%	13%	14%	19%
Moderate	46%	39%	42%	46%
Minimal	31%	39%	37%	28%
None	6%	9%	7%	7%

Region



- • • What level of involvement does IT audit have at each of the following stages of strategic technology projects?

	Planning	Design	Testing	Implementation	Post-Implementation	Project Risk Management
Significant	11%	9%	13%	11%	23%	20%
Moderate	27%	27%	29%	30%	43%	38%
Minimal	36%	36%	33%	32%	24%	28%
None	26%	28%	25%	27%	10%	14%



GLOBAL LEADER Africa

76%

of IT audit functions have a significant or moderate level of involvement in major technology projects.

“As organizations engage in disruptive innovation, continuous development or digitalization, the opportunities for partnership between audit and the IT function abound. When engaging in these partnerships, auditors should create collaborative relationships and avail themselves of the opportunity to consult. However, the audit function’s commitment to providing the third line of defense should not be forgotten. It is within this line and only this line that the attribute of objectivity resides.”

— Robin Lyons, Technical Research Manager, ISACA

- • • **Top risk factors for strategic technology projects in the organization**

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Frequency of modifications to project goals and outcomes based on changing business requirements	61%	55%	56%	55%
Frequency of change in project specifications without formal assessment	43%	39%	42%	37%
Goals and objectives are not clearly defined	35%	35%	34%	35%
Level of employee turnover on project teams	31%	32%	31%	30%
Capabilities and skills of the project manager and/or broader project team	33%	29%	29%	30%
Absence of a defined and documented project management methodology	24%	29%	33%	33%
Lack of stakeholder engagement	29%	27%	27%	31%
Lack of formal project governance structure	23%	29%	30%	28%
Lack of a defined SDLC	12%	14%	13%	16%



Change is the most critical underlying risk factor when it comes to strategic technology projects – specifically, change in goals, expected outcomes, project specifications, business requirements and more.

- • • **Top risk factors for strategic technology projects in the organization**

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Frequency of modifications to project goals and outcomes based on changing business requirements	52%	63%	56%	59%	57%	58%	53%
Frequency of change in project specifications without formal assessment	30%	38%	39%	61%	39%	42%	40%
Goals and objectives are not clearly defined	31%	33%	42%	38%	46%	32%	23%
Level of employee turnover on project teams	28%	40%	33%	33%	33%	28%	30%
Capabilities and skills of the project manager and/or broader project team	30%	35%	32%	25%	39%	29%	40%
Absence of a defined and documented project management methodology	32%	34%	22%	39%	37%	29%	28%
Lack of stakeholder engagement	34%	23%	34%	16%	22%	27%	45%
Lack of formal project governance structure	40%	20%	24%	18%	20%	29%	33%
Lack of a defined SDLC	19%	13%	12%	8%	7%	14%	8%



While change stands out as the top risk factor for strategic projects, other issues are prevalent in different regions, such as lack of clearly defined goals and objectives, employee turnover, and lack of a defined and documented project management methodology.

- • • **Is there a formal process to determine whether to continue or postpone the strategic technology project if new risks are identified while the implementation process is underway?**

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Yes, a formal process exists to continue or postpone the IT implementation project	59%	48%	46%	45%
No, a formal process does not exist to continue or postpone the IT implementation project	22%	34%	33%	37%
Unsure	19%	18%	21%	18%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Yes, a formal process exists to continue or postpone the IT implementation project	50%	59%	51%	44%	35%	52%	45%
No, a formal process does not exist to continue or postpone the IT implementation project	36%	18%	30%	46%	52%	28%	33%
Unsure	14%	23%	19%	10%	13%	20%	22%



As more strategic technology projects are undertaken by the IT organization employing an Agile methodology, a formal process to assess and potentially pause these projects if new risks are identified is even more important.

- • • In which of the following committees/working groups does IT invite IT audit to participate? (Multiple responses permitted)

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
IT Governance/Risk Management	70%	59%	56%	61%
Information Security	59%	59%	51%	58%
Data Privacy	40%	35%	30%	35%
IT Strategy	28%	21%	20%	31%
Change Oversight/Advisory	23%	21%	20%	22%
Enterprise Portfolio	17%	12%	9%	10%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
IT Governance/Risk Management	62%	71%	58%	54%	61%	65%	63%
Information Security	49%	49%	60%	56%	54%	59%	45%
Data Privacy	27%	38%	41%	26%	20%	38%	8%
IT Strategy	23%	32%	27%	21%	28%	24%	15%
Change Oversight/Advisory	23%	16%	18%	16%	20%	26%	13%
Enterprise Portfolio	10%	9%	11%	8%	9%	16%	10%



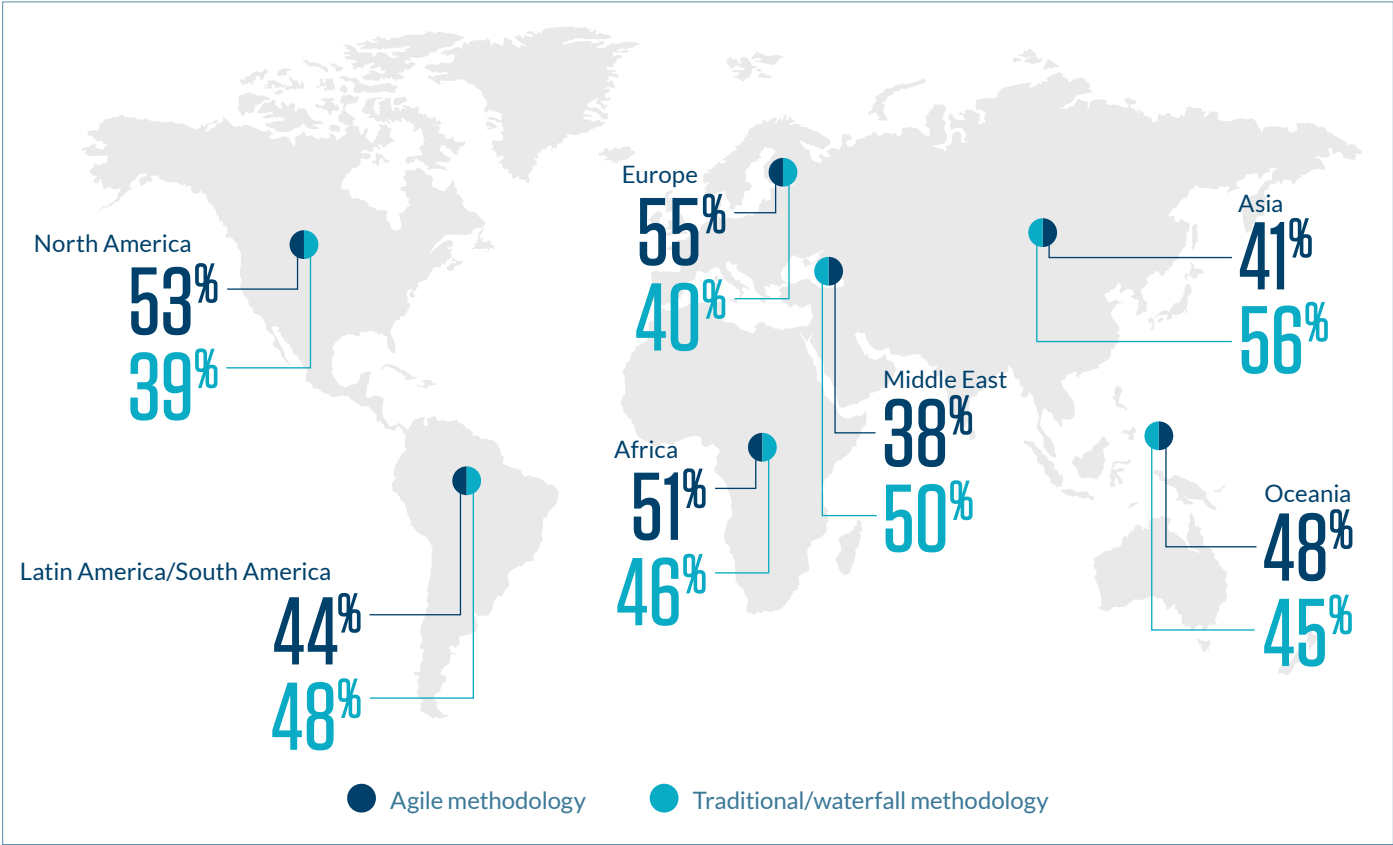
As expected, IT audit participates most frequently in IT Governance and Risk Management committees, but there is value in having IT audit participate in these other working groups, as well.

- • • Which of the following methodologies does your organization most commonly use for strategic technology projects?

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Agile methodology	57%	50%	46%	46%
Traditional/waterfall methodology	37%	40%	47%	50%
Other	6%	10%	7%	4%

Region



- • • **In which of the following Agile activities is internal audit involved?**
(Multiple responses permitted)

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Sprint review	28%	28%	29%	31%
Sprint retrospective	22%	18%	19%	16%
User story development	17%	17%	17%	26%
Sprint planning	18%	13%	19%	23%
Daily stand-up	14%	16%	12%	12%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Sprint review	36%	33%	29%	33%	12%	28%	32%
Sprint retrospective	17%	17%	26%	19%	12%	18%	16%
User story development	17%	29%	19%	19%	35%	16%	5%
Sprint planning	23%	24%	21%	15%	18%	16%	11%
Daily stand-up	4%	11%	16%	0%	12%	15%	11%



Today's Challenges: Topline Takeaways for IT Audit and Business Tech Leaders

Not only do the challenges identified by IT audit leaders and professionals mirror those of CIOs and technology leaders today, but they also are associated closely with transformation and innovation. As organizations strive to become more innovative, they must balance that with the need to manage security and disruption as well as data effectively, including but not limited to data quality, data governance and data protection.

While the top technology challenges identified by IT audit leaders and professionals who participated in our study did not change substantially from the prior year, there are notable takeaways. First, IT security and privacy, along with cybersecurity, represent the top

overall challenges, and by a substantial margin, over any others. Clearly, these challenges, and how they continue to shift rapidly based on the global threat landscape, are top-of-mind for IT auditors and likely for all business leaders.

Second, not only are data management and governance top challenges, but they also jumped significantly on our list compared to the prior year's results. Whereas once data management and governance may not have been top-of-mind, organizational policies and practices are garnering attention from the boardroom to the rank-and-file front lines, given the proliferation of data-rich devices at work and at home, regulations such as the EU's General Data Protection Regulation, and more developments.

Top Technology Challenges

- IT security and privacy/cybersecurity
- Data management and governance
- Emerging technology and infrastructure changes — transformation, innovation, disruption
- Resource/staffing/skills challenges
- Third-party/vendor management

Current	YOY Trend	2017
IT security and privacy/cybersecurity	↔	IT security and privacy/cybersecurity
Data management and governance	↑	Infrastructure management*
Emerging technology and infrastructure changes — transformation, innovation, disruption	↔	Emerging technology and infrastructure changes — transformation, innovation, disruption
Resource/staffing/skills challenges	↔	Resource/staffing/skills challenges
Third-party/vendor management	↑	Regulatory compliance
Regulatory compliance	↓	Budgets and controlling costs
Cloud computing/virtualization	↔	Cloud computing/virtualization
Project management and change management	↑	Third-party/vendor management
Budgets and controlling costs	↓	Project management and change management
Bridging IT and the business	NA	Data management and governance

* Note: In our latest survey, "infrastructure management," ranked second in the prior year, dropped out of the top 10 technology challenges.

IT Security and Privacy/Cybersecurity

As has been well documented, cyber risk has become one of the top challenges for any business to deal with. A single cybersecurity incident can significantly disrupt operations, result in loss of revenues leading to long-term financial damage, bring regulatory and legal actions, and damage an organization's reputation and the confidence of its customers.²

And these concerns, of course, are not limited to the IT audit function. Cyber criminals are becoming more creative and sophisticated. New cyber threats emerge daily that put any number of business systems at risk, and organizations face a monumental challenge to keep pace with the threats and safeguard their data, particularly their “crown jewels.” It's no surprise that cybersecurity is the chief concern not only for IT audit leaders and professionals, but also for CIOs and IT departments, as well as executive-level management and boards of directors.³

According to the ISACA/CMMI 2018 Cybersecurity Culture Survey, nearly nine in 10 of the 4,815 respondents participating in this global study believe that establishing a stronger cybersecurity culture will increase the profitability or viability of their organizations. In addition, 32% of respondents said there is a “significant gap” between the current and desired states of their organization's cybersecurity culture.⁴

Further, IT audit leaders and professionals worldwide likely view security and privacy issues as the top technology challenge because, among many other

issues, their organizations are changing and evolving as a result of numerous digital transformation efforts. Shifts of data and processes to the cloud, virtualization, use of artificial intelligence (AI) and robotics, and other innovations change the risk and control environment as well. It's imperative for IT auditors to be well aware of these changes and partner with management to ensure proper control and compliance practices are in place.

See page 31 for further discussion on cybersecurity issues.

Data Management and Governance

More organizations have great aspirations about leveraging technologies, including, but not limited to, RPA, AI, machine learning, deep learning, and in the case of internal audit and IT audit, continuous auditing and monitoring. These and other technologies hold great promise to fuel long-term growth for organizations. But underlying that promise — and potentially hindering it — is the need for strong and sound data.

As noted in Protiviti's recent global study on the use of AI, because few companies perceive their data to be a valuable asset, they do not devote sufficient attention to how it is collected. Companies should begin by looking at the source of their data and make sure there are clear rules and policies in place that ensure it is clean and usable.⁵

² *The Cybersecurity Imperative*, ESI ThoughtLab and WSJ Pro Cybersecurity, October 2018, www.protiviti.com/US-en/insights/cybersecurity-imperative.

³ *2018 Security Threat Report*, Protiviti, April 2018, www.protiviti.com/threatreport.

⁴ *Narrowing the Culture Gap for Better Business Results: The ISACA/CMMI Institute Cybersecurity Culture Report*, ISACA and the CMMI Institute, 2018, www.isaca.org/SiteCollectionDocuments/Cybersecurity-Culture-Report.pdf.

⁵ *Competing in the Cognitive Age: How companies will transform their businesses and drive value through advanced AI*, Protiviti, February 2019, www.protiviti.com/AI.

For IT audit, in particular, the ability to leverage advanced technologies is highly dependent on the quality of data in the organization. Moreover, as different functions in the organization begin to employ these technologies, IT audit must be able to access and govern the data being used to ensure various control and compliance requirements are being met.

Emerging Technology and Infrastructure Changes — Transformation, Innovation, Disruption

Recent global studies from Protiviti on the current and expected future use of AI⁶ and RPA⁷ show that organizations worldwide have substantial plans to leverage these technologies to drive greater revenue, profitability and shareholder value, along with increased productivity and cost efficiencies. Investment levels that are already significant today are likely to grow substantially in the coming years.

“If you talk to most companies today, they would tell you they’re not happy with the structure, quality or timeliness/accuracy of their data. Companies will have to decide if they want to create AI tools and techniques with imperfect data or wait until the data are fixed. One way or the other, it’s a perpetual challenge.”

— Cory Gunderson, Executive Vice President, Global Solutions, Protiviti

Notable findings from the 2018 ISACA Digital Transformation Barometer Research report underscore the challenges presented by emerging technologies and innovations.⁸

- Those [respondents] who have experienced significant challenges indicated that they were a solid 64% of the way along their digital transformation journey. Those who said they had experienced no challenges were only 36% of the way there. It’s the epitome of the expression, “No pain, no gain.”
- The Digital Transformation Barometer study asked which leading emerging technology stood the greatest chance of delivering the most transformative value to their organizations. The leaders? Big data at 28%, followed by AI/machine learning/cognitive tech at 25%, public cloud at 18%, IoT at 12% and blockchain at 8%.
- AI is a unique case because of the extent to which testing and intent to deploy skyrocketed between ISACA’s 2017 and 2018 Digital Transformation Barometer surveys. In just one year, the proportion of AI testers grew by half; the proportion of organizations intending to deploy AI grew by 35%.
- Between 2017 and 2018, there was little change in the proportion of respondents who described their leadership as being digitally literate: 53% in 2017 versus 54% this year. Receptivity to adopting all emerging technologies is far greater among organizations with digitally literate leaders (96% for very or moderately receptive in 2018) compared with other executives (55% for very or moderately receptive).

⁶ Ibid.

⁷ Taking RPA to the Next Level: How companies are using robotic process automation to beat the competition, Protiviti, April 2019, www.protiviti.com/RPA.

⁸ Manage Risk to Enable Today’s Transformative Technologies (2018 ISACA Digital Transformation Barometer), www.isaca.org/info/digital-transformation-barometer/index.html.

These are just a few examples of many areas in which organizations are transforming their infrastructure and technology environments to gain competitive advantage and compete against “born digital” organizations. In the process, these organizations must maintain their risk management practices and control structures, placing a significant burden on IT audit functions to keep pace with changes in the organization and ensure that audit plans address these transformations appropriately.

“CAEs and internal audit leaders need to adopt a mentality and capabilities oriented toward becoming more data- and technology-enabled. Currently, many lack a long-term strategy to transform IT audit into a data-driven function that makes use of leading technology solutions. Those that fail to focus on incorporating analytics, robotics and other emerging technologies into their auditing practices risk falling behind. As organizations continue to pursue digital transformation with increasing urgency, they expect a similar level of data and technology enablement within IT audit to drive the delivery of more efficient audits, deeper insights and increased risk assurance.”

— Andrew Struthers-Kennedy, Managing Director, Leader,
IT Audit Practice, Protiviti

Resource/Staffing/Skills Challenges

As organizations and IT audit functions focus on addressing these technology challenges, having the right skills and talent is an imperative. Both from an IT audit perspective and a broader IT perspective, resource needs are changing, and organizations are challenged to bring in and retain the resources they need.

In its research brief, *The Future of IT Audit*, ISACA explored the demand for new technical skills among IT auditors and how technology changes will affect the profession.⁹

- The vast majority of auditors indicated they had a significant (44%) or moderate (38%) impact on technology projects within their organization. There is room for improvement on when auditors are brought into projects, with 28% of respondents reporting they were not brought into technology projects until post-implementation.
- IT auditors note that there is a strong demand for technical skills today. Simultaneously, auditors indicate that there is an increased expectation of expertise across a broader subject area. Somewhat contrary, or perhaps as an outgrowth of that expectation, is the notion that the IT audit team should be enhanced with data scientists. With these skills in place, an IT audit team will be better able to meet the challenges of automation.
- Overall, auditors are optimistic (92%) when considering how technology will impact them professionally over the next five years. But there is uncertainty about the impact that automation and AI may have on staffing levels. Auditors are split on whether AI will replace all or some of the role of the IT auditor in the next three to five years, with 37% saying it is likely, and 42% saying it is unlikely.

