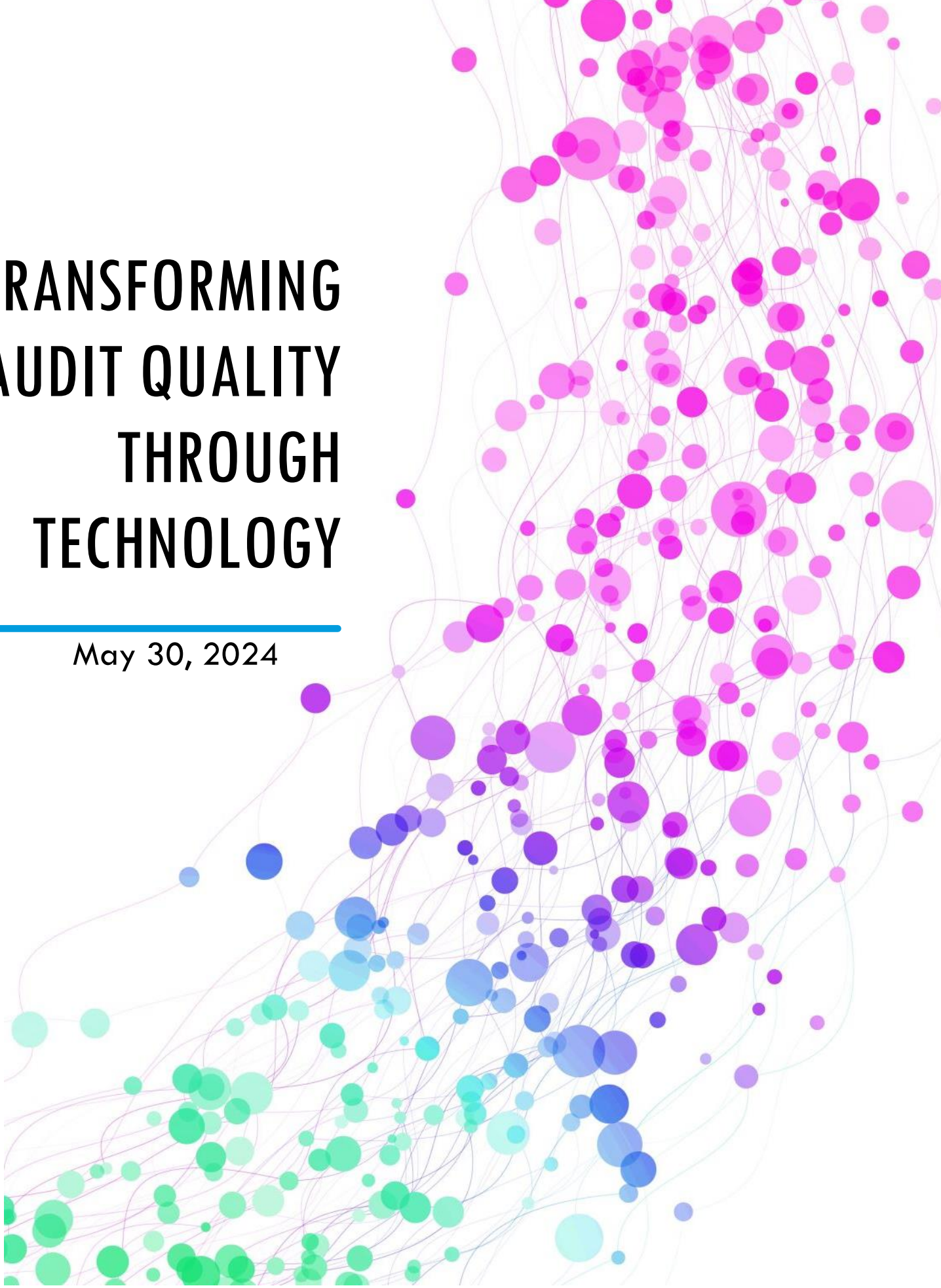
TRANSFORMING AUDIT QUALITY THROUGH TECHNOLOGY

May 30, 2024



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About the Technology Innovation Alliance Working Group

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Acknowledgments

This report is the culmination of the insights, feedback, and professional opinions of many experts including investors, preparers, audit committee members, auditors, academics, standard-setters, and technologists.

Thank you to the stakeholders who participated in the TIA Working Group roundtables and panels, including Danielle Davies, Amy Fairchild, Rudolf Bless, Dan Murdock, Mathew Watson, Tom Roos, Margaret Snyder, Daniel Christopherson, Miklos Vasarhelyi, Eric Floyd, Christopher Casserly, David Wood, Trevor Stewart, Tama Huang, Steven Yang, Ryan Byrnes, Ron Edmonds, Alan MacGibbon, Carol Larson, Jennifer Liu, Amy Pawlicki, Rod Brennan, Christine Tan, Will Bible, Daryl Box, Brian Fields, Dessa Glasser, Daniel Gorfine, Terry Grafenstine, Robert Hilbert, Kazi Islam, Deepak Lalit, Joe Lynch, Troy Merkel, Shamus Rae, Shivaram Rajgopal, Gina Sanchez, and Matt Winters.

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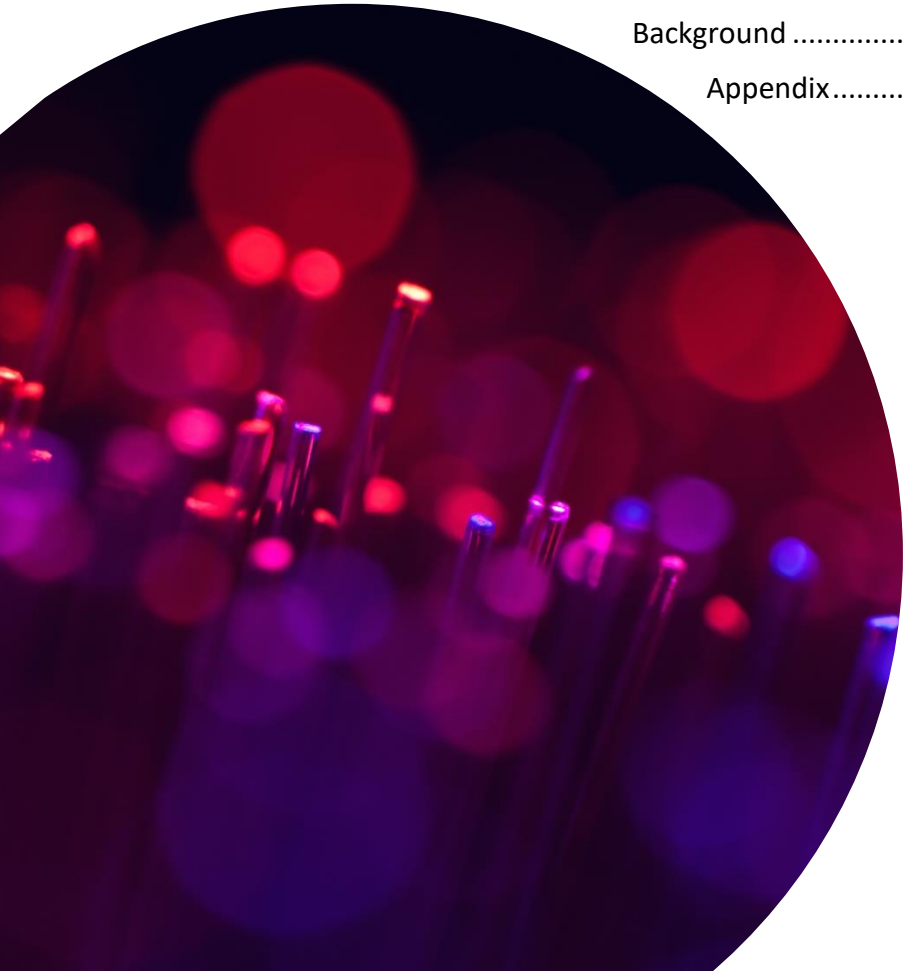
TABLE OF CONTENTS



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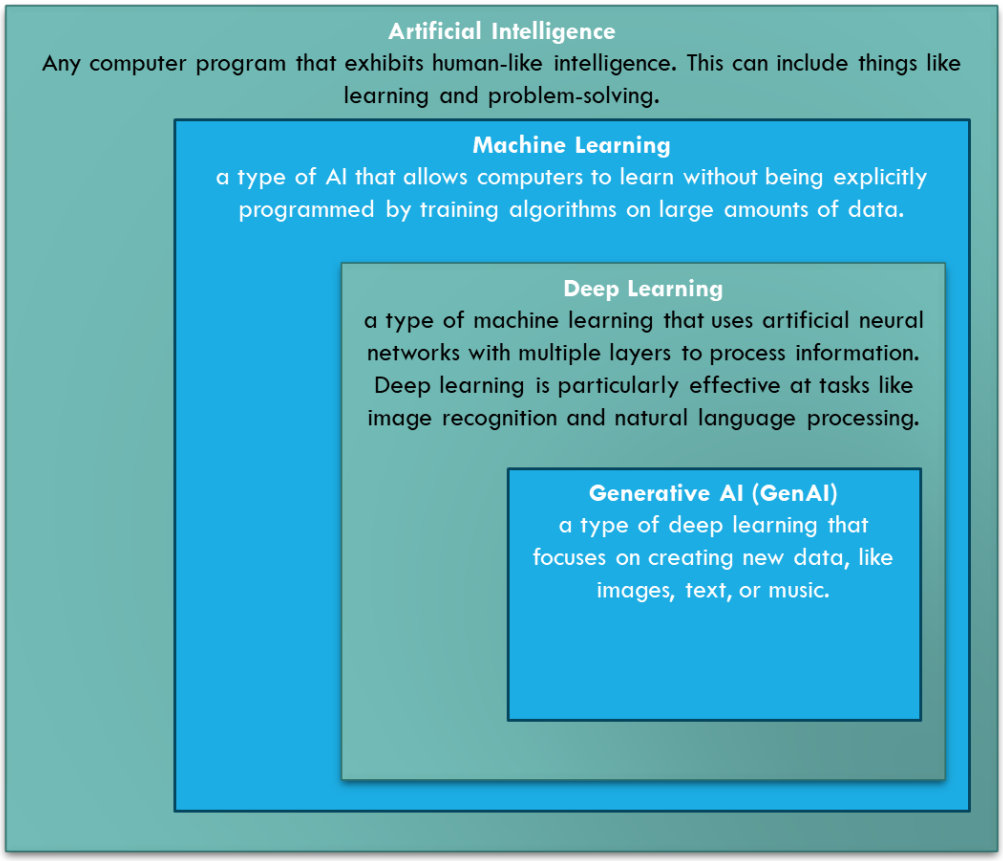
INTRODUCTION

On November 30, 2022, Open AI released its first public version of an AI-based chatbot named ChatGPT, launching a frenzy of speculation about the promises and perils of using generative artificial intelligence* (AI) in everything from diagnosing medical conditions to writing college essays to giving therapy.[1] Coincidentally, on the same day, the PCAOB launched the TIA Working Group based on a similar realization that emerging technologies such as generative AI and advanced data analytics have the potential to improve public company audit quality, and furthermore, that the PCAOB – as the regulator for audits of public companies – has an opportunity to proactively provide much needed guidance around the responsible use of such technologies while conducting an audit.[2]

*The visual below explains the distinction between AI and generative AI.