⁹ *The Future of IT Audit*, ISACA, 2019, www.isaca.org/Knowledge-Center/Documents/Future-of-IT-Audit-Report_res_eng_0219.pdf.

- Based on the survey results, IT auditors are quite confident (30%) their IT audit leadership is tech savvy enough to keep abreast of technology changes affecting IT audit. They are much less confident of executive leadership's ability (14%) to do so. Many auditors indicated that a technical skills gap has an impact on performing IT audits with a high degree of confidence.

One of the most significant challenges CAEs and IT audit leaders face is a shortage of talent with the knowledge and expertise to advance the use of analytics and technology-enabled auditing and approach it in a more sophisticated manner. According to the results of Protiviti's 2019 Internal Audit Capabilities and Needs Survey, a majority of internal audit groups lack the right skills to advance their functions toward the next generation of internal auditing, employing such practices as continuous monitoring, agile auditing, machine learning and AI, process mining, advanced analytics, and more.¹⁰

"The degree of automation's impact on IT auditors may be unknown, but automation of the practice of auditing is a known. Just as IT auditors are challenged with acquiring or enhancing technical skills to keep pace with organizational innovation, they will be similarly challenged with innovation in the practice of auditing."

— Robin Lyons, Technical Research Manager, ISACA

Third-Party/Vendor Management

As part of their business and digital transformation activities, organizations continue to shift more of their data and services to the cloud or to third parties to manage. In doing so, their risk profile is affected significantly. Consider that as companies adopt any new technologies, so do hackers.¹¹ IT audit leaders and professionals also are well aware that vendor risk management capabilities must be governed in the context of an increasingly difficult threat environment. According to the 2019 Vendor Risk Management Benchmark Study from the Shared Assessments Program and Protiviti, the relative maturity level of vendor risk management programs has not changed over the past 12 months, despite increased regulatory scrutiny; growing cyber threats at a global, national and state level; and a riskier business environment.¹²

¹⁰ *Embracing the Next Generation of Internal Auditing*, Protiviti, March 2019, www.protiviti.com/IASurvey.

¹¹ *The Cybersecurity Imperative*, www.protiviti.com/US-en/insights/cybersecurity-imperative

¹² *2019 Vendor Risk Management Benchmark Study: Running Hard to Stay in Place — The Shared Assessments Program and Protiviti Examine the Maturity of Vendor Risk Management Practices*, www.protiviti.com/vendor-risk.

Cybersecurity, Data and Privacy Remain Key Priorities for IT Audit — and Boards

Cybersecurity, as well as security and privacy of data, continues to be a top-of-mind concern not only for IT audit leaders, but also for the board of directors and management in their organizations. The issue is not so much whether IT audit and others are addressing these challenges. Rather, it's that the landscape continues to shift, and rapidly.

As much as organizations are focusing on cybersecurity and protecting their data, they are still behind given the changing landscape, growing sophistication of cyber criminals, evolving regulatory requirements (e.g., the General Data Protection Regulation in the European Union, California Consumer Privacy Act, etc.), and persistent gaps and process breakdowns that emerge as part of ongoing transformation projects in the organization.

Bottom line, IT audit cannot let its guard down, and it does not have the luxury of conducting high-level “check-the-box” audits of areas such as information security, controls and overall privacy. Security issues are among the greatest concerns for auditors because, if an emergency arises (e.g., data loss, security breach), they can bring most other processes and activities in the organization to a standstill. It's the enduring risk that can strike at any time and requires effective controls to be maintained and updated, as needed.

Detailed security assessments are required that account for how various processes are changing as a result of major technology projects or other key initiatives. IT audit also needs to develop meaningful recommendations that will have an impact on bolstering the organization's cybersecurity posture.



How engaged is your board of directors with information security risks relating to your business?

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
High engagement and level of understanding by the board	34%	24%	28%	26%
Medium engagement and level of understanding by the board	43%	43%	40%	39%
Low engagement and level of understanding by the board	8%	16%	21%	21%
Don't know	15%	17%	11%	14%

Region

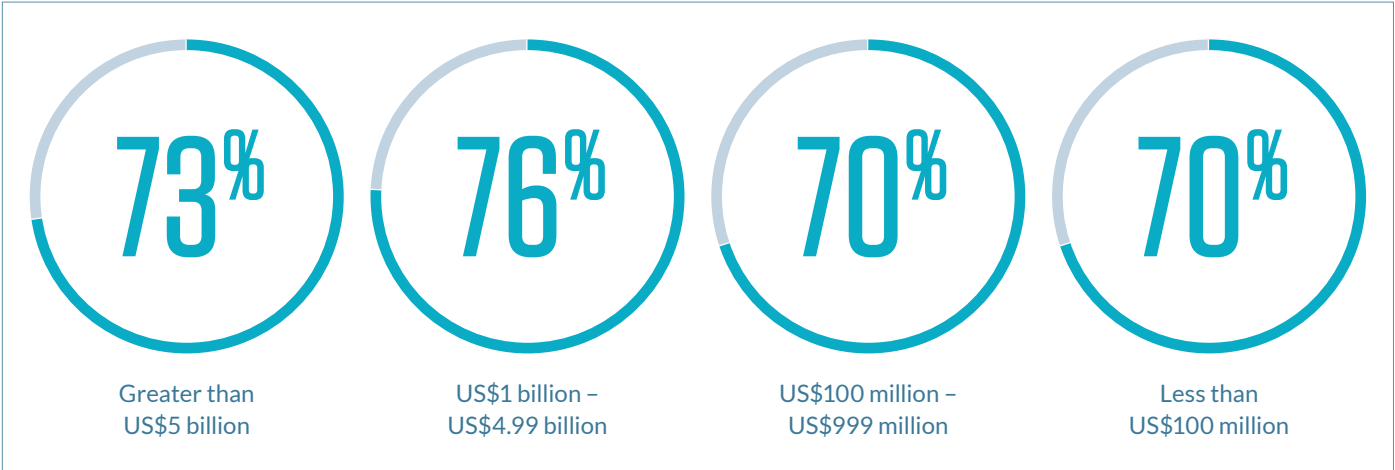
	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
High engagement and level of understanding by the board	30%	25%	27%	33%	24%	31%	20%
Medium engagement and level of understanding by the board	39%	38%	48%	44%	37%	39%	53%
Low engagement and level of understanding by the board	21%	18%	13%	23%	30%	14%	11%
Don't know	10%	19%	12%	0%	9%	16%	16%



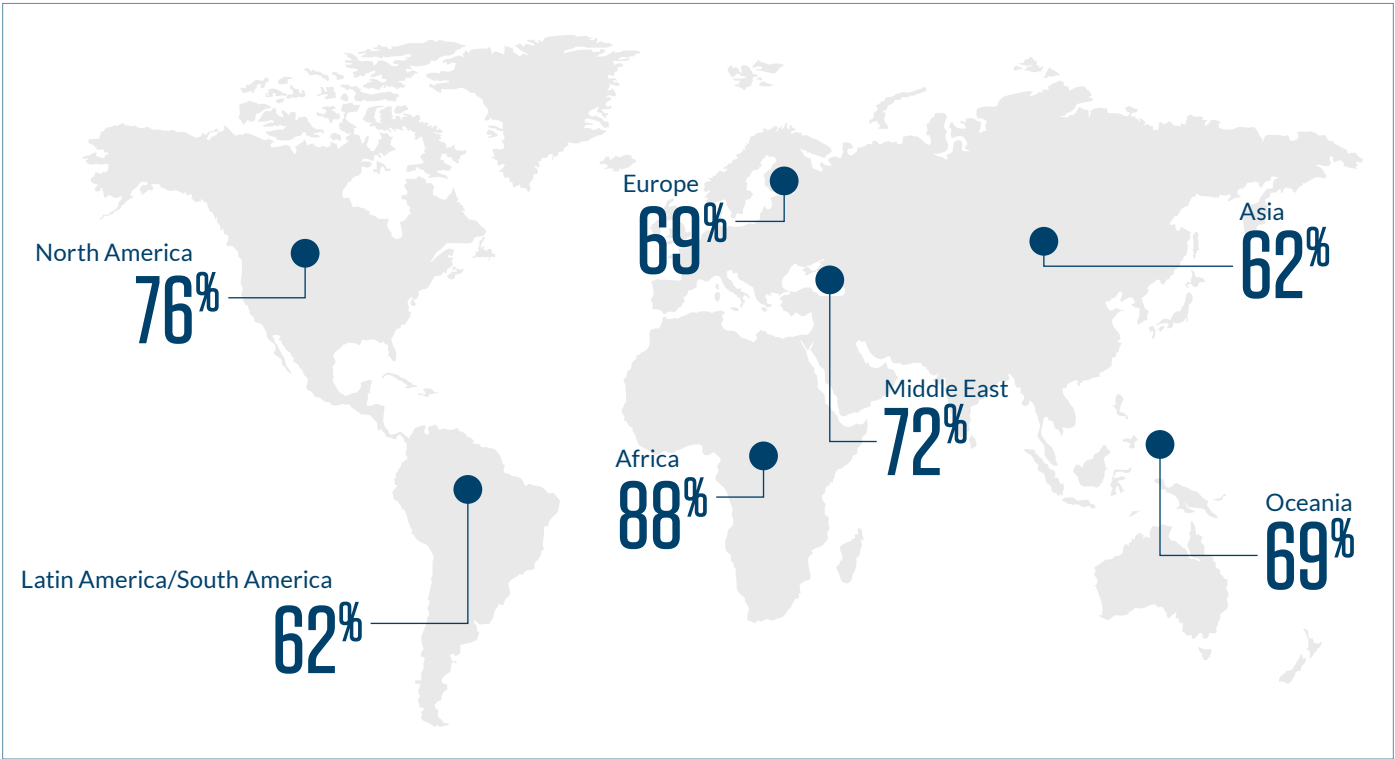
Boards remain significantly engaged with information security issues the organization faces, though reported engagement levels have trended down slightly from the prior year. This could indicate greater awareness among board members of organizational efforts to combat cyber threats.

- Has recent press coverage on cyberwarfare and/or cybersecurity affected your interest in, and focus on, the subject of information security? (Shown: “Yes” responses)

Company Size (Annual Revenue)

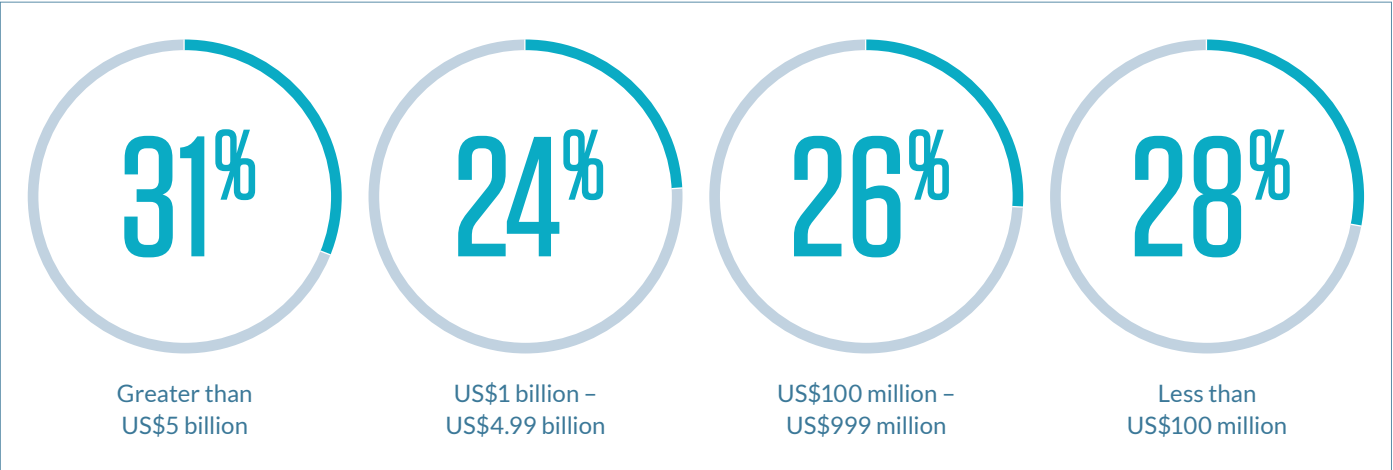


Region

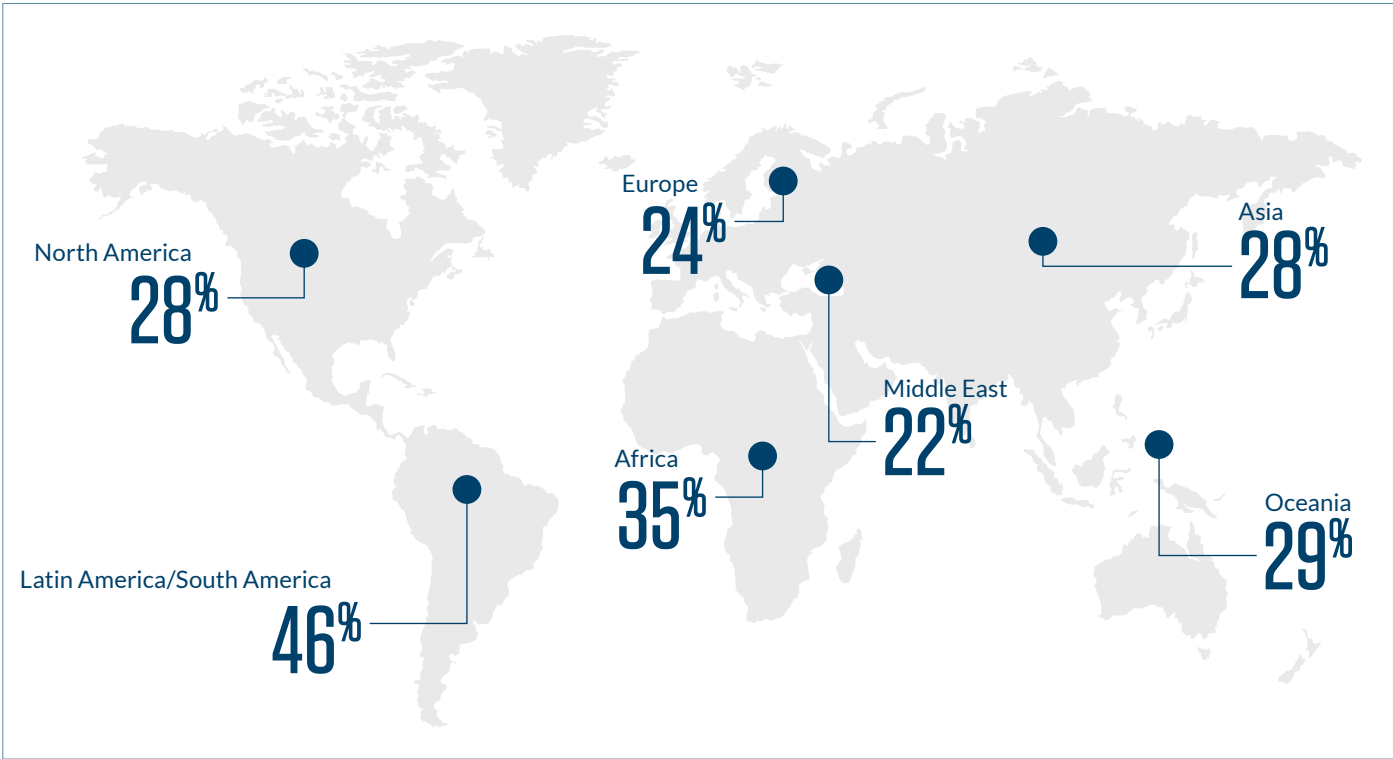


- • • Is your board of directors adding technical expertise to your board/disclosure committee?
(Shown: “Yes” responses)

Company Size (Annual Revenue)



Region



- • • If “Yes”: From where are they adding the technical expertise?*

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Sitting board members	60%	63%	60%	55%
Outside consultants	18%	22%	26%	28%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Sitting board members	62%	45%	56%	41%	58%	67%	77%
Outside consultants	35%	39%	25%	37%	33%	13%	8%

* Not shown: “Other” and “Don’t know” responses.



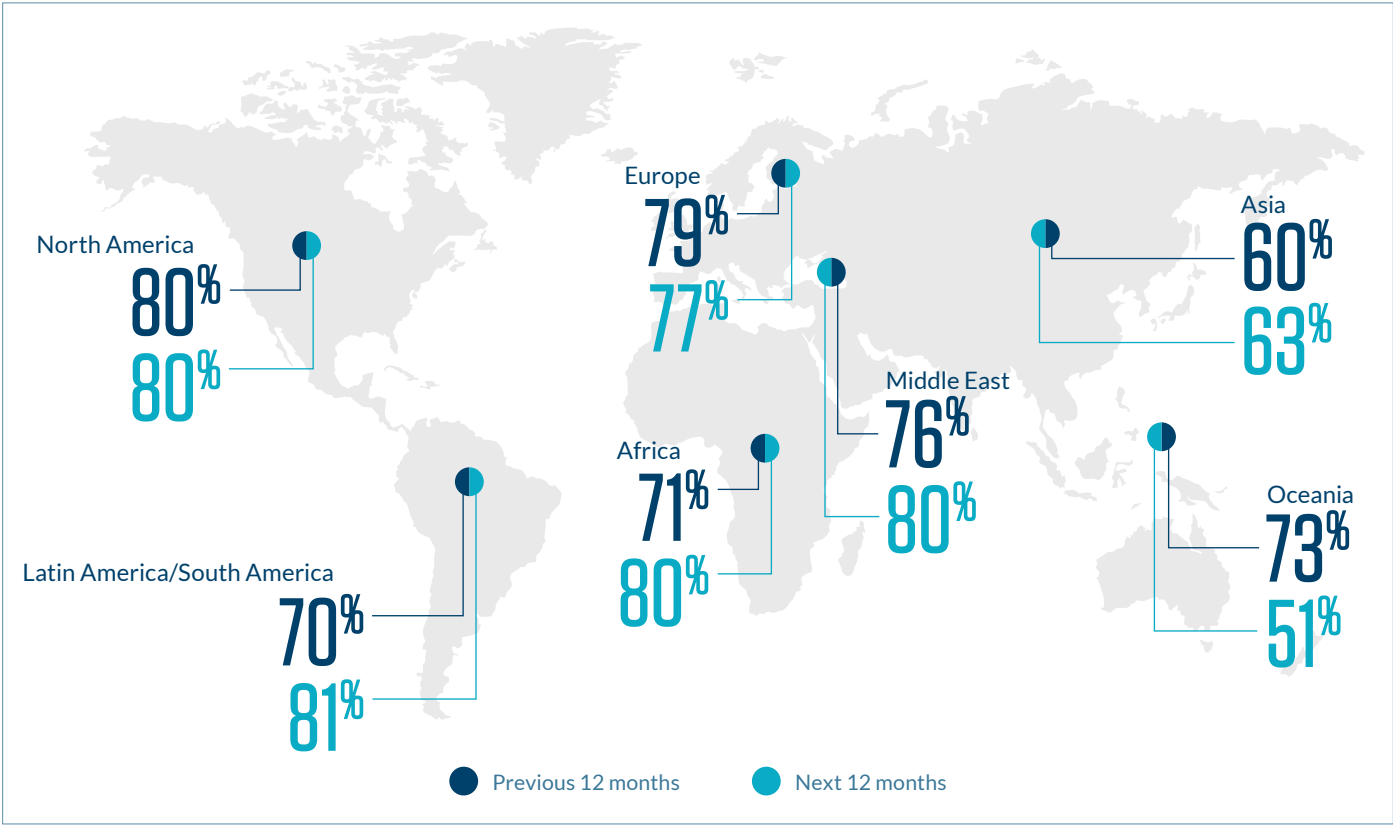
Cybersecurity and privacy matters, together with broader digital and technology transformations, are driving more boards to bring in experts with technical expertise, either as new directors or expert consultants.

• • • Cybersecurity included in the audit plan (Shown: “Yes” responses):

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Previous 12 months	81%	80%	75%	65%
Next 12 months	81%	77%	76%	66%

Region



- • • **Which of the following frameworks does the audit function use in performing assessments of the organization's cybersecurity posture/maturity? (Multiple responses permitted)**

NIST Cybersecurity Framework	54%
COBIT	51%
ISO 27000	43%
NIST 800-53	20%
CIS Top 20	12%
FFIEC Cybersecurity Assessment Tool	10%
AICPA Trust Service Criteria	7%

- • • **What cyber-related audit activities have been performed? (Multiple responses permitted)**

Security program assessment/framework gap analysis	66%
Privileged access management	61%
Technical assessments (vulnerability assessment, penetration testing, "red team")	48%
Data loss prevention (identification of "crown jewels")	44%
Security incident response — simulation/tabletop	38%
Social engineering	27%
Cyber breach kill chain	11%

KEY FACT



Among organizations that are not addressing cybersecurity as part of audit activities, the percentage of those that cite a lack of qualified/available resources (people or tools) as the primary reason

• • • **How are cybersecurity audits typically resourced? (Multiple responses permitted)**

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Exclusively with in-house (IT audit) resources	47%	40%	43%	42%
In-house resources with support from technical IT/information security resources	38%	33%	27%	34%
Co-sourced using external SMEs	29%	33%	26%	17%
Outsourced	12%	18%	19%	17%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Exclusively with in-house (IT audit) resources	42%	40%	48%	62%	50%	41%	22%
In-house resources with support from technical IT/information security resources	31%	36%	31%	29%	46%	33%	29%
Co-sourced using external SMEs	25%	20%	24%	14%	33%	28%	44%
Outsourced	22%	17%	15%	12%	11%	16%	24%



Getting Ahead of Talent and Skills Challenges

There is, unquestionably, a shortage of skills and talent today in IT audit. Organizations in every sector are experiencing challenges in finding the right people. As IT audit and internal audit functions continue to evolve, they face growing demands to recruit new expertise and, in the case of many current staff, retrain in new skills.

The results of this year's Global IT Audit Benchmarking Study show that, more than any other skills, IT audit functions are looking to hire professionals with expertise in advanced and enabling technologies.

These findings are consistent with those from other ISACA and Protiviti studies, which also reveal that access to enabling technology skills and expertise continues

to be a pervasive challenge. New agile methodologies, risks, technologies and processes require new skill sets. Further, as the importance of technology in the performance of internal auditing grows, the challenge becomes not how to apply technical acumen to old constructs, but rather how technologies change the way in which internal audit and IT audit achieve the desired outcome — i.e., risk assurance.¹³

¹³ *The Next Generation of Internal Auditing — Are You Ready?*, Protiviti, October 2018, www.protiviti.com/auditnextgen.

In addition to identifying needed technical skills, it is vital to recruit talent who also have a business mindset. IT audit functions require professionals who understand the new tools being employed in auditing and throughout the organization — AI, process mining, machine learning and more. However, these individuals do not need to be technical experts in these technologies — rather, they need to understand them and have a clear perspective on how they fit into the organization and the business processes and systems to which they are being applied. This is the type of business mindset that has become so valuable.

Technical skills are important, as are those centered around data science and analytics. But just as important is the ability to demonstrate and apply critical thinking. Why? Because despite the talent and skills we need today, requirements are likely going to change in the future as organizations continue to transform. Thus audit skill sets will need to be more fluid. Yet even with these changes, critical thinking will remain a vital requirement.

To access this talent, IT audit functions — and the organization in general, for that matter — need to start thinking differently about where to source talent and move beyond their traditional recruiting channels and candidate requirements for skills and experience.

“With the expectations of internal audit continuing to increase, the skills and technical acumen for IT auditors and all internal audit professionals need to change. To remain relevant, IT audit skills need to develop and also be accessed through non-traditional sources as new methodologies and technologies are employed. This might include the need to employ more data science capability; source skills from beyond the internal audit function, such as through partners and vendors; and ensure you have people that can change their mindset to think and act differently in a more agile and data-driven manner.”

— Mark Peters, Managing Director, IT Audit, Protiviti

- • • **What is your organization's hiring plan for the next 12 months in relation to IT audit staff?**

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Increase by more than 20%	6%	5%	5%	7%
Increase by 11% to 20%	7%	5%	7%	8%
Increase by 5% to 10%	16%	8%	11%	15%
Remain about the same	44%	52%	53%	38%
Reduce by 5% to 10%	2%	1%	1%	0%
Reduce by 11% to 20%	0%	1%	0%	0%
Reduce by more than 20%	1%	1%	0%	2%
Don't know	24%	27%	23%	30%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Increase by more than 20%	6%	6%	6%	4%	4%	6%	5%
Increase by 11% to 20%	6%	7%	8%	3%	7%	6%	11%
Increase by 5% to 10%	22%	16%	13%	26%	15%	11%	2%
Remain about the same	37%	41%	39%	51%	41%	53%	47%
Reduce by 5% to 10%	1%	0%	2%	2%	0%	1%	0%
Reduce by 11% to 20%	0%	0%	0%	1%	4%	0%	0%
Reduce by more than 20%	0%	1%	1%	0%	2%	1%	2%
Don't know	28%	29%	31%	13%	27%	22%	33%

- • • **What specific/unique skills is your organization looking to hire?**
(Multiple responses permitted)

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Advanced and enabling technologies	49%	42%	43%	38%
Critical thinking	36%	33%	31%	27%
Data science	34%	28%	24%	20%
Agile methodology	25%	15%	19%	16%
Communication expertise	18%	19%	18%	13%
Programming	12%	10%	13%	13%
Design thinking	11%	9%	9%	6%
Statistics	7%	9%	8%	6%
Lean processes	7%	8%	7%	5%
Human behavior/psychology	5%	5%	6%	5%
Decision science	6%	4%	2%	3%
Other	5%	5%	3%	5%
None	21%	31%	28%	29%



Skills in advanced and enabling technologies stand out as those that IT audit organizations are looking to hire, underscoring growing demand for next-generation auditing technologies like process mining, artificial intelligence and machine learning.

Region

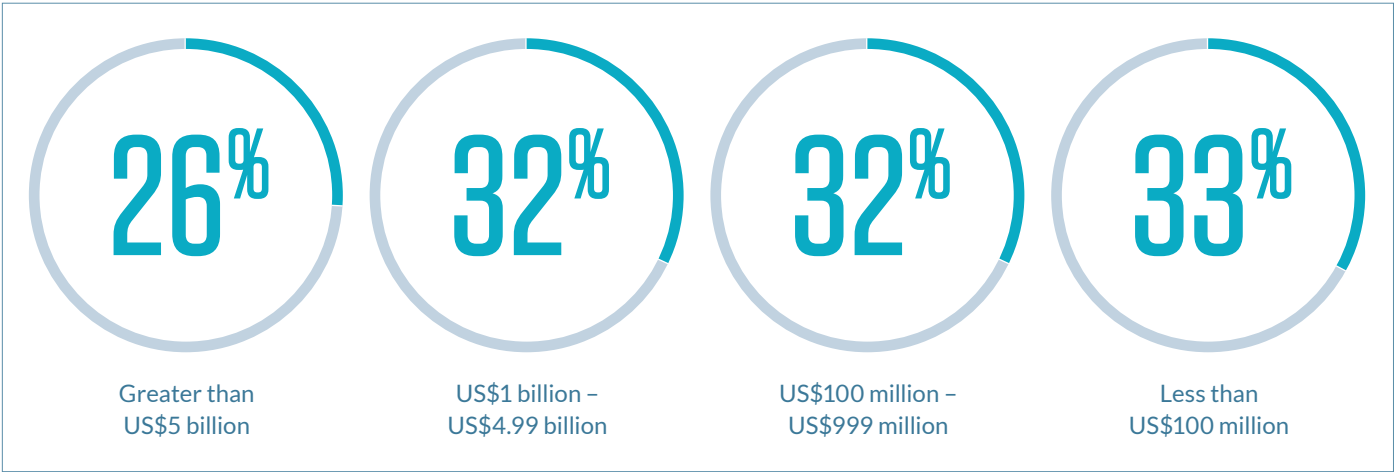
	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Advanced and enabling technologies	51%	47%	44%	43%	33%	43%	33%
Critical thinking	33%	28%	21%	33%	30%	39%	29%
Data science	33%	30%	31%	25%	35%	24%	13%
Agile methodology	15%	23%	21%	20%	20%	18%	16%
Communication expertise	15%	17%	11%	17%	24%	19%	16%
Programming	18%	14%	14%	20%	22%	9%	2%
Design thinking	9%	10%	7%	6%	13%	9%	11%
Statistics	5%	8%	8%	10%	11%	7%	9%
Lean processes	6%	7%	5%	9%	6%	8%	7%
Human behavior/psychology	3%	10%	5%	7%	11%	3%	13%
Decision science	2%	5%	4%	3%	15%	4%	2%
Other	6%	3%	4%	7%	2%	5%	4%
None	19%	20%	26%	22%	33%	29%	33%



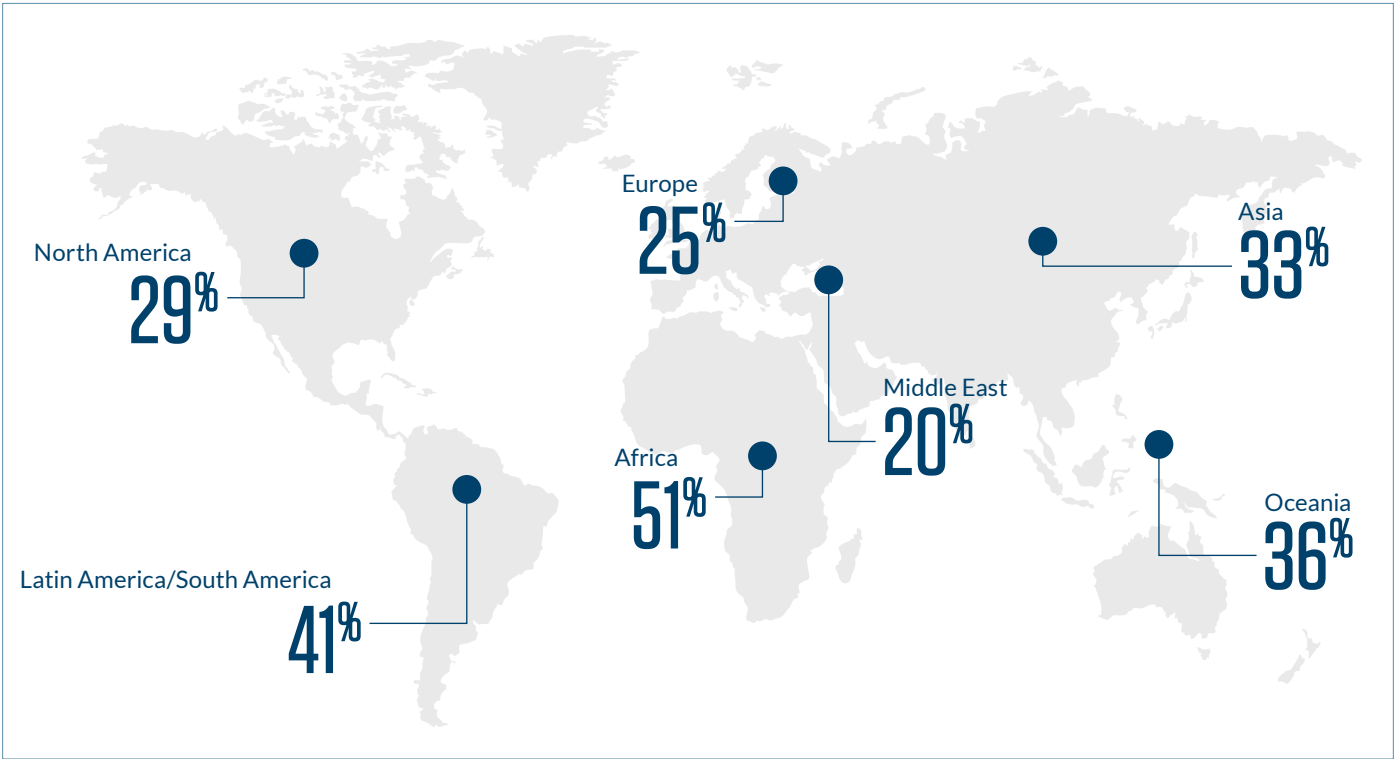
Along with skills in advanced and enabling technologies, critical-thinking skill sets are in demand in most regions.

- • • Are there specific areas of your current IT audit plan that you are not able to address sufficiently due to lack of resources/skills? (Shown: “Yes” responses)

Company Size (Annual Revenue)

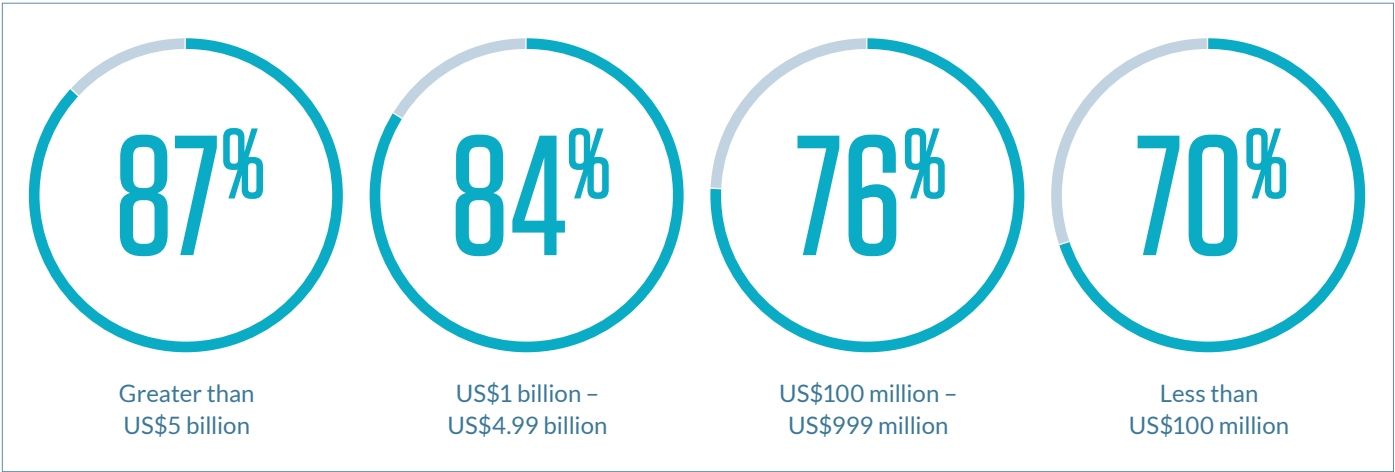


Region

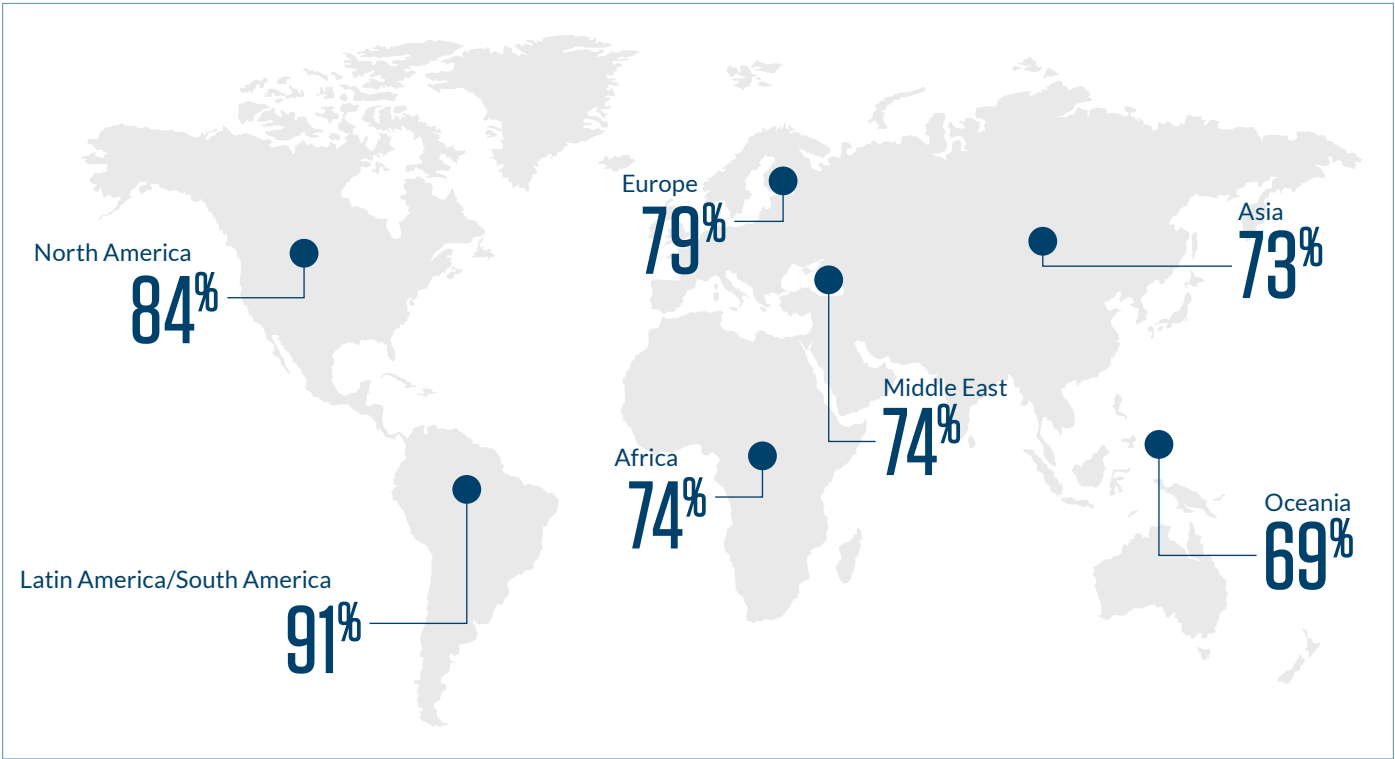


- • • Are IT audits conducted by individuals who are full-time internal audit professionals in the internal audit department and who focus on IT audit projects? (Shown: “Yes” responses)

Company Size (Annual Revenue)



Region



How the IT Audit Function Is Structured

The trend is now clear and, we expect, in place permanently. A majority of organizations have a designated IT audit director. And in most of these organizations, the IT audit director is a regular attendee at audit committee meetings.