Source: ISO/IEC 22989:2022

[1] Bernard Marr, "A Short History of ChatGPT: How We Got To Where We Are Today," *Forbes Magazine,* May 19, 2023, https://www.forbes.com/sites/bernardmarr/2023/05/19/a-short-history-of-chatgpt-how-we-got-to-where-we-are-today/?sh=77d1c27f674f

[2] "PCAOB Launches Technology Innovation Alliance Working Group," News Releases, PCAOB, November 30, 2022, https://pcaobus.org/news-events/news-releases/news-release-detail/pcaob-launches-technology-innovation-alliance-working-group

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This report is the result of nearly two years of research, discussion, and debate by the TIA Working Group internally and by soliciting the views of external stakeholders about how AI, data analytics, automation technologies, and other tools (such as digital signatures and data virtualization) have the potential to address two key objectives for the audit industry, namely (1) reducing the prevalence of Type II Errors (e.g., false negatives – not calling out a misstatement when there is in fact a misstatement)[3]; and (2) increasing competition in an otherwise concentrated public company audit marketplace.[4] In consideration of this opportunity, as well the scope of the PCAOB's statutory authority, this report highlights several strategic ideas for the PCAOB Board to consider for promoting technology that could improve audit quality in furtherance of its statutory mission to protect investors. These recommendations aim to build the foundation necessary for improving the technologies, systems, and processes which underpin the audit ecosystem, while ensuring that PCAOB audit standards evolve to recognize the role of these innovations. In turn, these developments should support enhancements to the skills and people capabilities necessary to generate momentum that improves audit quality and competitiveness.

WHY DOES AUDIT TECHNOLOGY MATTER?

A central mission of the public company audit profession is to help enhance the credibility and veracity of public company financial statements, protect investors (and their hard-earned money), mitigate the risks of fraud and misstatements, and maintain the competitiveness of and trust and confidence in the capital markets ecosystem.[5] Nevertheless, audit quality has deteriorated in recent years, as reflected in the PCAOB inspection reports.[6] The prevalence of Type II errors is one important example of this deterioration.[7]

Type II errors - e.g., false negatives; not calling out a misstatement when there is in fact a misstatement – have a greater likelihood of occurring due to a variety of contributing factors, including:[8]

- Audits becoming more of a procedural compliance practice (e.g., check-the-box) and less of an exercise of professional judgment
- Audits being conducted based on sampling instead of testing all transactions

[3] Minlei Ye, Dan A. Simunic, "The Impact of PCAOB-Type Regulations on Auditors Under Different Legal Systems," *Journal of Accounting, Auditing, and Finance,* Volume 39, Issue 2, (February 2022): 365 https://doi.org/10.1177/0148558X221078432
[4] Steven B Harris, "Audit Industry Concentration and Potential Complications," Speeches and Statements, PCAOB, December 7, 2017, https://pcaobus.org/news-events/speeches/speech-detail/audit-industry-concentration-and-potential-implications_674

[5] "Guide to Public Company Auditing," Center for Audit Quality, 0905caqauditguide.pdf (iasplus.com)
[6] "PCAOB Report: Audits With Deficiencies Rose for Second Year In a Row to 40% in 2022", News Releases, PCAOB, July 25, 2023, https://pcaobus.org/news-events/news-releases/news-release-detail/pcaob-report-audits-with-deficiencies-rose-for-second-year-in-a-row-to-40-in-2022
[7] Paul Barnes, "The auditor's going concern decision and Types I and II errors: The Coase Theorem, transaction costs, bargaining power and attempts to mislead," *Journal of Accounting and Public Policy*, Volume 23, Issue 6, (December 2004) https://www.sciencedirect.com/science/article/abs/pii/S0278425404000663
[8] The contributing factors to Type II errors in audit were sourced from discussions with TIA Working Group members and stakeholders during meetings and roundtable discussions.

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- Accounting standards transitioning toward valuation-based accounting, which is more difficult to audit than historical-cost accounting because it entails greater subjectivity and the use of complex valuation approaches
- Audit processes remaining non-digitalized [9] or inaccessible to computer programs in a world where business transactions are increasingly digitalized, contributing to the difficulty of consuming vast amounts of information and connecting dots to identify emerging trends and risks in a timely manner.

Using innovative technology when conducting an audit may address some of the above contributing factors to Type II errors and enhance audit quality. Automation technologies such as robotic process automation or natural language processing can help reduce the manual labor spent on audit procedures, freeing up the auditor's time for critical thinking and exercising professional skepticism. Technologies such as cloud data virtualization, advanced data analytics, and visualization tools have the potential to enable auditors to further experiment with emerging audit approaches such as 100% testing (thus reducing the likelihood of Type II errors when compared to sampling a data set.) [10] Similarly, data analytics and AI can be used to consume one or more structured and unstructured data sets to identify and assess risks of material misstatements.[11] AI can be used to analyze and link multiple data sets to identify risks and suggest areas for further investigation. Furthermore, the use of technology such as AI-based Optical Character Recognition (OCR) to digitize business transactions by preparers can help auditors to further deploy data-driven methods such as machine learning, statistical analysis, and data analytics which may improve audit quality.[12] Before the full potential of these technologies can be unlocked at scale, however, a foundation for adopting technology must be created – including taking steps such as developing trust in AI-based audit procedures, adopting cybersecurity measures for cloud-based and virtual environments, and standardizing data.[13] As explored in this report, the PCAOB could help facilitate the adoption of technologies within audit firms in a way that has the potential to improve audit quality.

Another pressing problem in the audit ecosystem is the high market concentration and lack of competition among audit firms. While there are approximately 1,600 PCAOB registered audit firms, the public company audit marketplace is currently dominated by the "Big 4" audit firms: Deloitte Touche Tohmatsu Limited (Deloitte), PricewaterhouseCoopers (PwC), Ernst & Young (E&Y), and Klynveld Peat

[9] "Digitalization Definition," Glossary, Gartner, https://www.gartner.com/en/information-technology/glossary/digitalization
[10] Feiqi Huang, Won Gyun No, Miklos A. Vasarhelyi, Zhaokai Yan, "Audit data analytics, machine learning, and full population testing," *The Journal of Finance and Data Science,* Volume 8, (November 2022) https://www.sciencedirect.com/science/article/pii/S240591882200006X
[11] "Data and Technology Research Spotlight," Spotlights, PCAOB, https://assets.pcaobus.org/pcaob-dev/docs/default-source/documents/data-technology-project-spotlight.pdf?sfvrsn=bb1f64f2_0
[12] Alejandro Beltran, "Fiscal data in text: Information extraction from audit reports using Natural Language Processing," *Journal of Data and Policy,* (February 2023), https://www.cambridge.org/core/journals/data-and-policy/article/fiscal-data-in-text-information-extraction-from-audit-reports-using-natural-language-processing/F4CAA159BD8C5C71873D85FCF1E4AA96
[13] See the TIA Working Group Current State Deliverable for an overview of the technologies currently used in the audit industry as well as emerging technologies.