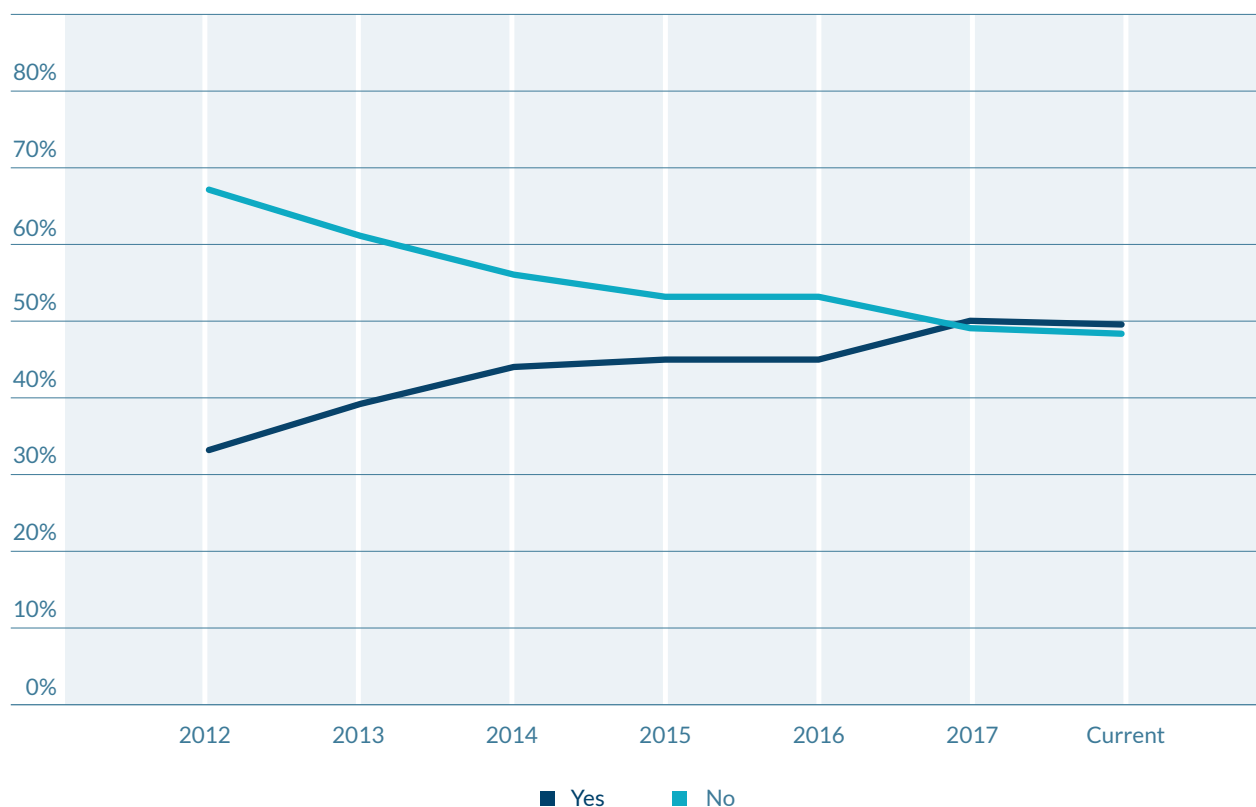
This is positive to see but also expected given the technology orientation of most organizations today as well as multiple transformation projects and programs moving forward regularly and relentlessly. Audit committees have a greater interest than ever in technology and cybersecurity issues and seek perspectives from IT audit leaders.

Another key aspect of the IT audit function structure involves skills and resources. As noted earlier, there continues to be a major shortage of qualified IT audit talent in the market. Moreover, needed skill sets are changing, with knowledge and technical skills in areas

such as data science, robotics, AI and machine learning, among others, growing significantly in importance for IT audit. This is where the ability to access the right resources — whether through recruiting, employing new strategies for leveraging outside resources, and/or co-sourcing or outsourcing certain IT audit activities — becomes paramount.

The IT audit function needs to embrace new approaches to finding the right resources given both these talent challenges as well as shifting requirements of the function in light of changes in their organizations.

• • • Do you have a designated IT audit director (or equivalent position)?



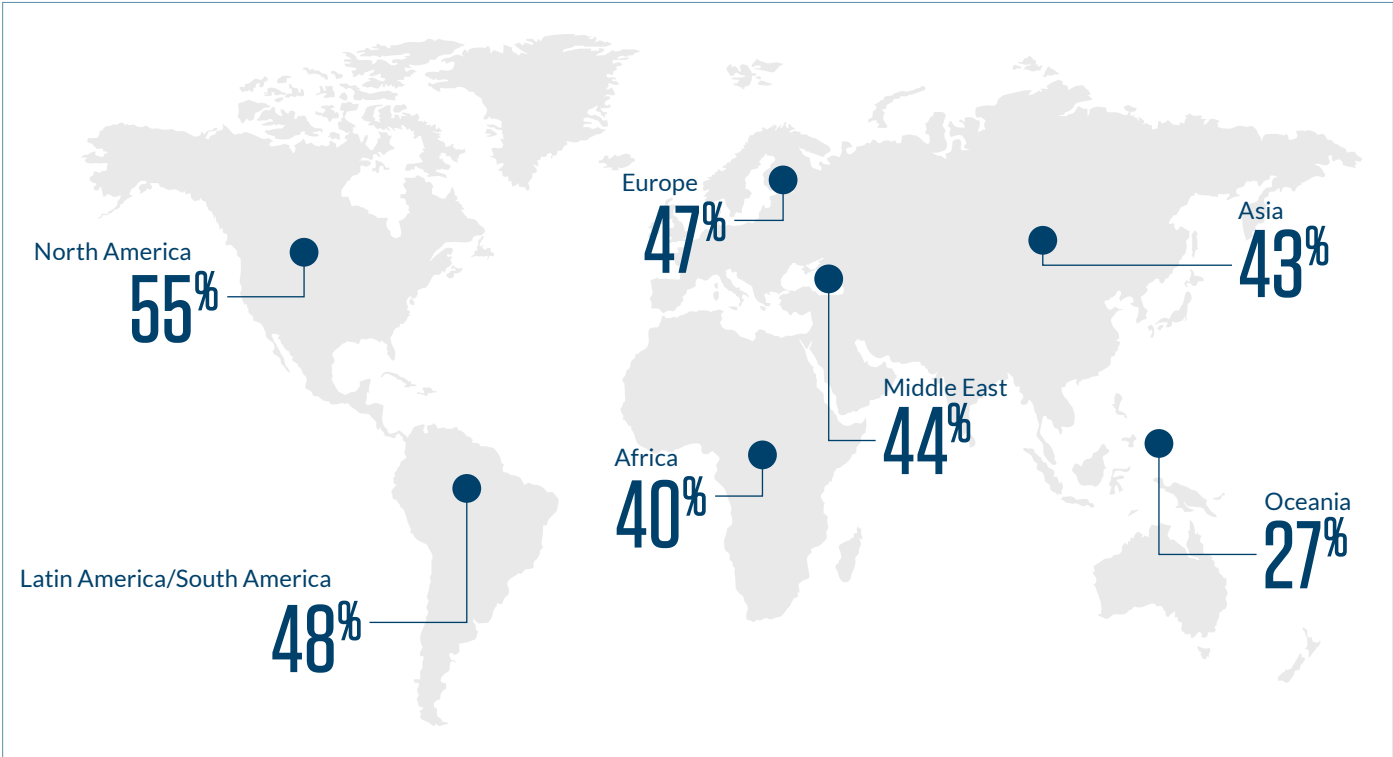
Company Size (Annual Revenue)

("Yes" responses)

	Current	2017	2016	2015
Greater than US\$5 billion	64%	71%	59%	60%
US\$1 billion - US\$4.99 billion	42%	46%	44%	40%
US\$100 million - US\$999.99 million	39%	31%	36%	31%
Less than US\$100 million	44%	45%	38%	41%

- • • Do you have a designated IT audit director (or equivalent position)?

Region (“Yes” responses)

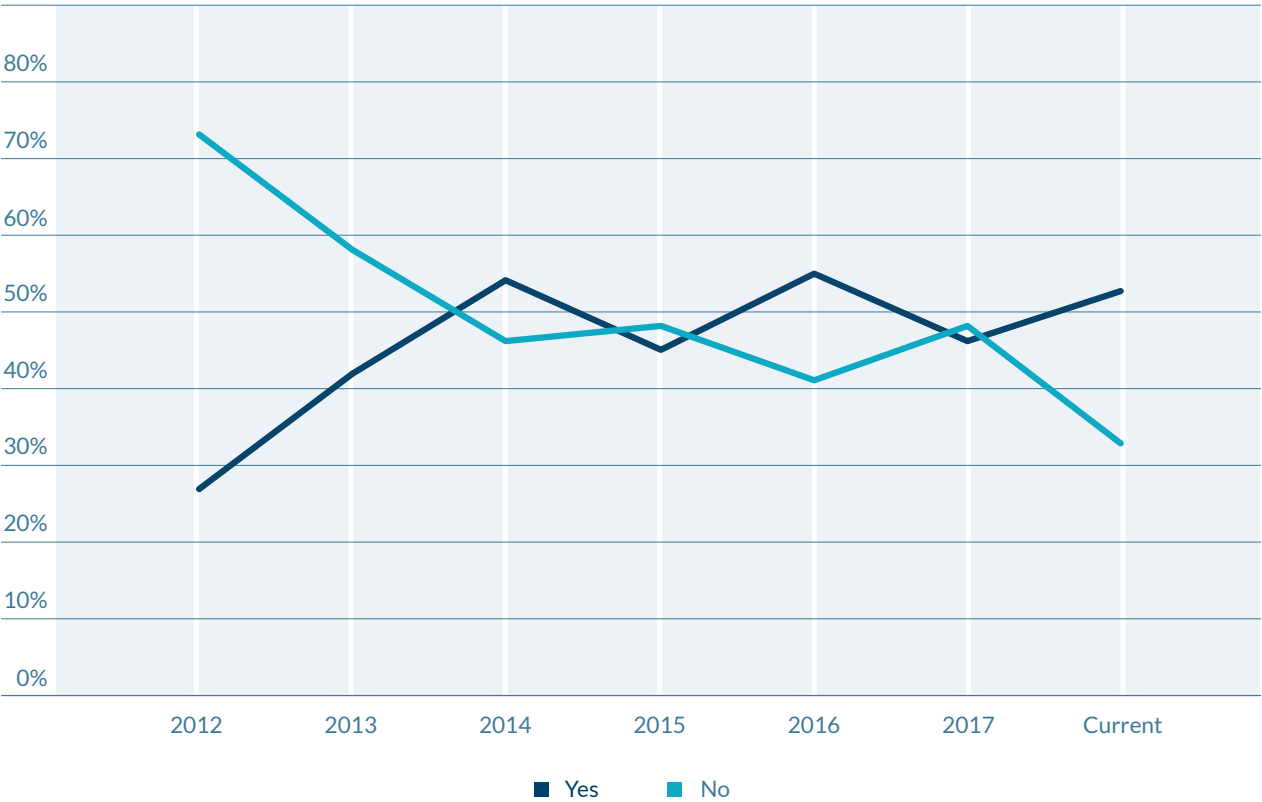


• • • To whom within the organization does your IT audit director report?

Region

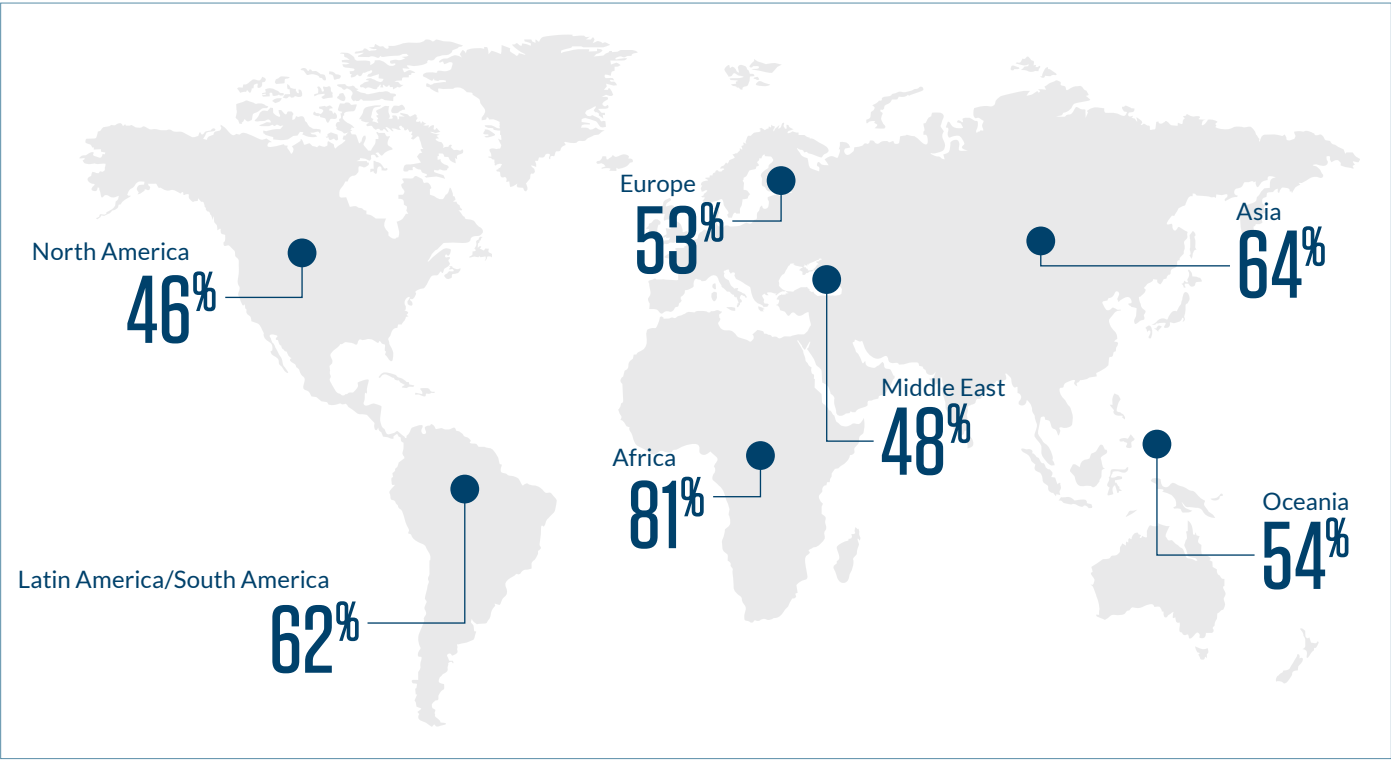
	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Chief Audit Executive	54%	57%	54%	68%	66%	65%	54%
Chief Executive Officer	21%	19%	21%	16%	14%	10%	8%
Report through some other function	17%	10%	12%	8%	7%	13%	31%
A director under the CAE	4%	7%	10%	5%	10%	8%	7%
Chief Information Officer	4%	7%	3%	3%	3%	4%	0%

• • • Does the IT audit director (or equivalent position) regularly attend the audit committee meetings?*



- • • Does the IT audit director (or equivalent position) regularly attend the audit committee meetings?

Region (“Yes” responses)





GLOBAL LEADER
North America

55%

of organizations have a designated IT audit director or equivalent position.

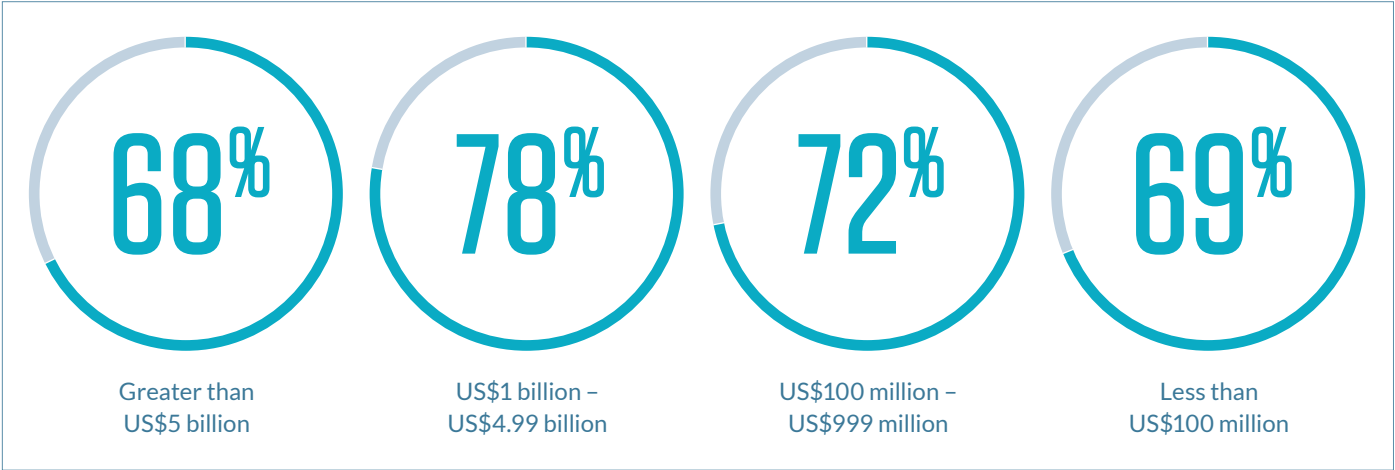


GLOBAL LEADER
Africa

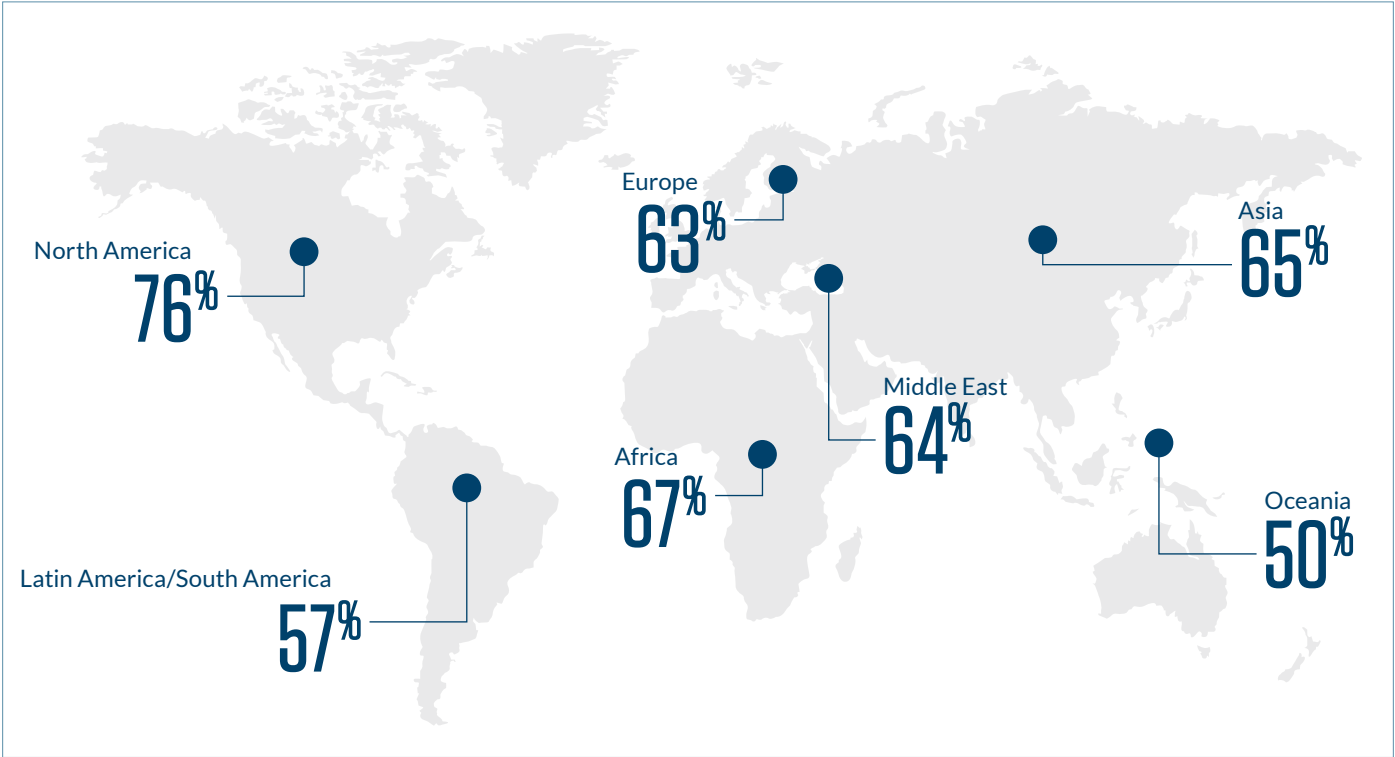
81%

of IT audit directors regularly attend audit committee meetings.

- • • If the IT audit director does not regularly attend audit committee meetings: Does the CAE have sufficient knowledge to hold a discussion about IT audit matters with the audit committee? (Shown: “Yes” responses)



Region



- • • Does the CAE or IT audit director attend any of the following meetings to help construct the IT audit plan? (Multiple responses permitted)

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Regularly scheduled meetings with CIO	40%	26%	40%	42%	34%	48%	40%
IT strategy meetings	27%	26%	26%	37%	33%	26%	13%
Large-scale IT project meetings	30%	23%	22%	21%	24%	30%	25%
IT department staff meetings	16%	23%	18%	33%	9%	20%	10%
IT portfolio management meetings	14%	10%	14%	18%	6%	15%	17%

- • • Are there IT assurance projects occurring within other areas of the organization?

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Yes	38%	30%	29%	20%
No	29%	39%	44%	52%
Unsure	33%	31%	27%	28%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Yes	28%	19%	30%	29%	36%	33%	31%
No	50%	46%	35%	54%	36%	39%	42%
Unsure	22%	35%	35%	17%	28%	28%	27%

- • • **How are IT audit resources structured within your organization?**

Company Size (Annual Revenue)

	Greater than US\$5 billion			US\$1 billion – US\$4.99 billion			US\$100 million – US\$999.99 million			Less than US\$100 million		
	Current	2017	2016	Current	2017	2016	Current	2017	2016	Current	2017	2016
Part of the internal audit department, not a separate function	55%	49%	50%	63%	59%	61%	58%	58%	59%	46%	43%	46%
Part of the internal audit department, but considered to be a separate function	34%	41%	36%	25%	34%	26%	27%	28%	23%	23%	25%	22%
Embedded in the organization as a separate audit function	8%	9%	10%	7%	3%	8%	10%	6%	10%	23%	21%	21%
No IT audit resources are available within the organization	3%	1%	4%	5%	4%	5%	5%	8%	8%	8%	11%	11%

Region

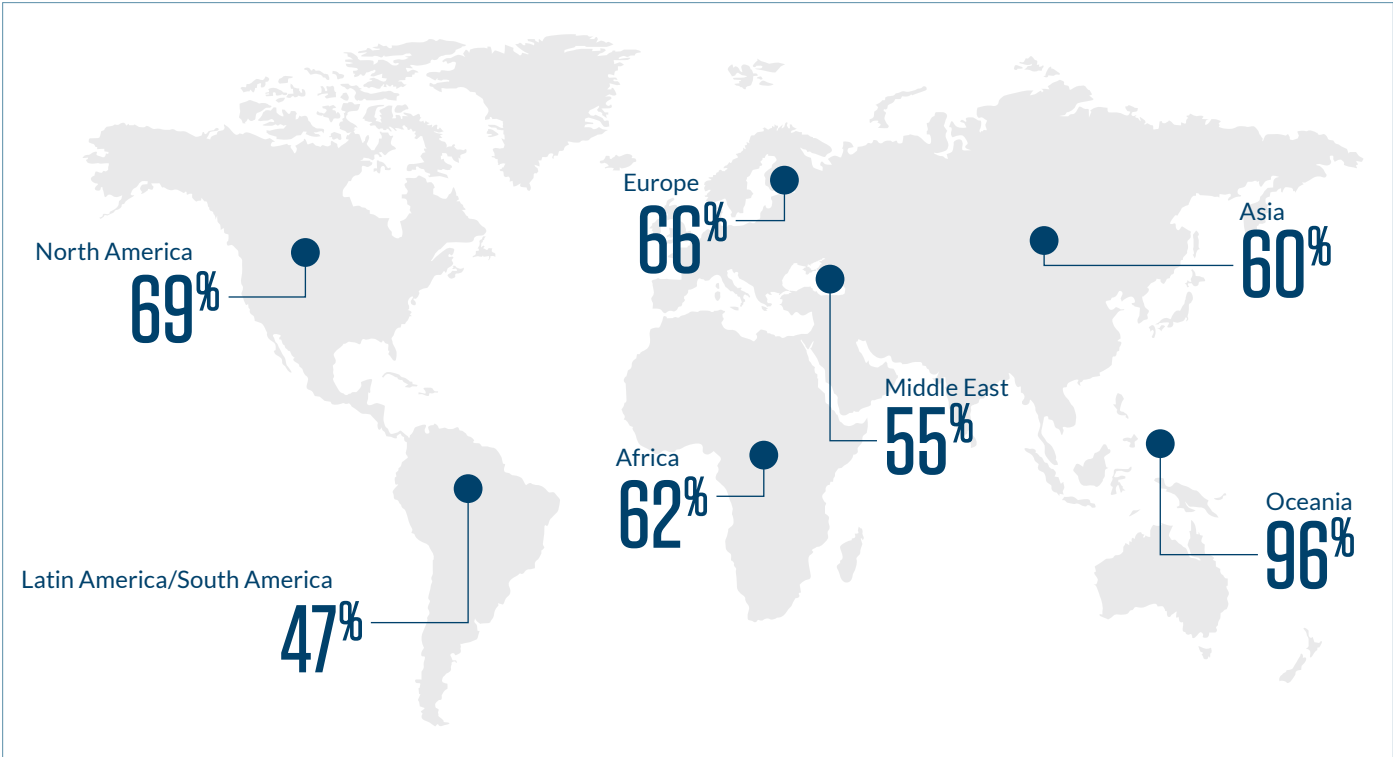
	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Part of the internal audit department, not a separate function	49%	45%	51%	52%	42%	62%	67%
Part of the internal audit department, but considered to be a separate function	29%	34%	30%	38%	40%	24%	21%
Embedded in the organization as a separate audit function	16%	14%	15%	9%	9%	9%	4%
No IT audit resources are available within the organization	6%	7%	4%	1%	9%	5%	8%

- Do you use outside resources to augment/provide your IT audit skill set?
(Multiple responses permitted)

Company Size (Annual Revenue)

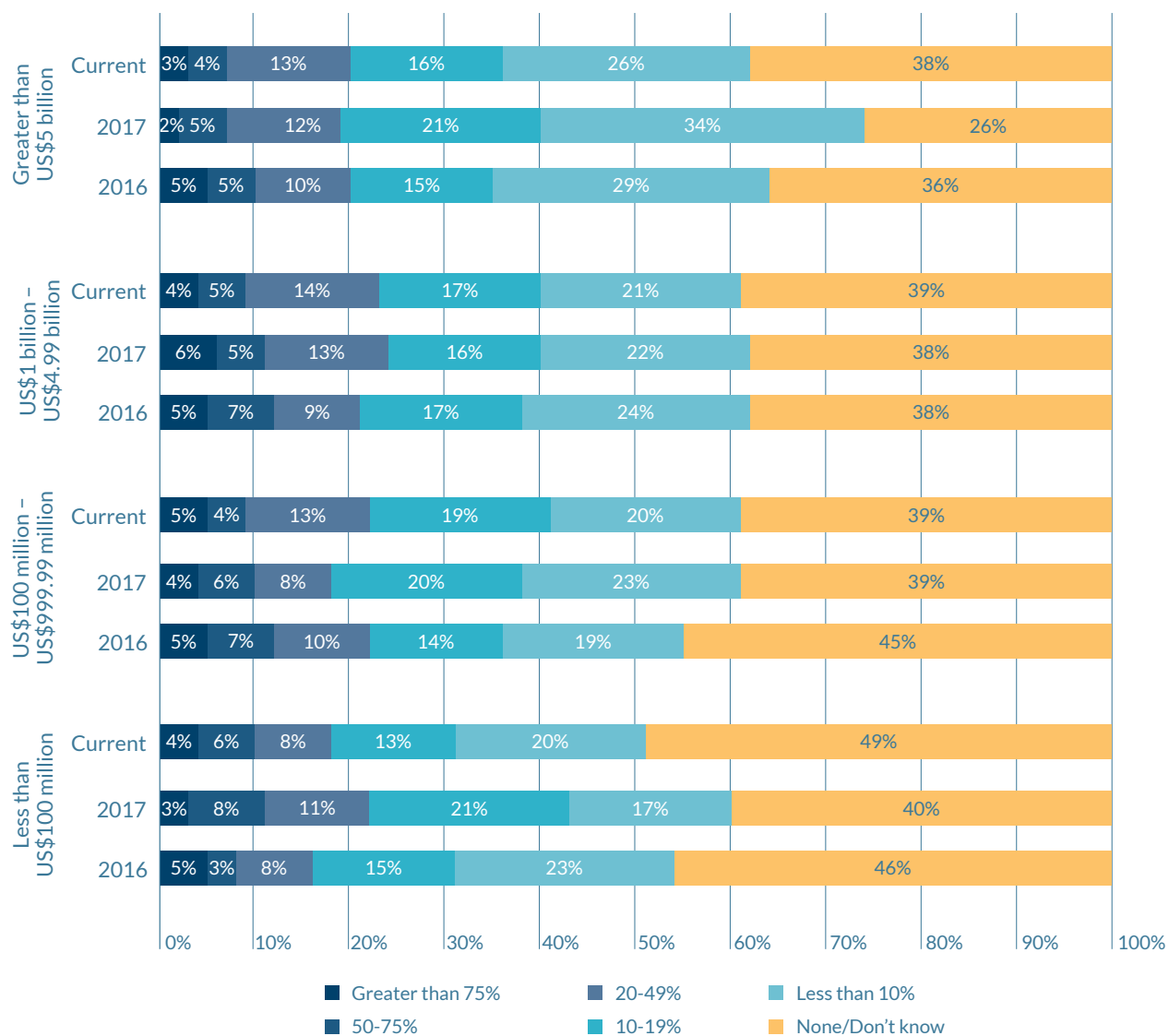
	Greater than US\$5 billion			US\$1 billion – US\$4.99 billion			US\$100 million – US\$999.99 million			Less than US\$100 million		
	Current	2017	2016	Current	2017	2016	Current	2017	2016	Current	2017	2016
Yes, we use guest auditors	26%	28%	22%	23%	18%	15%	23%	18%	24%	23%	22%	22%
Yes, we outsource the IT audit function	5%	5%	6%	5%	5%	5%	10%	6%	8%	8%	9%	8%
Yes, we use co-source providers	42%	53%	36%	39%	42%	46%	34%	39%	30%	23%	30%	23%
We do not use outside resources	38%	31%	43%	39%	42%	40%	43%	44%	45%	53%	47%	51%

Region (“Yes” responses)



- • • What is the percentage of outside IT audit resource hours used compared to total IT audit hours?

Company Size (Annual Revenue)



- • • **Please indicate the primary reason(s) your company uses outside resources to augment IT audit skills. (Multiple responses permitted)**

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Lack of resources	39%	38%	33%	32%
In-house internal audit department lacks IT audit skill sets	26%	30%	24%	20%
Different/outside perspectives	23%	22%	24%	18%
Provides the opportunity for people to learn from the experiences of outside resources	21%	18%	23%	22%
Variable resource modeling	16%	13%	13%	9%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Lack of resources	23%	31%	35%	29%	35%	39%	40%
In-house internal audit department lacks IT audit skill sets	24%	26%	23%	16%	20%	26%	38%
Different/outside perspectives	20%	22%	20%	18%	18%	23%	28%
Provides the opportunity for people to learn from the experiences of outside resources	25%	27%	24%	11%	20%	18%	21%
Variable resource modeling	4%	16%	14%	3%	11%	13%	32%

Appendix: IT Audit Risk Assessments and the Audit Plan

- • • Does your organization identify and assess technology risk for audit planning purposes?