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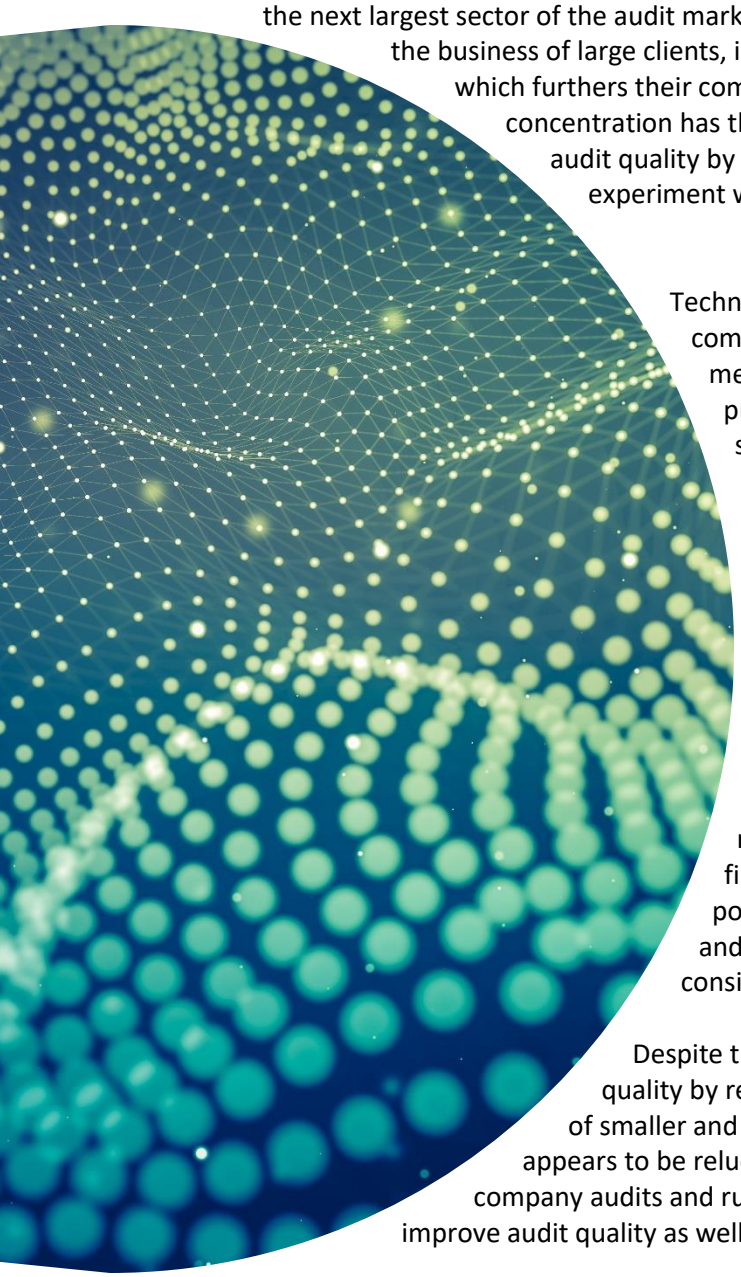
Marwick Goerdeler (KPMG).[14] Furthermore, the barrier of entry for engaging with large multinational clients remains high, even for medium-sized audit firms such as BDO and Grant Thornton which make up the next largest sector of the audit market. As a result, the Big 4 audit firms continue to capture the business of large clients, in turn increasing their resources and depth of expertise, which furthers their competitive dominance in the audit marketplace. This market concentration has the potential to reduce market resiliency and may harm audit quality by reducing incentives to provide high-quality audits and to experiment with new technologies.[15]



Technology could help increase competition in the public company audit marketplace. It can offer resource-saving methods that could especially benefit smaller audit firms by providing opportunities for expanded and customized client services, enhancing scalability, reducing the cost of otherwise manual tasks, reducing junior auditor staff time spent on mundane and repetitive tasks, and retaining talent by offering a more interesting and productive work environment.[16] Innovative, data-driven audit methods may also enable smaller audit firms to attract larger clients while still offering high quality outcomes and more competitive audit fees.[17] Conversely, technology has the potential to further market concentration. Methods such as AI require a lot of data, processing power, and specialized labor to function - resources which may only be available to larger audit firms. Thus, more proactive involvement by regulators and policy makers in providing incentives for smaller audit firms and medium-sized firms to use technology should be considered as a means for increasing their ability to compete.

Despite the opportunity to use technology both to improve audit quality by reducing Type II errors and to increase the competitiveness of smaller and medium-sized audit firms, the public company audit firms appears to be reluctant to adopt new technologies in conducting public company audits and runs the imminent risk of missing the opportunity to improve audit quality as well as further investor protection. This reluctance appears to

[14] "Registered Firms," Registration, PCAOB, https://pcaobus.org/oversight/registration/registered-firms

[15] See the February 12, 2024 Stakeholder Roundtable, which included discussion on how larger audit firms are hesitant to experiment with new technologies without assurance from regulators. Also see: Joshua L. Gunn,, Brett S. Kawada, Paul N. Michas, "Audit market concentration, audit fees, and audit quality: A cross-country analysis of complex audit clients," *Journal of Accounting and Public Policy,* Volume 38, Issue 6, (December 2019) https://www.sciencedirect.com/science/article/pii/S0278425419301413.

[16] Discussion about the benefits of smaller firms using technology is sourced from TIA Working Group Stakeholder Roundtable participants representing smaller and mid-sized firms.

[17] "How do different accounting firms use AI?", Thomspon Reuters, https://tax.thomsonreuters.com/blog/how-do-different-accounting-firms-use-ai/

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be a result of tensions between traditional and technology-based audit procedures, sluggishness in the development of technology-based skillsets (particularly in smaller and medium-sized audit firms), a low compliance risk appetite, lack of competitive incentives, and an unequal distribution of resources across the varied sizes of audit firms. At the same time, there is a risk that the overuse of technology by audit firms could negatively impact the audit profession: underdeveloped technology has the potential to threaten audit quality; the potential lack of accountability and explainability of AI methods, including machine learning (ML), may reduce trust in new technologies; and resource-intensive technologies may only be available to well-resourced audit firms.[18]

These challenges demonstrate that there is an opportunity for the PCAOB, in consultation with key stakeholders, to obtain further understanding and guide the public company audit profession's use of technology, and to conduct research, develop new standards and enhance existing standards, and revolutionize its oversight practices to deliver on the PCAOB's mission of protecting investors by enhancing audit quality.

OPPORTUNITIES FOR THE PCAOB

In consideration of the opportunities and challenges noted above as well as the statutory limitations on the PCAOB's authority, the TIA Working Group is offering some strategic ideas in four categories (see below) for the Board's consideration, all with the goal of improving audit quality and protecting investors by proactively and strategically promoting the use of technology in auditing.

[18] "How do different accounting firms use AI?," Thomspon Reuters, https://tax.thomsonreuters.com/blog/how-do-different-accounting-firms-use-ai/

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(1) Promoting Structured Data Creation and Dissemination in Public Company Audits

Data is the core driver of artificial intelligence. AI methods, from machine learning to trend identification, all rely on computers ingesting large volumes of high-quality data to generate reliable results. Generally, the higher the data quality, the better the AI results. In audit, this means that the higher the data quality, the greater the likelihood that issues such as Type II errors or other misstatements will be identified timely. Furthermore, higher data quality ultimately increases user confidence in the technology and provides more opportunities for using AI in other processes. Like other financial services sectors, the audit industry has an especially promising opportunity to use AI because of the data-oriented nature of the profession, which includes the production of financial statements, transaction-level records, contracts and agreements, corporate minutes, Treasury information, market interactions, consumer information, and other available information to support a thorough and complete audit. In theory, this data could also be used to train AI models, automate routine audit processes, and perform sophisticated data analytics. However, the data quality, volume of data, data accessibility, data security, and data appropriateness are critical factors to achieve relevant and reliable AI results. Good data is fundamental to leveraging technology that is functional and effective for its proposed use. If the data is missing key attributes and fields, is inaccurate, biased, or otherwise difficult to access and use, then the technology built on this data will have limited utility. This presents a need to ensure that any data received and created from the auditing process is accessible, standardized, reliable, and contextualized before it can be used to effectively develop trusted AI models for performing audit procedures.

(A) Standardize Audit Documentation Taxonomy

Audit documentation is the written record of the basis for the auditor's conclusions that provides the support for the auditor's representations, whether those representations are contained in the auditor's report or otherwise. Audit documentation also facilitates the planning, performance, and supervision of the engagement, and is the basis for the review of the quality of the work because it provides the reviewer with written documentation of the evidence supporting the auditor's significant conclusions. Among other things, audit documentation includes records of the planning and performance of the work, the procedures performed, evidence obtained, and conclusions reached by the auditor. Audit documentation also may be referred to as work papers or working papers.[19] Currently, the audit

[19] See Paragraph 0-2 of AS 1215: AS 1215: Audit Documentation | PCAOB (pcaobus.org)

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documentation structure is not standardized, and is made up of many complex parts, including draft financial statements, transaction details, internal engagement processes, audit reports, and bespoke analyses. This variation in audit documentation structure across preparers, audit firms, and audit engagements presents a barrier for adopting new technologies such as AI and data analytics programs, which rely on standardized and quality data to provide the high-quality fuel that makes their methods so appealing. Thus, there is an opportunity to standardize audit documentation structure across the industry such that it can be used in conjunction with technologies such as AI and data analytics to facilitate discovery, information identification, and analyses that may produce more insights and recognize helpful trends across audits and industries more efficiently.

Standardizing audit documentation taxonomy could help set the foundation for adopting technologies such as AI and ML which could then address audit quality issues such as Type II errors and market concentration. High-quality, standardized data is necessary for adopting data-driven methods such as AI. However, standardizing data, for example at the transaction level, is extremely labor intensive and time consuming, which may pose an undue burden on audit firms. Standardizing information at a higher-level, such as the audit documentation structure itself, is less labor intensive, while still having the potential to provide significant benefits for audit firms. The following is an example of how the high-level structure of the audit documentation could be standardized:

Document Information (information about this audit workpaper "folder")	**Sections**
Who created the workpapers	Communicating Results
When created	Potential Audit Comments
Entity Information	Administration
Company the workpapers represent	Planning and Preliminary Work
Engagement type, period reported	Internal Control Work and Process Review
Section	Audit Program
Section identifier	Testwork
Section description	Assertions
Section conclusion(s)	Evidence
Process (Did this step, reviewed, approved)	Test
Process unique ID – counter	Result
Process ID - work performed code (e.g., test, interview)	Conclusion
Process Name - work performed description	Section/Master Index

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Process Result - work performed result (tick)	Risk evaluation Internal control assessment and Test of Controls
Status (Work done, WP done)	Audit checklist, plans and programs
Initials/code	Test of account balances
Name	Open points
Role (in what capacity - preparer, manager, partner)	Interviews
Date	Engagement letter
Comment	Audit Report
Digital signature in future	Management Letter
Associated file	Financial Statements (including management report) Final/Draft
Associated WP Ref	Findings
	Trial Balance
	Journal entries

Source: From 2005 Presentation to WCARS, Newark, NJ by Eric Cohen

Audit firms could leverage standardized structures to improve their internal inspection programs as more advanced analytics could be applied at greater velocity, which could help improve audit quality and efficiency. In addition, the audit workpapers submitted to PCAOB will be more structured, which could facilitate more timely, consistent, and robust analysis by the PCAOB. The successful standardization and application of data-driven models to audit documentation might also demonstrate

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the feasibility of using data driven methods in other cases, which can accelerate the application of technology (e.g., AI) to yield more reliable results.

For further information and an example of an audit documentation taxonomy, see Appendix A, "The Benefit of an Audit Documentation Exchange Format Standard (ADEF)."

(B) Digital Signatures

In the current audit reporting process, the audit reports and signatures included in the required SEC forms are submitted by issuers – and not by auditors themselves. This means that audit information (such as in the Form 10-K filing) is not directly submitted by the auditors, and the issuers copying-and-pasting that information from audit reports can make substantive mistakes, such as adding the wrong auditor, uploading the wrong audit report, or making misstatements in audit records systems such as EDGAR.[20] This lowers the quality of the audit information itself and makes it inherently less trustworthy, which is a particular problem in the context of technology adoption. If a technologist cannot trust that the information contained in the required Form 10-K filings is complete and accurate, then that information would most likely not be used for data analytics, training models, or digitizing information, which may cause the auditor to rely on less efficient and more expensive alternative procedures. Verifying that the information in a financial report is accurate and high-quality, then, is a necessary step for the adoption of data-driven methods. This is how digital signatures can help.

Digital signatures are digital logs that archive when and where a document was signed and by whom. Digital signatures which capture the auditor's sign-off – and not just the issuer's sign-off - has multiple potential benefits. Most obviously, it could enhance the accountability, traceability and trust associated with audit reports and financial statements. This trust is especially important for introducing accountability and

[20] "U.S. SEC settles with two traders over EDGAR filing system hack," Reuters, April 9, 2020, https://www.reuters.com/article/idUSKCN21R33G/

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clarity as new technology methods get introduced within the audit process and thus require additional oversight by the PCAOB. Digital signatures could also reduce the surface area for cyberattacks on audit reports. In the current system (namely EDGAR), any issuer can upload or change information about the audit report, which does not prevent bad actors from taking adverse actions such as falsifying audit information or changing the name of the accountable audit firm. Although such actions would be in violation of the SEC rules and could subject issuers to potential enforcement, the risk remains. Digital signatures also reduce the number of steps between filing an audit report in a Form 10-K filing and reporting that information to the PCAOB in a Form AP; since much of the information is the same, auditors need not re-verify the information in the Form 10-K filing (see Appendix B). This would enable PCAOB to obtain audit data earlier, data which has been validated at the time of the filing. Furthermore, since the PCAOB has penalized audit firms that do not complete Form AP, streamlining this step could help reduce errors, omissions, and duplication. The overall reduction in redundant steps can help audit firms shift their time and resources from completing the audit reporting process to engaging in more critical audit procedures, which could therefore result in a higher-quality audit.

Note that this recommendation should only be implemented in coordination with the SEC when digital signatures for issuer filings are considered by the Commission.

For more information on Audit Digital Signatures and examples of signature technologies, see Appendix C.

POSSIBLE NEAR-TERM NEXT STEPS

- Develop a proof-of-concept (POC) audit documentation taxonomy for a selected audit area (e.g., Property, Plant, & Equipment) and test its utility with relevant stakeholders
- Initiate discussion and engagement with the SEC staff on its digital signature initiative and the process enhancements that could be jointly achieved with the PCAOB

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(2) Using AI in Audit

While the potential benefits of using AI are often lauded by companies, government officials, regulators, and technologists, AI is still in the early stage of development and adoption in accounting and auditing, and must overcome challenges, including those discussed above, to be fully embraced. In light of AI acceptance and adoption accelerating in recent months[21], we recommend the PCAOB focus on (1) learning more about how AI functions and can function in auditing, and (2) developing risk management guidance containing principles and frameworks to help audit firms evaluate and govern the responsible use of AI in auditing. Both of these initiatives could ultimately facilitate the increased use of technology in auditing as a whole, with the potential to improve audit quality as a result. Furthermore, this could provide clarity to audit firms and audit methodology providers with regard to good practices regarding audit firms' use of technology in conducting the audit.

To learn more about AI and its use by firms in conducting audits, the PCAOB could run its own parallel project that explores how AI-based analysis can reduce Type II errors and also assess the risks such analyses might introduce. For example, when the PCAOB consumes data by inspecting workpapers, this presents an opportunity for the PCAOB itself to experiment with data-driven technologies and analyses. Perhaps the PCAOB could use AI technology to assess work papers in a more efficient way on a continual basis, or to test the benefits of standardizing audit documentation as explored above. This kind of hands-on experience could give the PCAOB a more in-depth understanding of the benefits and challenges of using AI in conducting audits, which could then help it effectively oversee how audit firms use AI.

Second, the PCAOB could issue iterative, non-authoritative guidance containing risk management principles and frameworks on the use of AI in auditing. For example, the guidance could provide an initial baseline addressing the high-risk and low-risk uses of AI in public company auditing. The guidance could be reviewed and updated iteratively as needed. This could also provide the PCAOB with further insights into areas for potential standard-setting or rulemaking. In addition to issuing guidance and principles, developing guidelines around the use of AI addresses some unique challenges in regulating emerging technologies such as AI. Audit firms use AI in many different and changing ways (some of which are not reflected in public company audits), so providing exact direction on the way audit firms should use AI could be ineffective and counter-productive to addressing potential risks. Guidance, principles, and frameworks, on the other hand, are more use-case agnostic and can apply to a wide range of applications.

The exploration of AI within the PCAOB and the development of guidance could result in an evidence-based and flexible approach to monitoring the use of AI in conducting audits, helping build the foundation for a future in which both the PCAOB and the audit firms are prepared to use AI responsibly.

[21] Chris Gaetano, "EY, KPMG upgrade AI capacities for auditors," May 21, 2024, *Accounting Today,* https://www.accountingtoday.com/news/ey-kpmg-upgrade-ai-capacities-for-auditors-and-assurance#:~:text=While%20KPMG%20declined%20to%20share,meeting%20or%20transcript%3B%20more%20effectively

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The following examples provide some inspiration for these principles, including the GAO Generative AI Policy (Appendix D), SR 11-7: Guidance on Model Risk Management[22], the International Ethics Standards Board for Accountants (IESBA)[23], International Association for Accounting Education and Research (IAAER)[24], and International Federation of Accountants Colleagues (IFAC)[25].

POSSIBLE NEAR-TERM NEXT STEPS

- Establish an AI Task Force within the PCAOB consisting of staff with technical expertise in AI and context expertise in auditing, inspections, and standard setting.
- Using an agile approach (e.g., six 2-week sprints), the AI Task Force could develop a few use cases in public company audits whereby AI could predict the risk of misstatements due to error or fraud.
- Leverage the AI Task Force to develop staff guidance (principles and framework) on the responsible use of AI in audits.

(3) Regulatory Innovation Capacity Building: Facilitate Ongoing Innovation in Audit Quality

In addition to using AI itself, the PCAOB could deepen its understanding of the use of AI by audit firms and therefore build on its evidence-based approach to standard setting by creating opportunities for structured experimentation and information sharing among the PCAOB, audit firms, and technologists. This would help address some barriers in the adoption of technology by audit firms such as limited information sharing, stunted collaboration, and perceived regulatory uncertainty. The setting for this experimentation could take the form of a PCAOB-hosted "Innovation Lab" that could host structured events and programs aimed at understanding and testing technology used by firms in conducting an audit.[26]

One type of event could include a "tech sprint," a time-boxed period where small teams work together to generate minimally viable solutions for problems in conducting audits. This could be used for prototype generation, primarily to create ideas to help the PCAOB learn how its data could be used and to develop tools that could improve PCAOB programs. Another approach is creating a structured beta environment used for collaborative testing with third parties (e.g., audit firms, tech solution providers) for specific experimentation initiated by the PCAOB. For example, before amending standards and rules related to technology, the PCAOB may want to understand, for instance, how 100% testing would work, how AI could enhance risk assessments, or how AI can be used for fraud detection.

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[22] See: SR 11-7: "Guidance on Model Risk Management," The Federal Reserve, https://www.federalreserve.gov/supervisionreg/srletters/sr1107.htm

[23] See "The International Ethics Standards Board for Accountants (IESBA0)", IESBA, https://www.ethicsboard.org/iesba-code

[24] See the "International Association for Accounting Education and Research (IAAER)", IAAER, Mission Statement, https://www.iaaer.org/about/mission-statement

[25] See the "International Federation of Accountants Colleagues (IFAC)", IFAC, https://www.ifac.org/

[26] See the European Securities and Market Authority (ESMA) December 2023 report as a working model. See: ESA_2023_27_Joint_ESAs_Report_on_Innovation_Facilitators_2023.pdf (europa.eu)

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This could also help the PCAOB identify and overcome any associated challenges to the adoption of these approaches presented by existing standards. For example, the transition between traditional audit methods, which some view as deterministic and rule-based according to an "either/or" schema, and AI-based methods which are probability-based and generate predictions of certain outcomes (e.g., risk of understatement in a liability account), could be explored during a structured experimentation program.[27] This approach can also promote technology experimentation before dedicating extensive time to standard-setting and rulemaking, without a significant risk of changing the current approach prior to gaining a robust understanding of the risks to audit quality. Audit firms may be incentivized to participate, as they would directly be affected by such standard-setting projects. It would also help audit firms understand the direction the PCAOB is considering, which may result in them taking a proactive approach to bolster their policies and procedures regarding their use of technology in conducting an audit.

POSSIBLE NEAR TERM NEXT STEPS

- Establish an Innovation Lab (which could include the PCAOB AI Task Force recommended above) at the PCAOB
- Upon establishment, the Innovation Lab could commission some time-bound standard setting projects aimed at testing the application of technology in conducting the audit. The test could be related to:
  → a specific standard that will be significantly impacted by emerging technologies such as AI; or
  → if more practical, a concept statement on the future of auditing enabled by technology.