Company Size (Annual Revenue)

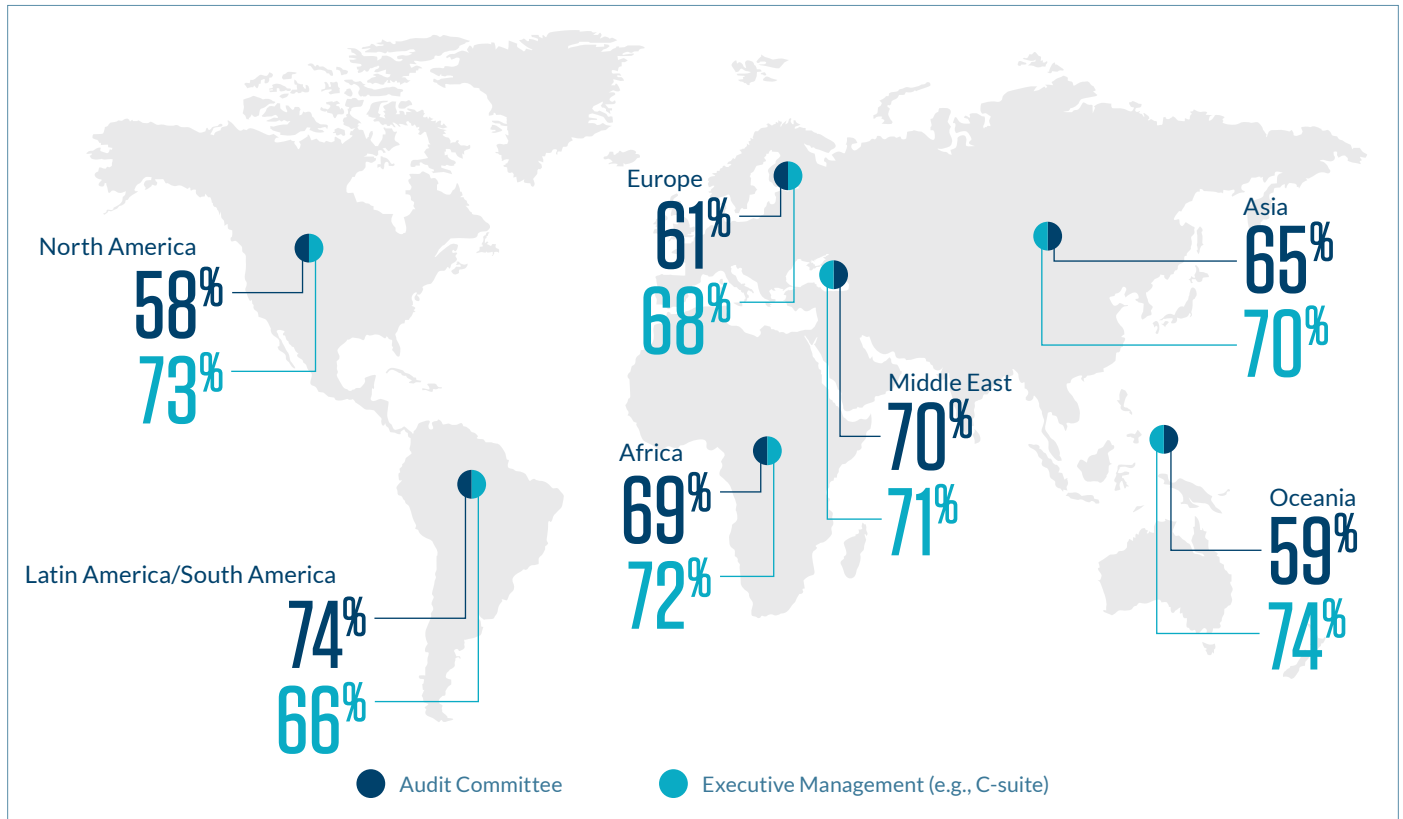
	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Yes, it is conducted as part of the overall internal audit risk assessment process	79%	72%	71%	63%
Yes, it is conducted separately from the overall internal audit risk assessment process	10%	12%	13%	12%
Yes, it is conducted by a group other than internal audit, but internal audit relies on the output to produce their audit plan	6%	8%	8%	6%
No, an IT audit risk assessment is not conducted	5%	8%	8%	19%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Yes, it is conducted as part of the overall internal audit risk assessment process	68%	66%	69%	72%	70%	77%	66%
Yes, it is conducted separately from the overall internal audit risk assessment process	8%	14%	15%	10%	11%	10%	13%
Yes, it is conducted by a group other than internal audit, but internal audit relies on the output to produce their audit plan	10%	7%	6%	10%	7%	6%	13%
No, an IT audit risk assessment is not conducted	14%	13%	10%	8%	12%	7%	8%

- • • Please indicate the level of involvement of each of the following individuals/groups in your organization's process to identify and assess technology risk. (Shown: Percentage of "Significant/Moderate" levels of involvement)

Region



Not surprisingly, levels of involvement in the organization's process to identify and assess technology risk indicate a general upward trend among both audit committees and executive management compared to our prior year survey results.

- • • **How often does the process occur to identify and assess technology risk within the organization?**

Company Size (Annual Revenue)

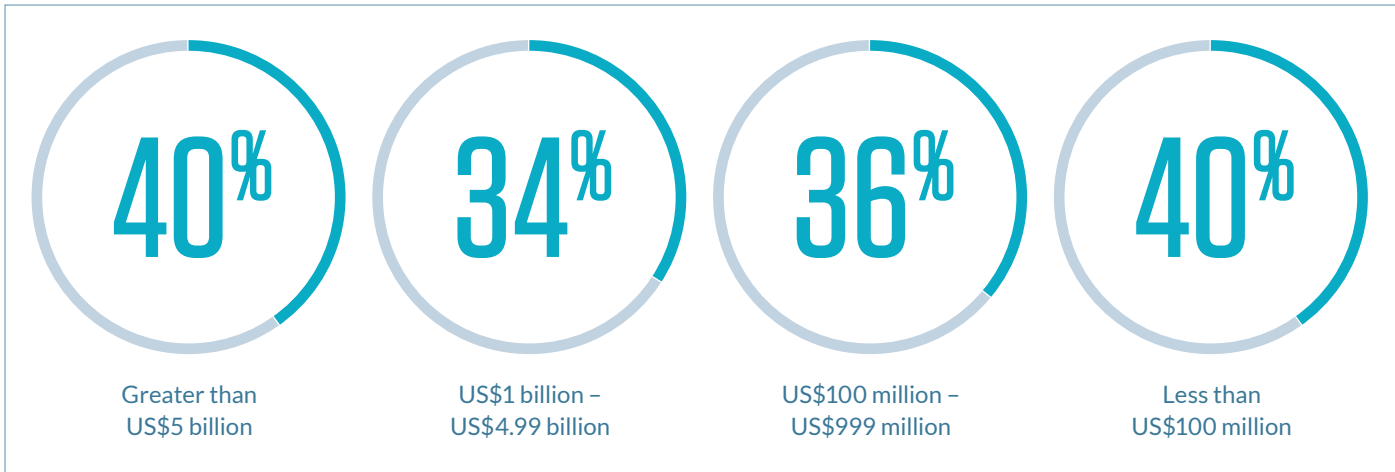
	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Continually	31%	27%	21%	23%
Monthly	4%	3%	3%	5%
Quarterly	21%	12%	17%	12%
Semi-annually	7%	7%	11%	8%
Annually	33%	46%	41%	41%
Less than annually	4%	5%	7%	11%

Region

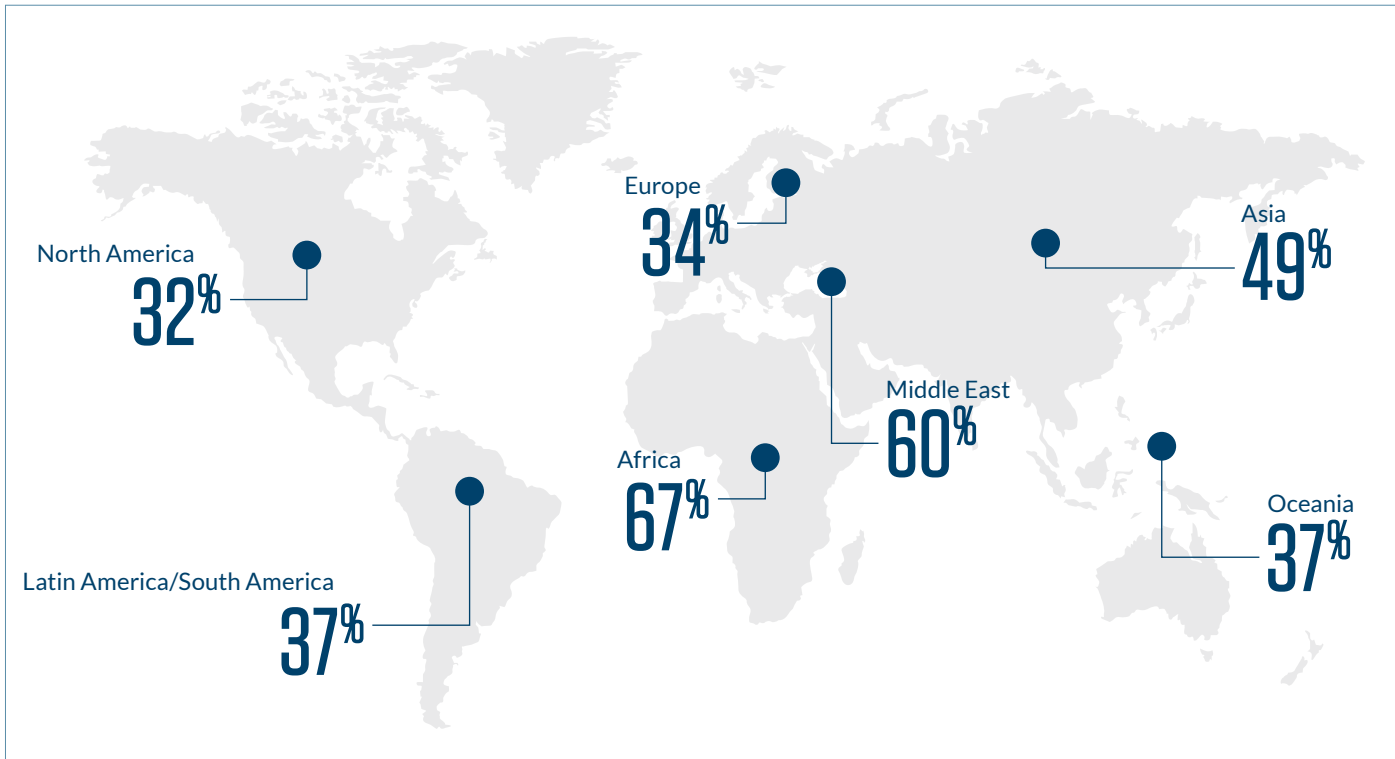
	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Continually	29%	22%	21%	21%	22%	30%	26%
Monthly	7%	5%	3%	3%	5%	3%	4%
Quarterly	14%	17%	18%	13%	11%	16%	22%
Semi-annually	11%	10%	10%	10%	3%	7%	6%
Annually	31%	39%	42%	46%	46%	38%	36%
Less than annually	8%	7%	6%	7%	13%	6%	6%

- • • Will digitalization efforts impact the frequency of updates made to your organization’s fiscal 2019 IT audit risk assessment? (Shown: “Yes” responses)

Company Size (Annual Revenue)



Region



- • • **How frequently will your IT audit risk assessment be updated in fiscal 2019 due to digitalization changes within your organization?**

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Continually	27%	31%	25%	29%
Monthly	6%	4%	5%	8%
Quarterly	27%	17%	24%	14%
Semi-annually	14%	17%	16%	14%
Annually	22%	26%	22%	25%
Less than annually	3%	4%	5%	7%
Never	1%	1%	3%	3%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Continually	38%	26%	22%	17%	16%	31%	23%
Monthly	8%	5%	6%	7%	8%	4%	12%
Quarterly	24%	18%	20%	21%	24%	23%	29%
Semi-annually	13%	14%	20%	14%	16%	14%	12%
Annually	13%	29%	25%	38%	30%	22%	6%
Less than annually	3%	3%	5%	3%	3%	5%	18%
Never	1%	5%	2%	0%	3%	1%	0%

- • • Which of the following activities is your IT audit function responsible for? (Multiple responses permitted)

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Conducting IT general control audits	82%	70%	81%	86%	69%	79%	78%
Conducting application audits	82%	67%	74%	85%	73%	72%	70%
Conducting IT process audits	73%	63%	76%	85%	80%	69%	78%
Conducting cybersecurity audits	65%	52%	69%	78%	73%	71%	65%
Conducting IT governance audits	73%	56%	71%	62%	56%	61%	74%
Collecting and analyzing data to support internal audit activities	66%	53%	61%	74%	69%	66%	67%
Conducting IT infrastructure audits	63%	53%	67%	68%	64%	60%	59%
Conducting integrated audits	59%	41%	60%	70%	58%	61%	57%
Conducting physical security audits	59%	41%	53%	71%	54%	52%	39%
Testing IT compliance	65%	32%	45%	58%	56%	54%	33%
Conducting pre- and post-implementation audits	52%	33%	41%	48%	46%	49%	43%
Conducting framework assessments (e.g., against COBIT, NIST, ISO, etc.)	47%	30%	45%	62%	44%	46%	46%
Testing business continuity/disaster recovery plans	54%	27%	37%	55%	39%	46%	46%
Providing consultative services	39%	19%	29%	34%	22%	43%	37%
Performing continuous auditing	46%	27%	31%	51%	31%	32%	26%
Conducting readiness reviews/gap assessments for new or emerging regulations (e.g., GDPR)	34%	15%	46%	26%	20%	32%	15%
Evaluating the organization's IT risk management capability and maturity	35%	19%	37%	44%	31%	27%	30%
Providing IT risk advisory support for large-scale IT projects	39%	21%	24%	27%	19%	34%	28%
Conducting IT fraud investigations	39%	24%	33%	40%	41%	25%	30%

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Conducting vendor audits (including third-party attestation reports)	30%	20%	30%	33%	15%	31%	20%
Testing for IT Sarbanes-Oxley or other related country-specific compliance	10%	11%	16%	18%	7%	45%	7%
Supporting internal audit innovation/transformation strategy	28%	18%	28%	29%	25%	29%	20%
Providing external audit support (direct assist)	25%	12%	17%	27%	12%	36%	15%
Conducting vulnerability assessments	46%	18%	22%	36%	29%	21%	20%
Conducting IT assurance review or consulting for customer-facing product development related to security or privacy concerns	29%	21%	17%	23%	22%	21%	24%
Leading internal audit innovation/transformation strategy	21%	15%	22%	30%	17%	21%	9%
Conducting cyber incident response activities	21%	18%	20%	25%	31%	20%	22%
Maintaining internal control framework documentation	24%	16%	14%	21%	22%	24%	11%
Conducting IT assurance reviews as part of due diligence for mergers and acquisitions	33%	18%	15%	25%	15%	21%	20%
Developing strategy around internal audit's toolkit (advanced and enabling technologies)	21%	11%	19%	21%	12%	19%	15%
Conducting reviews of third-party cloud services via the use of the Cloud Security Alliance (CSA) framework	19%	9%	16%	16%	5%	21%	4%
Supporting the organization's PCI compliance program	11%	11%	12%	14%	10%	19%	11%
Conducting penetration testing (including Red & Blue team activities)	26%	10%	15%	21%	20%	14%	15%
Conducting RPA audits	12%	5%	14%	7%	2%	18%	15%
Conducting social engineering audits	19%	6%	14%	11%	15%	13%	9%
Conducting table-top or simulation-based reviews	11%	9%	6%	4%	8%	10%	9%

- • • Of the total number of IT audits conducted annually, what percentage of total IT audit hours are spent on the following areas?

Company Size (Annual Revenue) – Top 3 Audit Areas

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Conducting IT general control audits	●	●	●	●
Collecting and analyzing data to support internal audit activities		●	●	●
Conducting application audits	●		●	●
Testing for IT Sarbanes-Oxley or other related country-specific compliance	●	●		

Region – Top 3 Audit Areas

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Conducting IT general control audits	●	●	●	●	●	●	●
Collecting and analyzing data to support internal audit activities	●	●	●	●	●	●	
Conducting application audits	●	●	●	●	●		●
Testing for IT Sarbanes-Oxley or other related country-specific compliance						●	
Conducting integrated audits							●

- • • On which of the following accepted industry framework(s) is the process to identify and assess technology risk based? (Multiple responses permitted)

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
COBIT	68%	55%	67%	82%	68%	61%	49%
COSO	36%	38%	32%	55%	33%	40%	23%
ISO	47%	40%	43%	43%	40%	28%	51%
ITIL	38%	29%	42%	28%	30%	25%	28%
NIST CSF	13%	9%	19%	21%	11%	45%	34%
FFIEC CAT	1%	4%	2%	9%	2%	10%	2%

- • • What percentage of time does the IT audit function spend on assurance vs. compliance vs. consulting activities?

Company Size (Annual Revenue)

	Greater than 75%	50-75%	25-49%	15-24%	1-14%	None/Don't know
Greater than US\$5 billion						
Assurance	25%	29%	22%	13%	5%	6%
Compliance	7%	16%	28%	24%	17%	8%
Consulting	1%	6%	16%	22%	38%	17%
US\$1 billion – US\$4.99 billion						
Assurance	21%	28%	26%	12%	6%	7%
Compliance	6%	18%	28%	23%	17%	8%
Consulting	1%	4%	11%	29%	41%	14%
US\$100 million – US\$999.99 million						
Assurance	20%	30%	25%	11%	7%	7%
Compliance	8%	18%	30%	21%	15%	8%
Consulting	2%	6%	15%	22%	40%	15%
Less than US\$100 million						
Assurance	15%	28%	24%	15%	8%	10%
Compliance	9%	18%	28%	21%	13%	11%
Consulting	6%	10%	15%	20%	31%	18%