(4) Encourage Technology Literacy in Auditor Skillsets

The TIA Working Group heard from stakeholders that some auditors lack skillsets in technology, data analysis, and AI, which in turn, hinders the adoption and sophisticated use of technology within audit firms. While dictating the pedagogy at institutions of higher education and how audit firms train their workers is beyond the scope and jurisdiction of the PCAOB, the PCAOB could nonetheless encourage institutions of higher education to include in their accounting curricula core subjects such as advanced principles of data analytics, computer science, and artificial intelligence. In addition, the PCAOB could encourage educators to highlight (1) that the use of technology while conducting an audit cannot replace human judgment and understanding and (2) that professional judgment and skepticism are

[27] This characterization of traditional versus AI methods reflects comments made by TIA Working Group members and Stakeholder Roundtable participants.

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equally important when using technology and must be performed by people, not machines. This would help close the gap between the theoretical benefits of new technology and the on-the-ground implementation of technology within public company audits. In addition, as the PCAOB continues to modernize its standards, it should consider at some point whether the proficiency of the independent auditor needs to go beyond accounting and auditing as currently stated in AS 1010.

POSSIBLE NEAR-TERM NEXT STEPS

- Encourage research studies on the impact of auditor technology literacy on audit quality
- Consult with academic stakeholders such as the American Accounting Association on ways to encourage institutions of higher education to incorporate advanced principles of data analytics, computer science, and artificial intelligence in their accounting programs
- Develop internal training programs on using GenAI tools (e.g., ChatGPT) to aid PCAOB inspection and standard setting programs

SUMMARY

In summary, the TIA Working Group recommends the Board consider four areas of action to promote the adoption of technology that improves the quality of public company audits. These areas are (1) "Promoting Structured Data Creation and Dissemination in Public Company Audits," namely by standardizing audit documentation taxonomy and applying digital signatures; (2) "Using AI in Audit" by experimenting with AI at the PCAOB and providing guidance for using AI while conducting the audit; (3) "Regulatory Innovation Capacity Building: Facilitate Ongoing Innovation in Audit Quality" by exploring structured methods to experiment with new AI technology; and (4) "Encourage Technology Literacy in Auditor Skillsets" by promoting AI and data-based analytics skills to be taught to auditors.

These recommendations are based on extensive research and consultation with experts from many stakeholder groups including auditors, preparers, investors, audit committee members, academics, and technologists through various TIA Working Group activities. A summary of the research methodology and TIA Working Group discussions can be found below.

BACKGROUND

Methodology

In exploring the use of technology in auditing, the TIA Working Group conducted a series of working group meetings, stakeholder roundtables, and research. In August 2023, the TIA Working Group completed the **Current State Deliverable,** which gave an overview of the technologies relevant to

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financial reporting and auditing. This report expands on that deliverable's work and goes deeper into the technology, people, and processes which could be leveraged to facilitate the use of technology in auditing. Since the first TIA Working Group meeting in December 2022, the TIA Working Group held monthly meetings to deliberate and discuss technology implications to achieve the goals mentioned above. The group also hosted three **stakeholder roundtables,** made up of individuals representing large, medium, and small-sized audit firms, technology firms, preparers, investors, audit committee chairs and members, and academics. Members of the TIA Working Group also **conducted 1:1 interviews** and meet-and-greets with stakeholders for more in-depth insights. TIA Working Group members also conducted **additional research** and leveraged member expertise, public research papers, and industry conferences to inform their work. Below is a summary of the discussions and content of the TIA Working Group meetings and stakeholder roundtables.

Summary of TIA Working Group Discussion

As discussed in the TIA Working Group sessions, there are many opportunities to leverage new technologies such as AI, automation, and data analytics to improve the audit process. However, the audit ecosystem is complex and implementing new technologies raises questions about data, audit methodology, technology adoption, regulatory compliance, business incentives, and marketplace dynamics. Below is a summary of these themes as explored in the TIA Working Group meetings and stakeholder roundtables.

Data

Good data is fundamental to building technology that is functional and effective for its intended use. However, the data quality, volumes of data, data accessibility, and data appropriateness are critical for relevant and reliable AI results. If the data is inaccessible, messy, missing key attributes and fields, inaccurate, or biased, then the technology built on this data will have limited utility. This presents a need to ensure that data created from the auditing process is accessible, standardized, reliable, and contextualized before it can be used to develop AI models.

For any technology to leverage data, the data must be accessible. From a technical perspective, data needs to be in a format which can be easily ingested and used by machines. But in conversations with representatives from audit firms, many noted that audit data does not always exist in this form. For example, data provided by issuers may come from disparate systems or be confined in documents (e.g, Excel, Word, PDF) that is not easily machine-readable. For instance, one participant at a TIA Working

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Group stakeholder roundtable mentioned that some PCAOB and SEC rules are published online in non-searchable PDFs, which makes searching those rules, uploading them into a machine system, or creating an automated policy review tool difficult and laborious.[28] From a technical perspective, there is an opportunity here to apply technologies such as AI-based OCR to digitize text or other AI models that can handle undigitized data. However, this requires additional labor and technical resources which may only be available to large audit firms who can better absorb the costs as opposed to smaller audit firms.

Another technological accessibility issue lies in data that is stored across multiple locations or exists in an ecosystem with a complex architecture.[29] For example, conglomerate preparer companies often have financial data distributed across thousands of subledgers, all with different data formats, locations, permissions, and data fields.[30] The TIA Working Group heard from some preparer companies who were looking into the use of technology to help tackle this problem. They cited the use of AI to help aggregate data from subledgers and subsystems to validate financial statement data, create data visualizations, create commentary on the drivers of trend analysis, and identify data anomalies. But as one stakeholder noted, data aggregation is not only a technical problem, but also a people and talent problem. For example, some subsidiaries do not have a dedicated Chief Data Officer or technical team to manage the data, so there is a lack of talent and oversight to bring that data all together.[31]

Even if the data is technically accessible, the data might still have problems related to data governance, data ownership, and data persistence. For example, data persistence, which is the arrangement between the auditor and issuer on data use and retention during and after the audit, might present a barrier to using data for AI if the data sharing agreement does not allow for data to be used in novel technologies or analyzed in certain ways. Confidentiality agreements between the preparer and auditor might also present a similar barrier here.[32] Similarly, transferring sensitive issuer data to a potentially unsecure auditor cloud environment for the purpose of being processed by a potentially unsecure

[28] Feedback from February 12, 2024 TIA Working Group Stakeholder Roundtable
[29] Feedback from June 12, 2023 TIA Working Group Meeting
[30] Feedback from July 17, 2023 TIA Working Group Preparer Panel
[31] Feedback from July 17, 2023 TIA Working Group Preparer Panel
[32] Feedback from February 12, 2024 TIA Working Group Meeting

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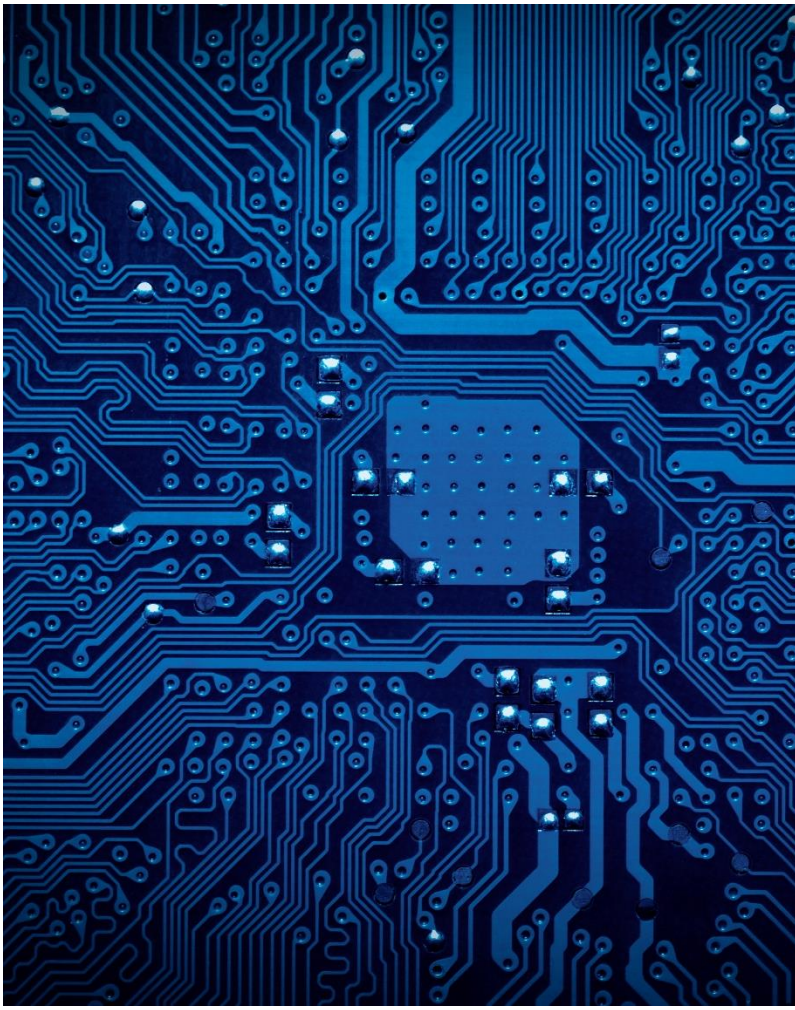
technology may present privacy and security risks for the issuers.[33] Again, there are opportunities to use technology to tackle these problems. One example raised by a TIA Working Group roundtable participant is the ability for data service providers (e.g., Amazon Web Services) to create a "clean data room" where data does not need to be transferred or exchanged, as it can just be stored in a "clean room" and different parties can access the data for various beneficial purposes, including data virtualization. In other words, there is a difference between handing over all the data and granting temporary access to data.[34] Furthermore, sensitive client data can be handled in a variety of ways, for example, by aggregating and anonymizing data, masking sensitive data, using synthetic data, or applying access controls to analytic tools.[35] In other cases, an organization might determine that the benefits of hosting data in a shared environment, such as the cloud, might outweigh the potential negatives. For example, when the 2020 Covid-19 pandemic disrupted the global workforce, one TIA Working Group stakeholder was able to proceed with processing payments and providing financial statements precisely because its systems were on the cloud.[36]