Region

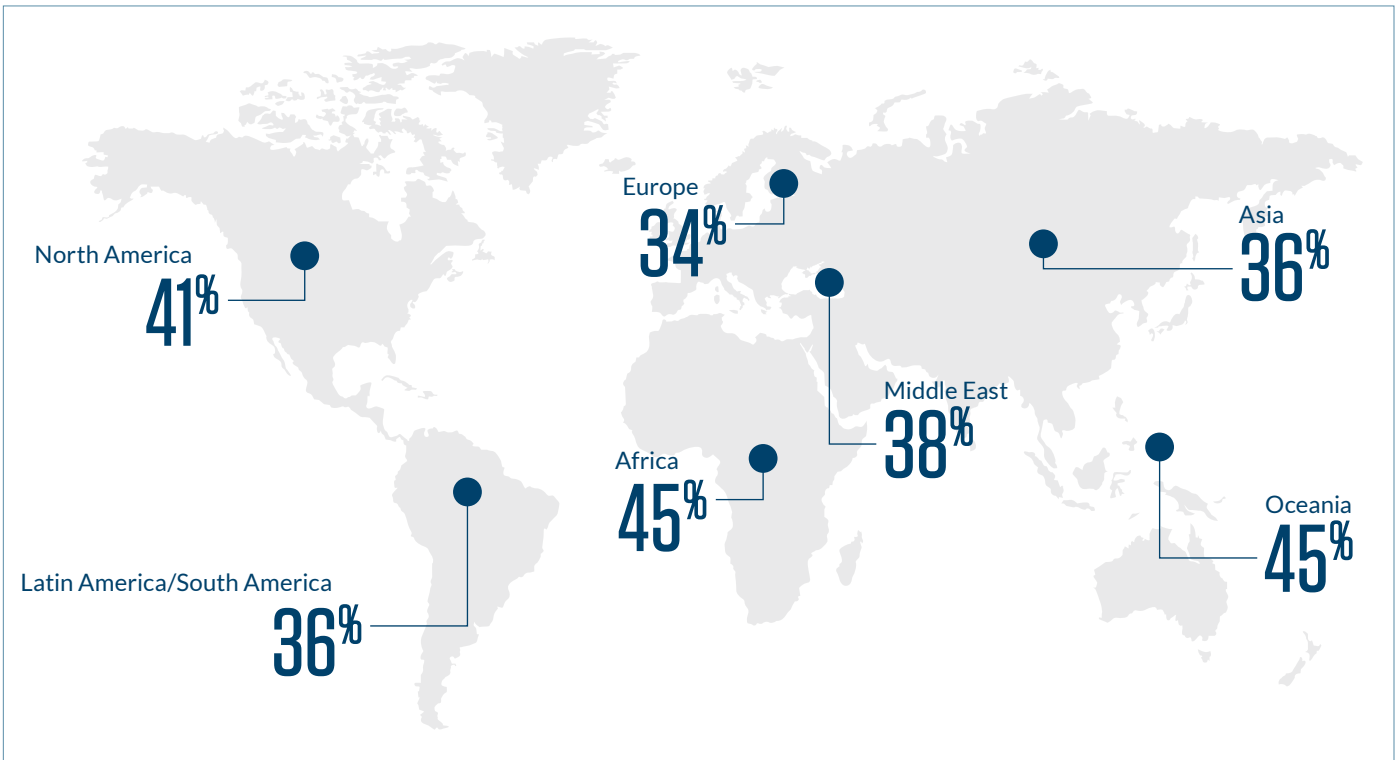
	Greater than 75%	50-75%	25-49%	15-24%	1-14%	None/Don't know
Africa						
Assurance	33%	37%	17%	9%	3%	1%
Compliance	6%	19%	27%	30%	14%	4%
Consulting	5%	12%	15%	23%	33%	12%
Asia						
Assurance	19%	25%	28%	13%	7%	8%
Compliance	7%	17%	34%	22%	12%	8%
Consulting	1%	9%	20%	26%	25%	19%
Europe						
Assurance	23%	28%	23%	12%	5%	9%
Compliance	7%	14%	31%	21%	18%	9%
Consulting	2%	5%	14%	19%	41%	19%
Latin America/South America						
Assurance	23%	37%	24%	6%	7%	3%
Compliance	10%	21%	24%	31%	9%	5%
Consulting	3%	13%	14%	23%	37%	10%
Middle East						
Assurance	18%	35%	19%	11%	11%	6%
Compliance	6%	18%	30%	30%	11%	5%
Consulting	6%	9%	9%	22%	43%	11%
North America						
Assurance	19%	28%	24%	15%	7%	7%
Compliance	9%	18%	27%	21%	16%	9%
Consulting	3%	6%	13%	23%	40%	15%
Oceania						
Assurance	18%	47%	22%	4%	4%	5%
Compliance	0%	29%	20%	27%	18%	6%
Consulting	0%	7%	18%	31%	27%	17%

- • • If your company has an ERM program, does the IT audit risk framework used for the risk assessment link to the ERM framework? (Shown: “Yes” responses)

Company Size (Annual Revenue)

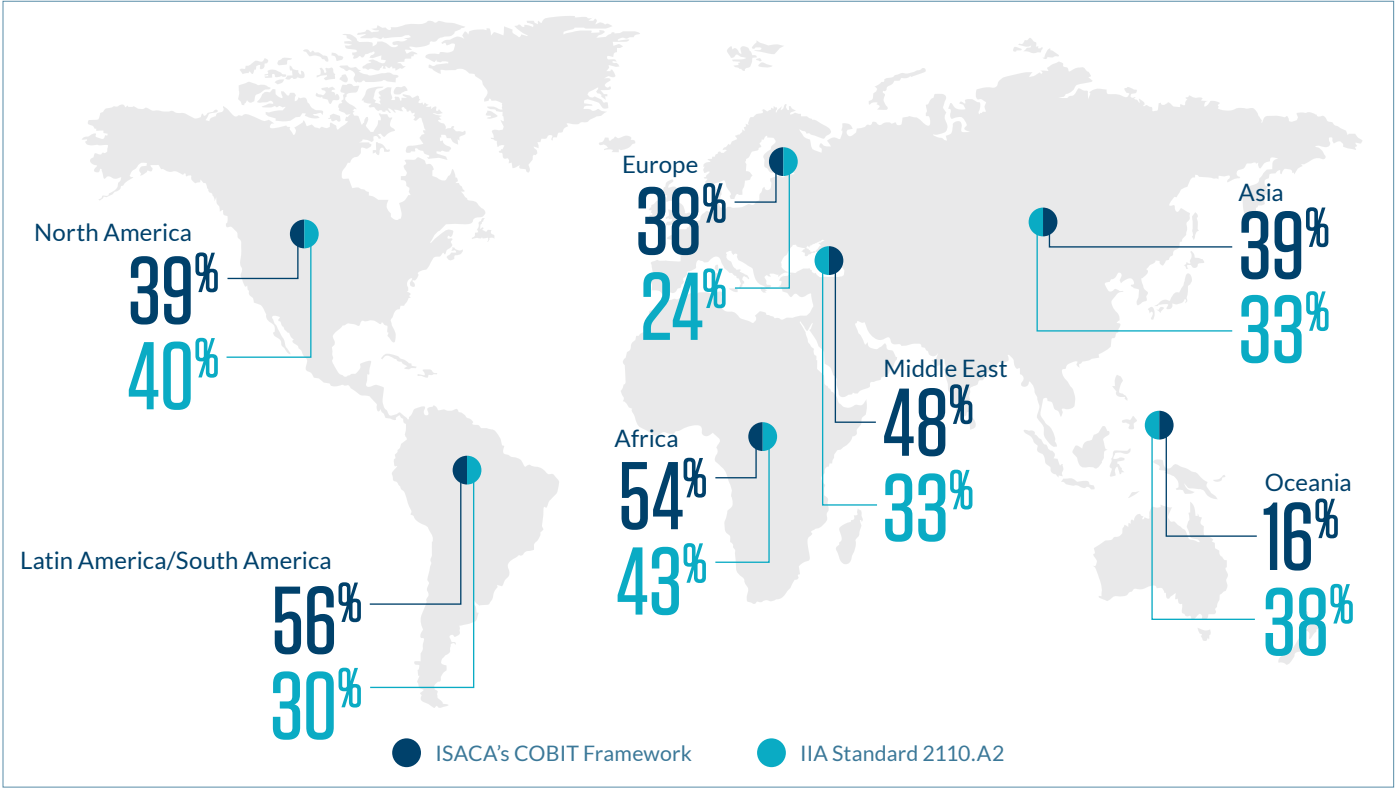
Greater than US\$5 billion			US\$1 billion – US\$4.99 billion			US\$100 million – US\$999.99 million			Less than US\$100 million		
Current	2017	2016	Current	2017	2016	Current	2017	2016	Current	2017	2016
47%	49%	47%	39%	39%	36%	37%	42%	42%	27%	39%	33%

Region

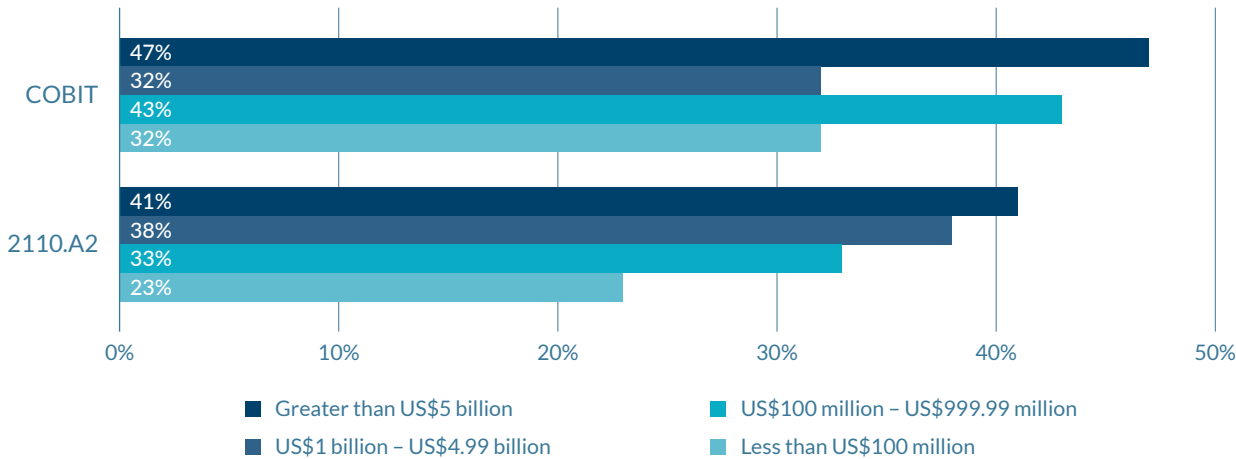


- Has your IT audit activity completed an evaluation and assessment of your organization’s IT governance process, in accordance with the following standards? (Shown: “Yes” responses)

Region



Company Size (Annual Revenue)





GLOBAL LEADER Latin America/South America

56%

of organizations have completed an evaluation and assessment of their IT governance process, in accordance with ISACA's COBIT Framework.



GLOBAL LEADER Africa

43%

of organizations have completed an evaluation and assessment of their IT governance process, in accordance with IIA Standard 2110.A2.

- • • If “No”: Please indicate whether you intend to complete an evaluation and assessment of your organization’s IT governance process.

Company Size (Annual Revenue)

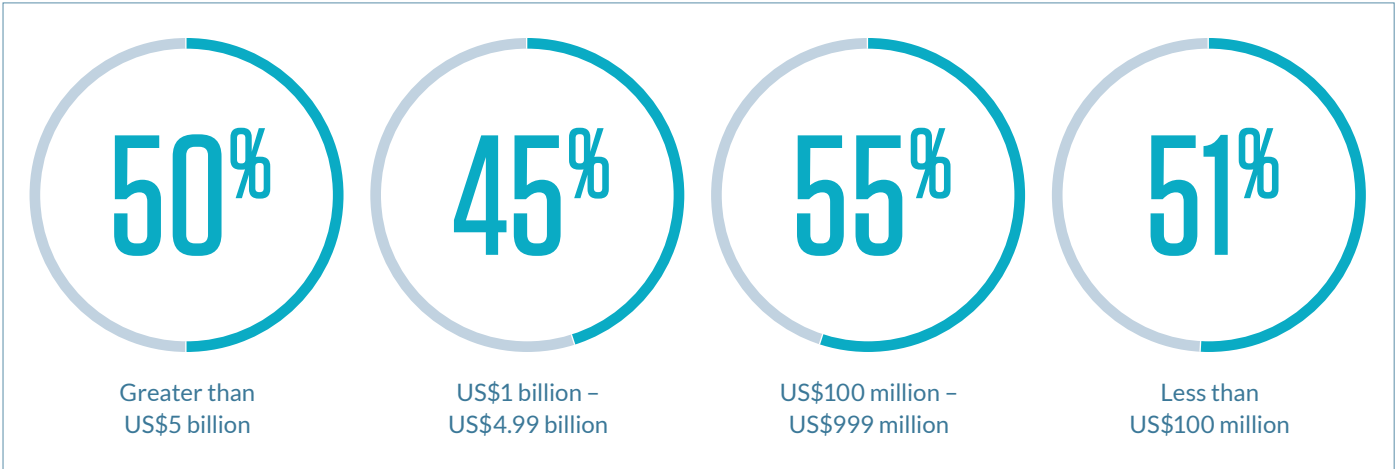
	Yes, within the next year		Yes, but not within the next year	
	COBIT	2110.A2	COBIT	2110.A2
Greater than US\$5 billion	11%	6%	27%	21%
US\$1 billion – US\$4.99 billion	13%	11%	23%	18%
US\$100 million – US\$999.99 million	16%	9%	32%	27%
Less than US\$100 million	15%	8%	28%	18%

Region

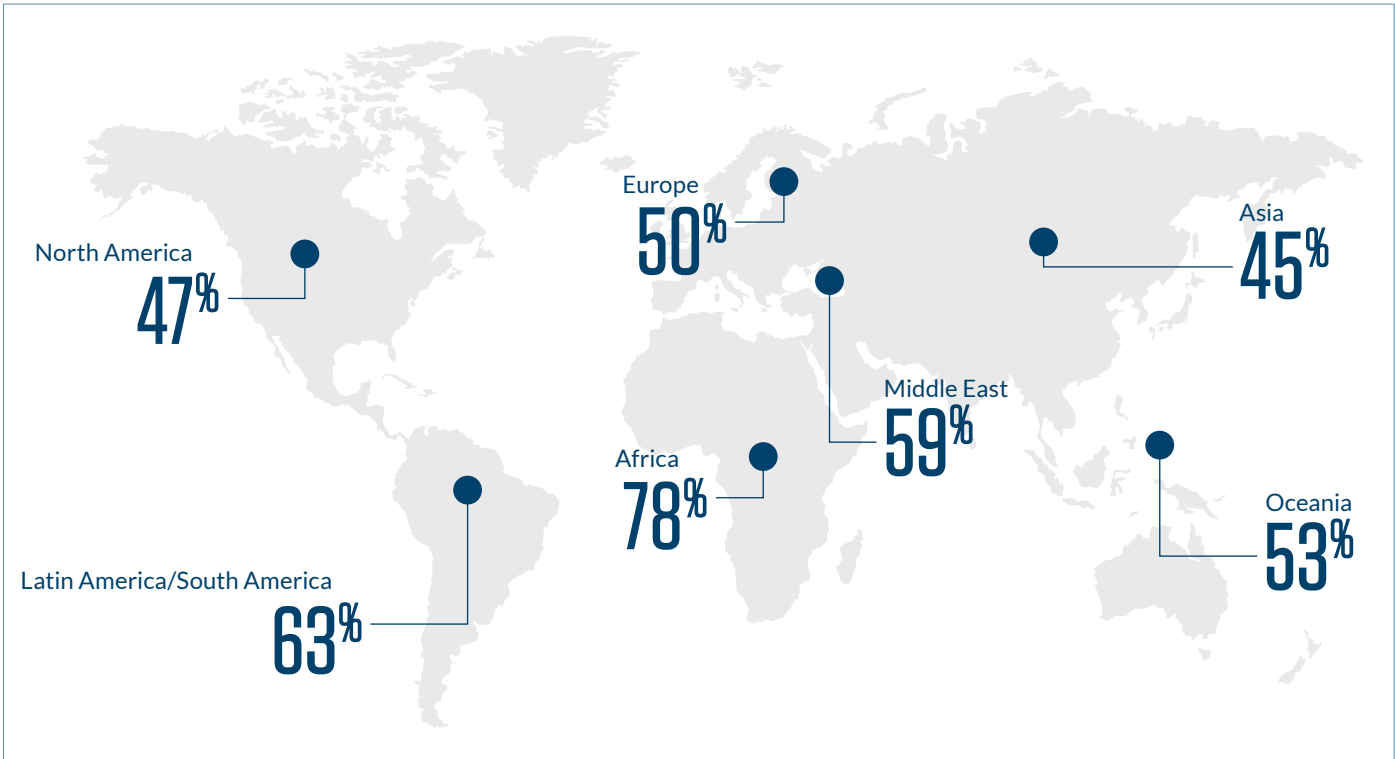
	Yes, within the next year		Yes, but not within the next year	
	COBIT	2110.A2	COBIT	2110.A2
Africa	33%	25%	45%	34%
Asia	12%	6%	28%	25%
Europe	7%	5%	26%	15%
Latin America/South America	22%	6%	39%	23%
Middle East	18%	8%	36%	33%
North America	15%	10%	26%	21%
Oceania	13%	7%	26%	29%

- • • When planning, conducting and reporting the results of IT audits, does the IT audit function utilize ISACA's standards, guidelines and procedures, as incorporated in ITAF (Information Technology Assurance Framework)? (Shown: "Yes" responses)

Company Size (Annual Revenue)