Data must be both digitally accessible and preferably *standardized* to be used by computer models. The benefits of structuring and digitizing data components are that it facilitates discovery, information identification, and analysis. [37] However, the costs of standardizing data are that it takes a significant amount of time and effort. Furthermore, different types of methods require customized methods of data formatting, building data fields, or creating data attributes. Many TIA Working Group stakeholders raised examples where the lack of data standardization presented a barrier to implementing new data driven technologies. For example, while the federal government has a centralized repository of Single Audit Act reports to understand how federal financial assistance programs are performing, the data is not standardized and is unstructured, which makes it difficult for users to compare different data sets or do trend analyses.[38] Similarly, data cleaning – which involves

[33] Note that "privacy" is a contested value in audit. On one hand, the point of audit is to be intrusive, so regulators might be able to set aside some data privacy concerns. On the other hand, regulators want more data, but some firms claim they don't trust regulators because of regulator's own inability to protect data and a data breach would be catastrophic. These issues may be mitigated by the fact that data used to conduct audit is often aggregated and anonymized.
[34] Feedback from September 18, 2023 TIA Working Group Meeting
[35] Feedback from April 17, 2024 TIA Working Group Meeting
[36] Feedback from March 20, 2024 TIA Working Group Meeting
[37] Feedback from April 17 2024 TIA Working Group Meeting
[38] Feedback from September 18, 2023 TIA Working Group Meeting

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resolving inaccuracies or removing corrupt data -- is a laborious effort, especially for large and unstructured datasets. For example, one TIA Working Group member with relevant experience estimated that data cleaning and data wrangling -- or gathering the data from the sources -- accounted for 50% of the time spent implementing a new data analytics platform.[39] As with managing data accessibility, the resources needed to perform data cleaning may not be available to smaller audit firms, which could exacerbate declining competition in the public company audit marketplace.

Still, standardization, while important, is not always necessary to use AI in other capacities. Many AI models can process unstandardized and unstructured data, and some of these methods are being explored in auditing. In addition, AI can enable the ingestion of exogeneous variables to provide additional insights. For example, some stakeholders pointed to risk assessment as an area where large audit firms seem to be using AI/ML to identify trends.[40] For instance, financial misstatements may not be found in standardized and quantifiable information, but instead in non-quantifiable knowledge like judgments and journals. So, using technology such as generative AI or process mining to identify risks in unstructured data might result in improved audit outcomes.[41]

Finally, even though data is a major barrier, it is still not clear whose responsibility it is to standardize data. One TIA Working Group member suggested that there is an opportunity for standard setting bodies, such as the International Auditing and Assurance Standards Board (IAASB) and PCAOB, to use its convening power to bring the profession and technology providers together to discuss and assess solutions.[42]

Technology

Even if data is accessible, standardized, cleaned, and available in large amounts, the data-driven *methods* themselves might present new challenges to the current audit process, particularly around the probabilistic and opaque nature of some AI models. For example, most traditional audit methods are deterministic and rule-based according to an "either/or" schema.[43] AI, on the other hand, is probability-based and generates predictions. This creates a different paradigm for what might be considered reliable audit results when audits become more digital-native. This issue is compounded by the "black box" phenomenon of many AI models, e.g., the fact that the results and predictions of ML models are not easily explainable, verifiable, or repeatable. This is in stark contrast with the current audit approach which emphasizes "showing one's work" and engaging in processes which are explainable and repeatable.[44] Nevertheless, this may present an opportunity for new schemas of trust and reliability to be developed in audit methodology; for example, by demonstrating that AI generates reliable results, integrating human oversight into AI pilots, or using digital signatures.

During discussions about technology innovation, stakeholders distinguished between two different types of technological innovation: (1) using technology to improve the existing audit process and (2) using technology to change the audit process itself. Generally, the first type of innovation involves using

[39] Feedback from April 17, 2023 TIA Working Group Meeting
[40] Feedback from September 18, 2023 TIA Working Group Meeting
[41] Feedback from September 18, 2023 TIA Working Group Meeting
[42] Feedback from May 15, 2023 TIA Working Group Meeting
[43] Feedback from March 20, 2023 TIA Working Group Meeting
[44] See: AS 1215.06, which generally provides that audit documentation must contain sufficient information to enable an experienced auditor having no previous connection with the engagement to understand the procedures performed.

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technology to make existing audit processes more automated, faster, streamlined, or less labor-intensive. This use of AI has the potential to improve audit quality by freeing up auditors to focus on more complex tasks involving critical thinking and professional judgment. Conversely, it may not improve the audit process itself, and other opportunities for introducing new audit techniques may not be considered.

The second type of innovation is more about changing the audit procedures themselves, such as using AI for substantive testing. To do this, stakeholders emphasized the need for effective change management and standardization which reflects the change in audit approach. From a technological perspective, the infrastructure needed to use new technologies, such as AI, was another barrier. For example, the resources and technical know-how to run computer heavy methods, such as AI, was a potential roadblock. As one stakeholder noted in a TIA Working Group meeting, enterprise IT needs and limitations are different from the environment needed for advanced data analytics which involves more exploratory iterations and requires more flexibility in the environment.[45] Cybersecurity concerns may also be a barrier, albeit an important one, to the speedy adoption of emerging technologies. Stakeholders noted that security and privacy processes such as security review approval, moving data and technology to on-premises versus the cloud, and setting up guardrails for the use of technology extended the timeline of adopting new technologies.[46]

Another factor to consider is that the speed of technological innovation, especially in AI, is a potential barrier to quick adoption.[47] Emerging technologies, such as AI, inherently move very quickly, and they are a challenge for any non-technologically oriented field to adapt to on a constant basis. Furthermore, stakeholders noted that technology adoption moves slower in specialized fields like accounting, and it is challenging to develop human capital with expertise in both accounting and technology.[48] This might be especially true for smaller audit firms, who do not have the resources to invest in or experiment with new technologies. Still, this creates an opportunity for auditors, accountants, and other audit-related personnel to acquire technology skills. This may be done within the audit firm or within institutions of higher education. Note that many stakeholders emphasized that new technology use is not just about training people and that audit firms need to account for workers' capacity, priorities, and behaviors as well. [49]

Regulatory Compliance

From the audit firms' perspectives, they expressed concern about compliance risk when innovating or trying new technology. In several TIA Working Group meetings and stakeholder roundtables, audit firms expressed that they did not feel that there was a safe environment for them to communicate with their regulator about nuanced issues related to the use of emerging technologies.[50] Auditors noted they are also wary of Audit Committee criticisms.[51] Still, some stakeholders expressed that organizations design their financial reporting systems and audit processes to comply with standards. So, to the extent that auditing standards are revised to encourage the use of technology within audit firms, there is the

[45] Feedback from March 20, 2023 TIA Working Group Meeting
[46] Feedback from July 17, 2023 TIA Working Group Preparer Panel
[47] Feedback from March 20, 2023 TIA Working Group Meeting
[48] Feedback from November 20, 2023 TIA Working Group Stakeholder Roundtable
[49] Feedback from November 20, 2023 TIA Working Group Stakeholder Roundtable.
[50] Feedback from April 17, 2023 TIA Working Group Meeting and Feedback from May 15, 2023 TIA Working Group Meeting
[51] Feedback from July 17, 2023 TIA Working Group Preparer Panel

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potential that the companies under audit will be motivated to support the use of technology to improve audit quality.[52]

Business Incentives and Marketplace Dynamics

The current audit business model is a pay-per-hour model that heavily relies on human labor to serve a set of clients. While this economic structure is not set in stone, it may create embedded profit incentives both for and against adopting new technologies. On the one hand, technology can be used to improve efficiency and create a better audit process for the auditors themselves. On the other hand, even if an audit firm or preparer company has invested in technology, technology resources may be unevenly distributed among the audit firms or issuers. This means that not all audit engagements will benefit from technological investment. For example, some stakeholders, namely those representing preparers, noted that investments in technology for improving back-end accounting and reporting processes are not as prioritized compared to investments in technology for front-end customer facing products. Preparers noted that it is harder to justify return on investment (ROI) when a current process works "well enough." This may be especially true in both audit firms and preparer companies, who respectively conduct audits and sell consumer facing products and services.[53]

The current audit marketplace is characterized by a concentration of economic power among the "Big 4" audit firms which account for the vast majority of public company audits. These audit firms audit the vast majority of the S&P 500 companies. There are a few medium-sized audit firms who share the next largest issuer base, and many smaller audit firms which serve smaller issuers. This marketplace dynamic creates both challenges and opportunities when it comes to introducing new technologies.