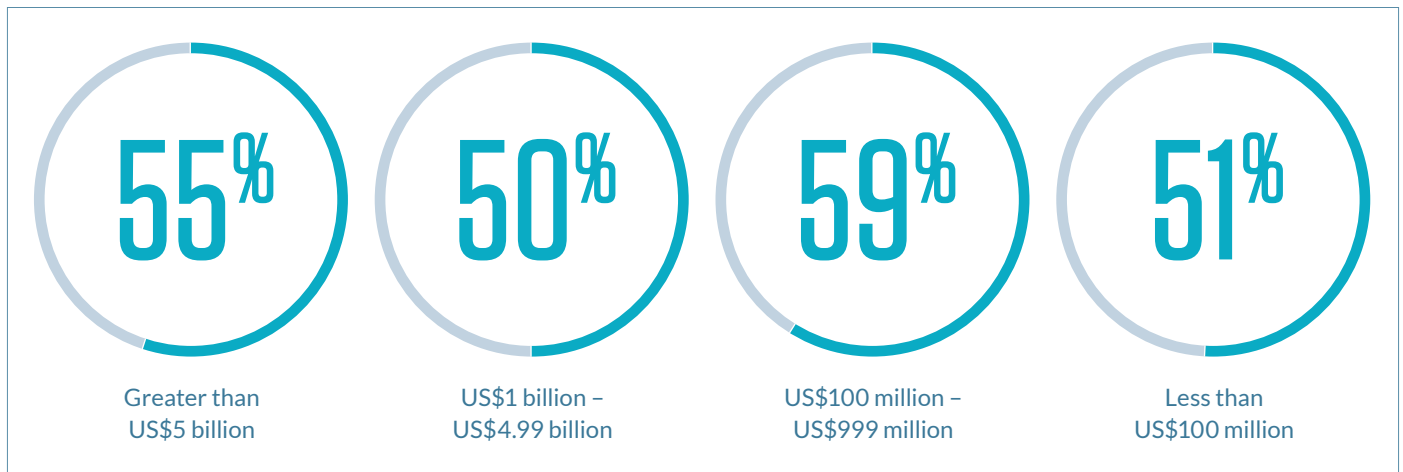


Region

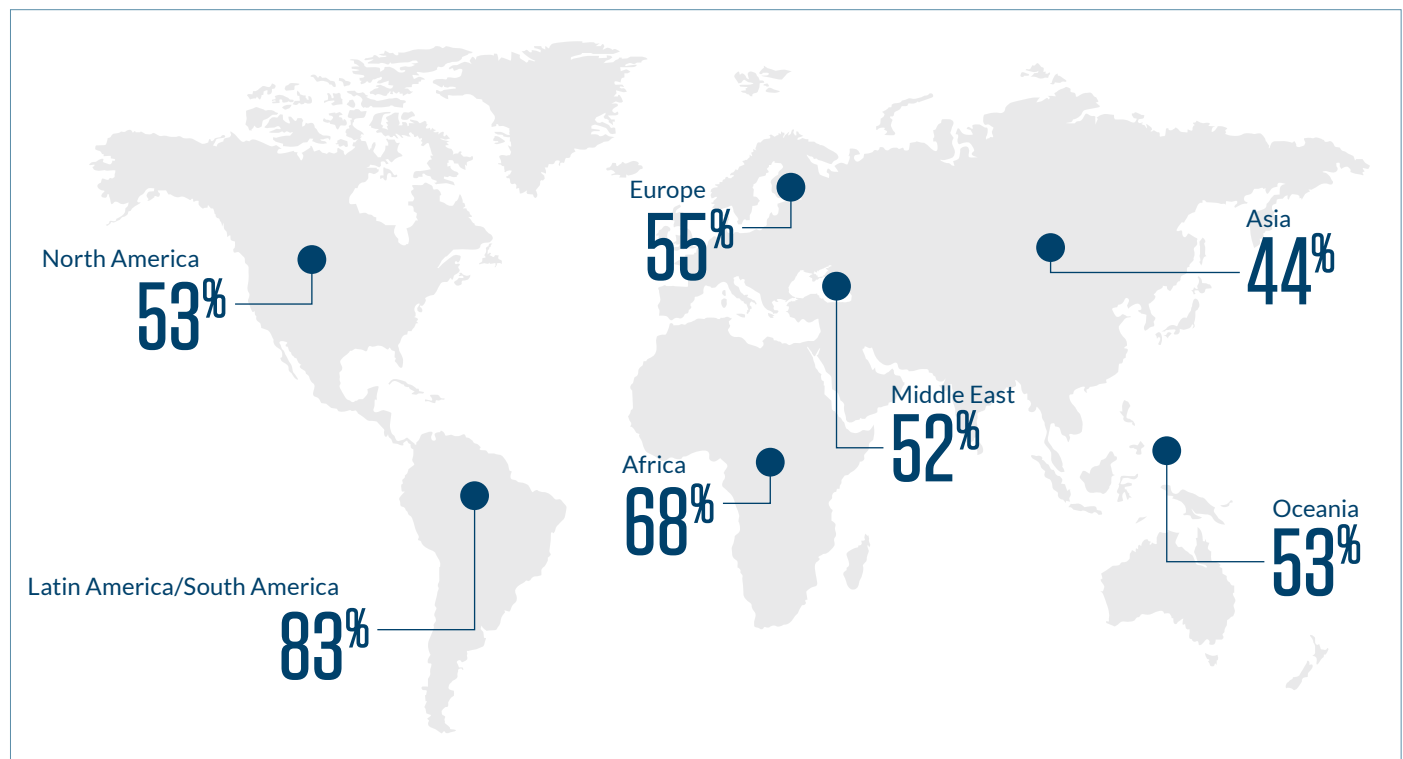


- • • When performing IT process assessments, does the IT audit function use ISACA's COBIT framework? (Shown: "Yes" responses)

Company Size (Annual Revenue)



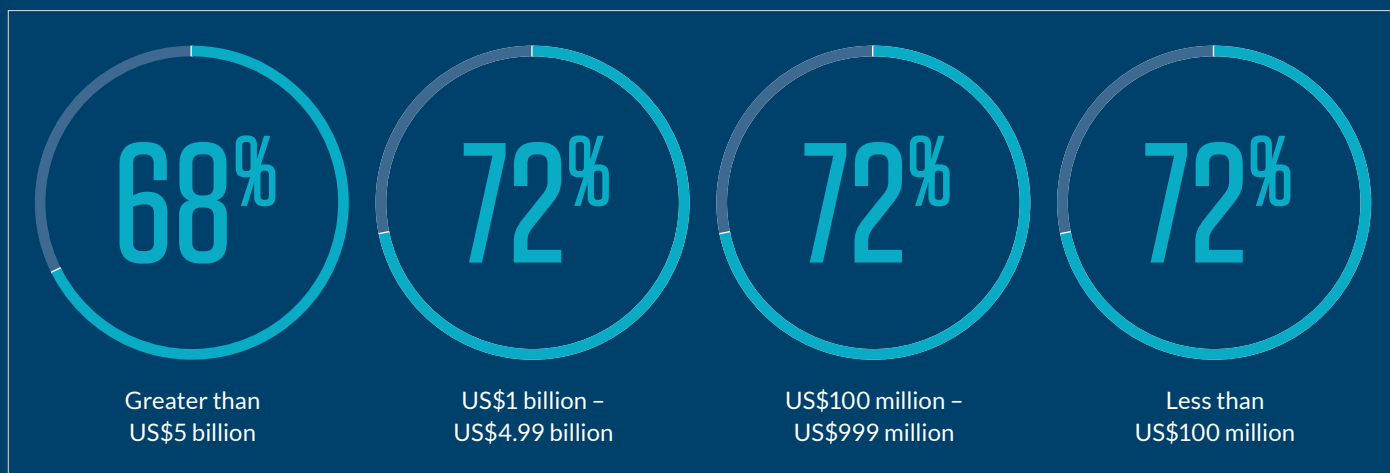
Region



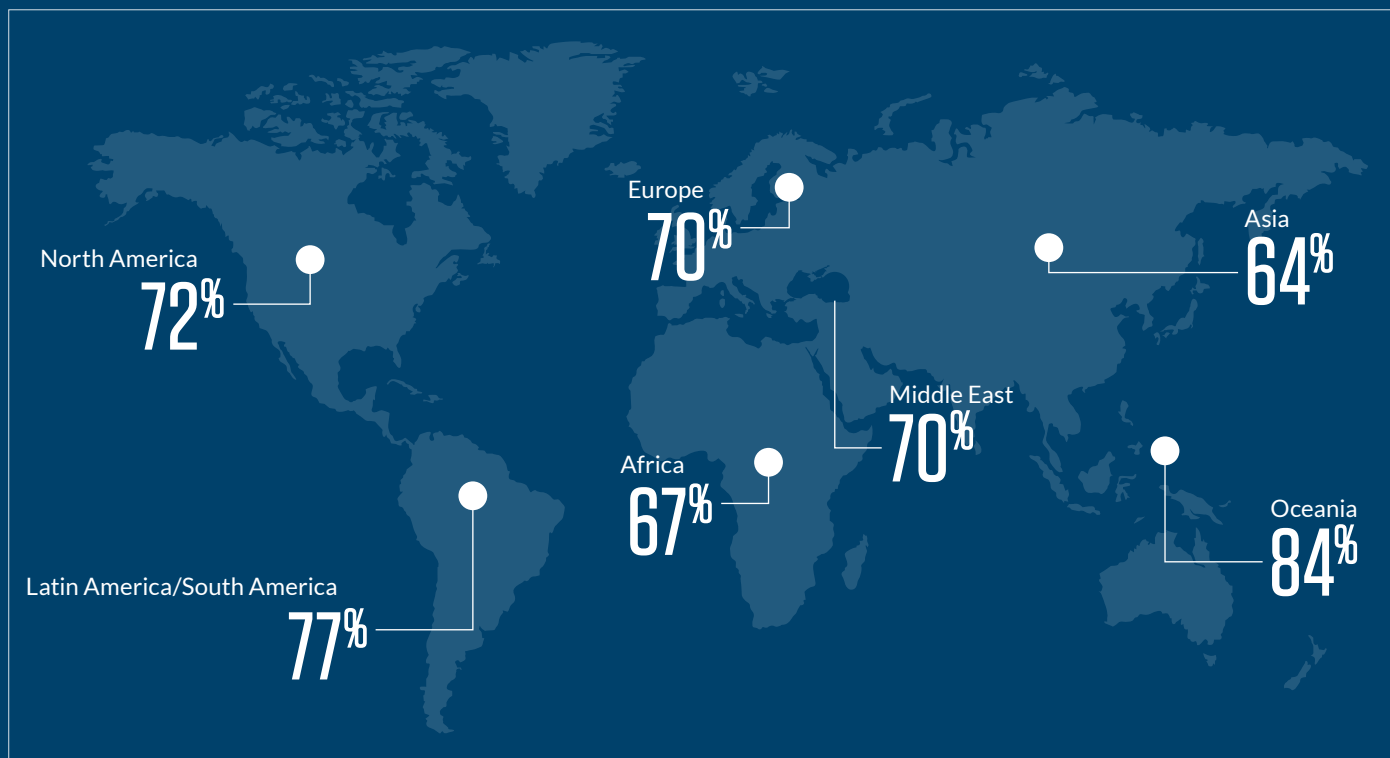
A Look at COBIT 2019

- • • Are you aware of COBIT 2019? (Shown: “Yes” responses)

Company Size (Annual Revenue)



Region



- • • If “Yes”: Do you plan to begin using/implementing COBIT 2019?

Company Size (Annual Revenue)

	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Yes	27%	22%	31%	23%
No	17%	23%	23%	26%
Unsure	56%	55%	46%	51%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Yes	56%	29%	21%	35%	32%	24%	18%
No	12%	13%	24%	33%	26%	23%	29%
Unsure	32%	58%	55%	32%	42%	53%	53%

- • • If “Yes”: Will you be a first-time user of COBIT by implementing COBIT 2019?

Company Size (Annual Revenue)

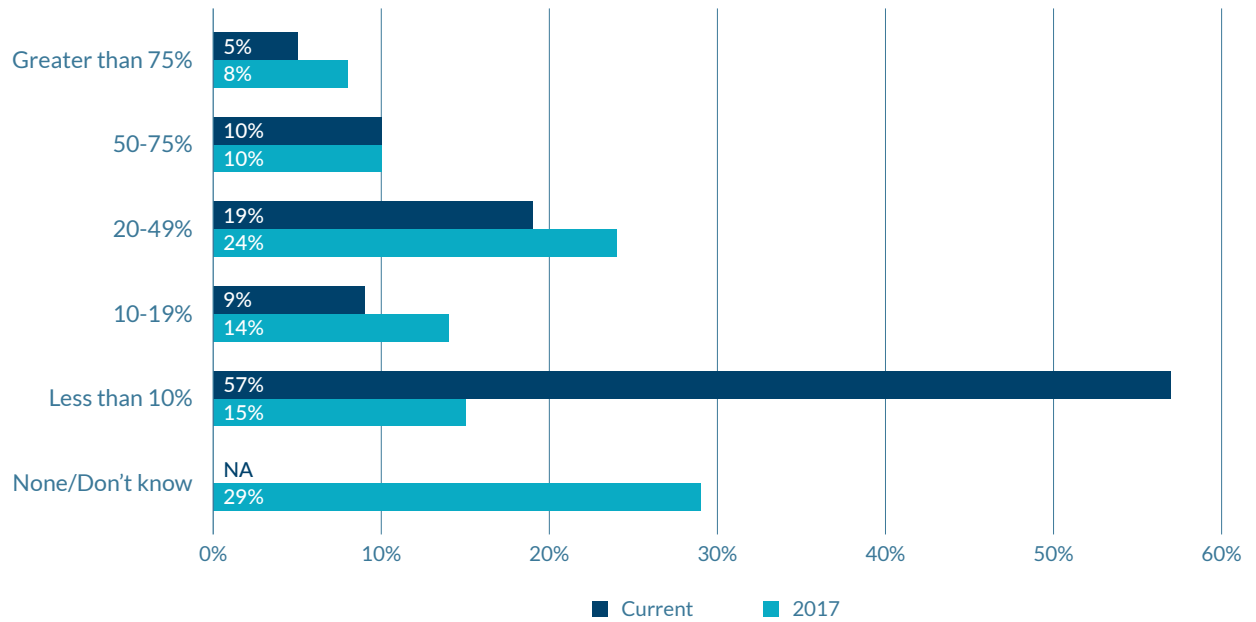
	Greater than US\$5 billion	US\$1 billion – US\$4.99 billion	US\$100 million – US\$999.99 million	Less than US\$100 million
Yes	28%	25%	28%	42%
No	66%	75%	66%	50%
Unsure	6%	0%	6%	8%

Region

	Africa	Asia	Europe	Latin America/ South America	Middle East	North America	Oceania
Yes	46%	53%	15%	32%	50%	22%	43%
No	51%	42%	74%	58%	42%	75%	43%
Unsure	3%	5%	11%	10%	8%	3%	14%

- • • In your most recently completed year of Sarbanes-Oxley (SOX) compliance, what percentage of your organization's IT audit hours are associated with SOX-related activities?

Base: Respondents required to comply with the U.S. Sarbanes-Oxley Act.



Demographics

- • • **Position**

Chief Audit Executive (or equivalent)	7%
IT Audit Director	7%
Audit Director	3%
IT Audit Manager	26%
Audit Manager	10%
IT Audit Staff	30%
Audit Staff	7%
Other	10%

- • • **Industry**

Financial Services	30%
Government/Education/Not-for-Profit	14%
Manufacturing/Engineering	7%
Insurance	7%
Professional Services	4%
Technology	4%
Telecommunications	3%
Energy	3%
Healthcare Provider	3%
Tech Services Consulting	3%
Retail	3%
Transportation	2%
Consumer Products	2%
Utility	2%
Hospitality	1%
Distribution and Transportation	1%
Healthcare Payer	1%
Media	1%
Real Estate	1%
Life Sciences/Biotechnology	1%
Other	7%

- • • **Size of Organization (other than financial services) — by gross annual revenue in U.S. dollars**

\$20 billion or more	15%
\$10 billion - \$19.99 billion	7%
\$5 billion - \$9.99 billion	9%
\$1 billion - \$4.99 billion	21%
\$500 million - \$999.99 million	11%
\$100 million - \$499.99 million	15%
Less than \$100 million	22%

- • • **Size of Organization (financial services organizations) — by annual assets under management in U.S. dollars**

More than \$250 billion	20%
\$50 billion - \$250 billion	13%
\$25 billion - \$49.99 billion	9%
\$10 billion - \$24.99 billion	12%
\$5 billion - \$9.99 billion	10%
\$1 billion - \$4.99 billion	13%
Less than \$1 billion	23%

- • • **Type of Organization**

Publicly traded	38%
Private	35%
Government	18%
Not-for-profit	6%
Other	3%

• • • **Organization Headquarters**

North America	46%
Europe	24%
Asia	14%
Africa	7%
Latin America/South America	4%
Middle East	3%
Oceania	2%

• • • **IT Audit Department Headquarters**

North America	46%
Europe	22%
Africa	15%
Asia	7%
Latin America/South America	4%
Middle East	3%
Oceania	3%

- Audit Department Headcount**

0-4	17%
5-9	16%
10-19	19%
20-29	11%
30+	37%

- Total Number of Full-Time IT Auditors**

0	5%
1	19%
2	15%
3	10%
4	7%
5	7%
6-10	15%
11+	22%

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 75 offices in over 20 countries.

We have served more than 60% of *Fortune* 1000® and 35% 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.

ABOUT ISACA

Now in its 50th anniversary year, ISACA® (isaca.org) is a global association helping individuals and enterprises achieve the positive potential of technology. Today's world is powered by information and technology, and ISACA equips professionals with the knowledge, credentials, education and community to advance their careers and transform their organizations. ISACA leverages the expertise of its 460,000 engaged professionals — including its 140,000 members — in information and cybersecurity, governance, assurance, risk and innovation, as well as its enterprise performance subsidiary, [CMMI® Institute](#), to help advance innovation through technology. ISACA has a presence in 188 countries, including more than 220 chapters worldwide and offices in both the United States and China.

Participate in the ISACA Knowledge Center: www.isaca.org/knowledge-center

Follow ISACA on Twitter: [www.twitter.com/ISACANews](https://twitter.com/ISACANews)

Join ISACA on LinkedIn: ISACA (Official), www.linkedin.com/company/ISACA

Like ISACA on Facebook: www.facebook.com/ISACAHQ

PROTIVITI INTERNAL AUDIT AND FINANCIAL ADVISORY PRACTICE – CONTACT INFORMATION

Brian Christensen
Executive Vice President,
Global Internal Audit
+1.602.273.8020
brian.christensen@protiviti.com

Andrew Struthers-Kennedy
Managing Director
Leader, IT Audit Practice
+1.410.454.6879
andrew.struthers-kennedy@protiviti.com

AUSTRALIA

Adam Christou
+61.03.9948.1200
adam.christou@protiviti.com.au

BELGIUM

Jaap Gerkes
+31.6.1131.0156
jaap.gerkes@protiviti.nl

BRAZIL

Raul Silva
+55.11.2198.4200
raul.silva@protiviti.com.br

CANADA

Ram Balakrishnan
+1.647.288.8525
ram.balakrishnan@protiviti.com

CHINA (HONG KONG AND MAINLAND CHINA)

Albert Lee
+852.2238.0499
albert.lee@protiviti.com

FRANCE

Bernard Drui
+33.1.42.96.22.77
b.drui@protiviti.fr

GERMANY

Peter Grasegger
+49.89.552.139.347
peter.grasegger@protiviti.de

INDIA

Sachin Tayal
+91.124.661.8640
sachin.tayal@protivitiglobal.in

ITALY

Alberto Carnevale
+39.02.6550.6301
alberto.carnevale@protiviti.it

JAPAN

Yasumi Taniguchi
+81.3.5219.6600
yasumi.taniguchi@protiviti.jp

MEXICO

Roberto Abad
+52.55.6729.8070
roberto.abad@protivitiglobal.com.mx

MIDDLE EAST

Sanjay Rajagopalan
+965.2295.7772
sanjay.rajagopalan@protivitiglobal.me

THE NETHERLANDS

Jaap Gerkes
+31.6.1131.0156
jaap.gerkes@protiviti.nl

SINGAPORE

Nigel Robinson
+65.6220.6066
nigel.robinson@protiviti.com

UNITED KINGDOM

Mark Peters
+44.207.389.0413
mark.peters@protiviti.co.uk

UNITED STATES

Brian Christensen
+1.602.273.8020
brian.christensen@protiviti.com



www.isaca.org

Phone: +1.847.253.1545

Fax: +1.847.253.1443

Email: research@isaca.org

protiviti®

protiviti.com