On the one hand, the Big 4 audit firms with access to large clients and the resulting revenues from client engagements have more resources to create their own innovation labs and technologies. They have more clients with more data, so they could use this to train or develop data-driven technology methods.[54] On the other hand, precisely because of their market dominance, the Big 4 audit firms may have little incentive to technologically innovate to retain business. Some stakeholders noted that there is a perception that auditors have helped create these exact circumstances within the audit marketplace, benefiting from the high concentration.[55] In fact, some stakeholders representing Big 4 audit firms noted that there is not a "first-mover" advantage for deploying emerging technology, as it is simply more cost effective and safer to wait for another firm to develop the best practices for technology use, and then quickly copy their methods.[56] At the same time, however, audit firms are reluctant to share information about their technology use. Large audit firms tend to be very proprietorial and guarded about their technology, so gaining access to actual data to test is very difficult, especially with privacy concerns as audit firms are unsure whether they can keep data beyond the audit period. Audit firms also do not like to share their mistakes, so others cannot learn from them.[57]

There is a potential opportunity for smaller audit firms to use technology, such as AI, to continue to stabilize and steadily grow their market share. To scale this for smaller firms, it is worth noting that

[52] Feedback from November 20, 2023 TIA Working Group Stakeholder Roundtable
[53] Feedback from July 17, 2023 TIA Working Group Preparer Panel
[54] Feedback from November 20, 2023 TIA Working Group Stakeholder Roundtable
[55] Feedback from July 17, 2023 TIA Working Group Preparer Panel
[56] Feedback from July 17, 2023, TIA Working Group Preparer Panel
[57] Feedback from November 20, 2023 TIA Working Group Stakeholder Roundtable

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some external vendors are currently developing out-of-the-box solutions for smaller firms. For example, tools that can integrate with ChatGPT can summarize lease terms, contracts, etc.[58] Some stakeholders noted that regulators might consider removing any policy constraints on using lower cost or subcontracted technology vendors to complete repetitive, labor intensive, and low risk processes, such that smaller audit firms could partake in technology advances. However, others noted this might not increase competition because multinational audit clients still will not turn toward smaller firms, even when they have that technology because they do not trust that smaller audit firms have the depth of knowledge and experience to address the higher risk and non-technical judgment issues.[59] Furthermore, some stakeholders from technology companies expressed skepticism that audit firms would use their technology, citing auditors' reluctance to adopt new technology or change their methods. This feedback suggests that technology may not be enough on its own to increase the competitiveness for smaller audit firms, although smaller firms may benefit from the use of technology in other ways to improve audit efficiency and effectiveness.[60]

APPENDIX

Appendix A: The Benefit of an Audit Documentation Exchange Format Standard (ADEF)

Appendix B: Form AP Sample Analysis

Appendix C: Research Adding Digital Signatures over Digital Documents

Appendix D: GAO Generative AI Policy

[58] Feedback from November 20, 2023 TIA Working Group Stakeholder Roundtable
[59] Feedback from September 18, 2023 TIA Working Group Meeting
[60] Feedback from September 18, 2023 TIA Working Group Meeting

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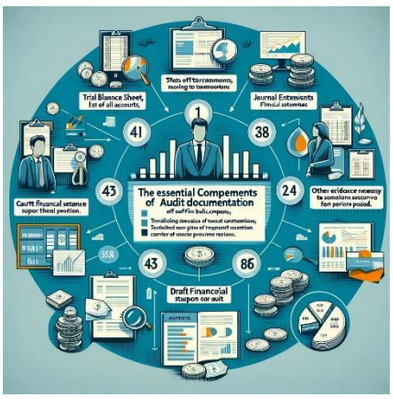
The Benefit of an Audit Documentation Exchange Format Standard (ADEF)

Prepared for the Technology Innovation Alliance Working Group (TIAWG) by Eric Cohen eric.e.cohen@computercpa.com

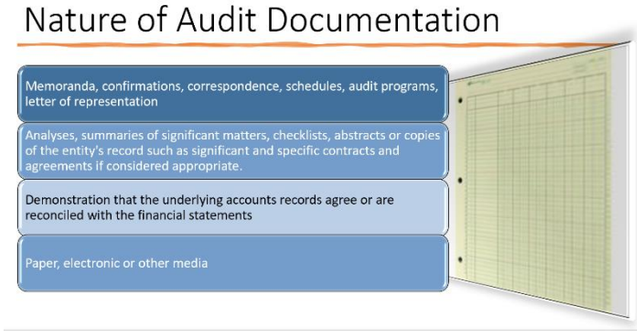


What is Audit Documentation?

Audit documentation is the record of audit procedures performed, relevant audit evidence obtained, and conclusions the auditor reached supporting their work in an audit. The audit documentation for a specific audit engagement is assembled in an audit file, and specific rules govern what needs to be documented, as well as the retention of and subsequent changes to the audit documentation. See PCAOB AS 1215.

An experienced auditor should be able to understand the nature, timing, extent of the audit procedures performed, and the audit evidence obtained, along with any significant matters and the conclusions reached.

Audit documentation generally includes draft copies of the financial statements, planning documents, audit programs, confirmations and legal representations, and other content necessary to be retained to support the opinion. It is the record providing support for the auditor's representations in the auditor's report, and demonstrates that the work was, in fact, performed.

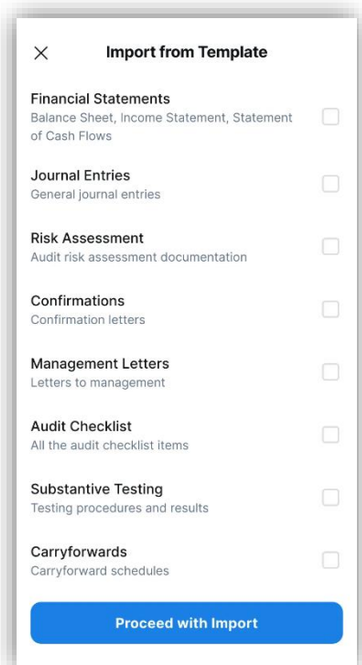


How is Audit Documentation used?

For prior engagement review: **future audit team, successor auditors**
As part of current engagement setup and carryforward: **current audit team**
Current engagement population and activity: **current audit team**
Documenting the work of others: **internal auditors, third party ("other") auditors**
Engagement oversight and review: **supervisors, audit committee, legal counsel**
Firm oversight and review: **firm quality assurance, peer reviewers, overseers**
Note: Audits may involve multiple auditing firms (AS 1206). Future mandates may include reliance on third parties in new ways. That means the ability to selectively expose and share audit documentation is of importance to the stakeholder community.

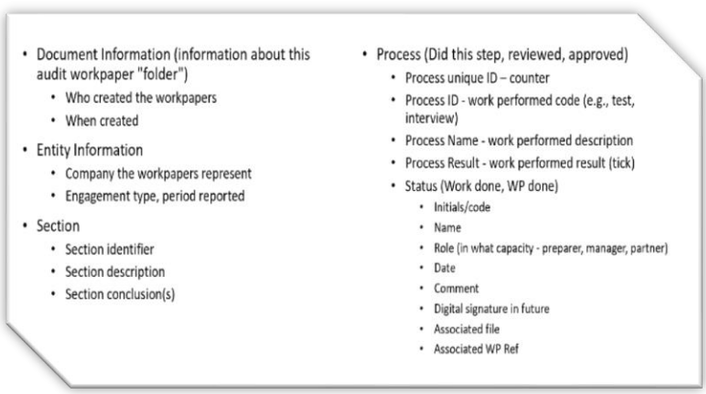
Why is this challenging?

There are many moving parts to audit document. There are the *inputs*, such as the draft financial statements, the necessary detail from the books and records, and carryforward information. There is the engagement *internals*, such as planning, risk evaluation, and engagement management. Finally, there is the *output*, such as the auditor's report, management report, and other analytics. Standards (e.g., XBRL GL, XBRL FR) can help in some areas, but the rest is bespoke; finding the right components is a challenge, let along understanding what they represent.



How can ADEF help?

While manual and automated audit documentation systems have their own design and terms, the basics of what is found in audit documentation is structured and common. A taxonomy that provides "bar codes" for unambiguously referencing the schedules, audit programs, procedures performed, evidence obtained, and conclusions reached will simplify the identification and exchange of the contents of the audit documentation and facilitate automated quality control, governance and oversight processes.



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Included in LEI data

Included in vLEI credential

Included in Inline report (machine readable metadata)

Not currently included

FORM AP

AUDITOR REPORTING OF CERTAIN AUDIT PARTICIPANTS

Registered public accounting firms must report information about certain participants in the audit and any amendments thereto to the PCAOB by completing and submitting this Form according to the instructions to Form AP.

It is important to refer to the instructions when completing each item of the Form. The Firm is responsible for completing each item according to the instructions, and should not merely rely on the Firm's own interpretation of the item descriptions appearing in this Form.

Italicized terms are defined in PCAOB Rule 1001, except for the definition of "other accounting firm" which appears in the general instructions to Form AP. The Firm must apply those definitions in completing the Form.

PART I - IDENTITY OF THE FIRM

ITEM 1.1 - NAME OF THE FIRM

a. Firm legal name

b. If different than its legal name, state the name under which the Firm issued this *audit report.*

PART II - AMENDMENTS

ITEM 2.1 - AMENDMENTS

If this is an amendment to a report previously filed with the *Board* -

a. Indicate, by checking the box corresponding to this item, that this is an amendment. ☐

b. Identify the specific Part or Item number(s) of this Form (other than this Item 2.1) as to which the Firm's response has changed from that provided in the most recent Form AP or amended Form AP filed by the Firm with respect to an *audit report* related to the *issuer* named in Item 3.1.

- ☐ Part I, Identity of the Firm
- Part III, *Audit* Client and *Audit Report*
  - ☐ Item 3.1, *Audit Report*
  - ☐ Item 3.2, *Other Accounting Firms*
  - ☐ Item 3.3, Divided Responsibility
- Part IV, Responsibility for the *Audit* is Not Divided
  - ☐ Item 4.1, *Other Accounting Firm(s)* Individually 5% or Greater of Total *Audit* Hours
  - ☐ Item 4.2, *Other Accounting Firm(s)* Individually Less Than 5% of Total *Audit* Hours
- ☐ Part V, Responsibility for the *Audit* is Divided
- ☐ Part VI, Certification of the Firm

If you check this box, use the text field below to describe the error or omission in Part VI as previously filed and to supply the information as it should have been provided in the previous submission. Use Part VI of this amended form only to certify the amended form, not to supply corrections to the previous form.

Sample Version

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Italicized terms are defined in PCAOB Rule 1001, except for the definition of "other accounting firm" which appears in the general instructions to Form AP. The Firm must apply those definitions in completing the Form.

PART III - *AUDIT* CLIENT AND *AUDIT REPORT*

ITEM 3.1 - *AUDIT REPORT*

a. Provide the following information concerning the *issuer* for which the Firm issued the *audit report* -

1. Indicate, by checking the box corresponding to this item, if the *audit* client is an:

☐ *Issuer*, other than employee benefit plan or investment company ☐ Employee Benefit Plan ☐ Investment Company

2a. Central Index Key (CIK) number, if any

☐ Check here, if none

2b. Fund Series, if any

Series Identifier	Fund Name

3. The name of the *issuer* whose financial statements were audited

4. Date of the *audit report* (mm/dd/yyyy)

5. The end date of the most recent period's financial statements identified in the *audit report* (mm/dd/yyyy)

6. The name (that is, first and last name, all middle names and suffix, if any) of the engagement partner on the most recent period's *audit,* his/her Partner ID, and any other Partner IDs by which he/she has been identified on a Form AP filed by a different *registered public accounting firm* or on a Form AP filed by the Firm at the time when it had a different Firm ID

Family name (last name) | Given name (first name) | Middle name | Suffix

Partner ID

Previously reported Partner ID(s)

7. The office of the Firm issuing the *audit report*

Country	City	State

b. Indicate, by checking the box corresponding to this item, if the most recent period and one or more other periods presented in the financial statements identified in Item 3.1.a.5 were audited during a single *audit* engagement. ☐

c. In the event of an affirmative response to Item 3.1.b, indicate the periods audited during the single *audit* engagement for which the individual named in Item 3.1.a.6 served as engagement partner (for example, as of December 31, 20XX and 20X1 and for the two years ended December 31, 20XX).

d. Indicate, by checking the box corresponding to this item, if the *audit report* was dual-dated pursuant to AS 3110, *Dating of the Independent Auditor's Report*. ☐

e. In the event of an affirmative response to Item 3.1.d, indicate the date of the dual-dated information.

Note: In responding to Item 3.1.e, the Firm should provide each date of any dual-dated *audit report*.

Date(s) of the dual-dated *audit report* (mm/dd/yyyy)

If different from the engagement partner named in Item 3.1.a.6, provide information about the engagement partner who audited the information within the financial statements to which the dual-dated opinion applies.

Family name (last name) | Given name (first name) | Middle name | Suffix

Partner ID

Sample Version

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Previously reported Partner ID(s)

ITEM 3.2 - *OTHER ACCOUNTING FIRMS*	
Indicate, by checking the box corresponding to this item, if one or more *other accounting firms* participated in the Firm's *audit*. If this item is checked, complete Part IV. By checking this box, the Firm is stating that it is responsible for the *audit*s or *audit* procedures performed by the *other accounting firm(s)* identified in Part IV and has supervised or performed procedures to assume responsibility for their work in accordance with PCAOB standards. Note: For purposes of Item 3.2, an *other accounting firm* participated in the Firm's audit if (1) the Firm assumes responsibility for the work and report of the *other accounting firm* as described in paragraphs .03-.05 of AS 1205, *Part of the Audit Performed by Other Independent Auditors*, or (2) the *other accounting firm* or any of its principals or professional employees was subject to supervision under AS 1201, *Supervision of the Audit Engagement*.	¢

ITEM 3.3 - DIVIDED RESPONSIBILITY	
Indicate, by checking the box corresponding to this item, if the Firm divided responsibility for the *audit* in accordance with AS 1205, *Part of the Audit Performed by Other Independent Auditors*, with one or more other *public accounting firm(s)*. If this item is checked, complete Part V.	¢

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PART IV - RESPONSIBILITY FOR THE *AUDIT* IS NOT DIVIDED

In responding to Part IV, total *audit* hours in the most recent period's *audit* should be comprised of hours attributable to: (1) the financial statement *audit;* (2) reviews pursuant to AS 4105, *Reviews of Interim Financial Information*; and (3) the *audit* of internal control over financial reporting pursuant to AS 2201, *An Audit of Internal Control Over Financial Reporting That Is Integrated with An Audit of Financial Statements*. Excluded from disclosure and from total *audit* hours in the most recent period's *audit* are, respectively, the identity and hours incurred by: (1) the engagement quality reviewer; (2) the person who performed the review pursuant to SEC Practice Section 1000.45 Appendix K; (3) specialists engaged, not employed, by the Firm; (4) an accounting firm performing the audit of the entities in which the *issuer* has an investment that is accounted for using the equity method; (5) internal auditors, other company personnel, or third parties working under the direction of management or the audit committee who provided direct assistance in the *audit* of internal control over financial reporting; and (6) internal auditors who provided direct assistance in the *audit* of the financial statements. Hours incurred in the *audit* by entities other than *other accounting firms* are included in the calculation of total *audit* hours and should be allocated among the Firm and the *other accounting firms* participating in the *audit* on the basis of which accounting firm commissioned and directed the applicable work.

In responding to Part IV, if the financial statements for the most recent period and one or more other periods covered by the *audit report* identified in Item 3.1.a.4 were audited during a single *audit* engagement (for example, in a reaudit of a prior period(s)), the calculation should be based on the percentage of *audit* hours attributed to such firms in relation to the total *audit* hours for the periods identified in Item 3.1.c.

Actual audit hours should be used if available. If actual audit hours are unavailable, the Firm may use a reasonable method to estimate the components of this calculation. The Firm should document in its files the method used to estimate hours when actual audit hours are unavailable and the computation of total audit hours on a basis consistent with AS 1215, *Audit Documentation*. Under AS 1215, the documentation should be in sufficient detail to enable an experienced auditor, having no previous connection with the engagement, to understand the computation of total audit hours and the method used to estimate hours when actual hours were unavailable.

Indicate, by checking the box, if the percentage of total *audit* hours will be presented within ranges in Part IV. ☐

ITEM 4.1 - *OTHER ACCOUNTING FIRM*(S) INDIVIDUALLY 5% OR GREATER OF TOTAL *AUDIT* HOURS

Firm ID _____ Check here if no Firm ID is available ☐ Percentage of participation _____ % or range _____

Legal name _____

Headquarters' office location:

Country _____

City _____ State _____

Note 1: In responding to Items 4.1 and 4.2, the percentage of hours attributable to *other accounting firms* should be calculated individually for each firm. If the individual participation of one or more *other accounting firm(s)* is less than 5%, the Firm should complete Item 4.2.

Note 2: In responding to Item 4.1, the Firm ID represents a unique five-digit identifier for firms that have a publicly available PCAOB-assigned number.

ITEM 4.2 - *OTHER ACCOUNTING FIRM*(S) INDIVIDUALLY LESS THAN 5% OF TOTAL *AUDIT* HOURS

a. State the number of *other accounting firm(s)* individually representing less than 5% of total *audit* hours. _____

b. Indicate the aggregate percentage of participation of the *other accounting firm(s)* that individually represented less than 5% of total *audit* hours by filling in a single number or by selecting the appropriate range as follows:

Aggregate percentage of participation _____ % or range _____

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Italicized terms are defined in PCAOB Rule 1001, except for the definition of "other accounting firm" which appears in the general instructions to Form AP. The Firm must apply those definitions in completing the Form.

PART V - RESPONSIBILITY FOR THE *AUDIT* IS DIVIDED

ITEM 5.1 - IDENTITY OF THE OTHER *PUBLIC ACCOUNTING FIRM(S)* TO WHICH THE FIRM MAKES REFERENCE

a. Provide the following information concerning each other *public accounting firm* the Firm divided responsibility with in the *audit* -

1. The legal name of the other *public accounting firm* and when applicable, the other *public accounting firm*'s Firm ID.

Firm ID | Check here if no Firm ID is available

Legal name

2. The office of the other *public accounting firm* that issued the other *audit report*.

Country

City | State

3. The magnitude of the portion of the financial statements audited by the other *public accounting firm*.

Criteria | Dollar Amount

Other | Percentage %

Note: In responding to Item 5.1.a.3, the Firm should state the dollar amounts or percentages of one or more of the following: total assets, total revenues, or other appropriate criteria, as it is described in the *audit report* in accordance with AS 1205.

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PART VI - CERTIFICATION OF THE FIRM

ITEM 6.1 - SIGNATURE OF PARTNER OR AUTHORIZED OFFICER

This Form must be signed on behalf of the Firm by an authorized partner or officer of the Firm by typing the name of the signatory in the electronic submission.

I, the undersigned, certify that -

a. I am authorized to sign this Form on behalf of the Firm;

b. I have reviewed this Form;

c. based on my knowledge, this Form does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading; and

d. based on my knowledge, the Firm has not failed to include in this Form any information that is required by the instructions to this Form.

Typed signature (to be submitted electronically):	Given name (first name)	Family name (last name)
Date of typed signature (mm/dd/yyyy):		
Business Title:		
Capacity in which signed:	Partner ☐ Officer ☐	

Business telephone number (incl. country and area codes)

Business e-mail address

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Research Adding Digital Signatures over Digital Documents

Ie: Public/Private Keys with Role Credentials

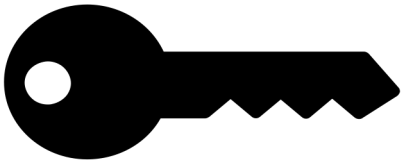
1. Provide what Users Really Want.

- Data Providers and Users want traceability and key details about facts they rely on. EDGAR provides quite a bit already. *Assertions about audit sign off are currently made by companies not the audit firm*.
- Digital signatures over the audit report by the firm would enhance trust.
- Digital signature by audit partner would enhance accountability and clarity but *would not alter the information available to users* (PCAOB Audit Database provides this already). These digital signatures could remove the need to file a Form AP – all details could be pulled directly from the filings.

```
XOM REVENUE – USD413,680m
2022-12-31
ACTUALS
SIGNED BY XOM
FIGURE WAS SUBJECT TO AUDIT
SIGNED BY PRICEWATERHOUSECOOPERS
ENGAGEMENT PARTNER CHARLES CHANG
```

2. Reduce Cyber Attack Surface Area

- Authentication into systems like EDGAR is very well managed. Low risk of breach. *Very high impact in financial and trust terms*.
- Adding mandatory digital signatures from both the company and the auditor would mean that only filings that pass all three layers of authentication would be accepted. This form of "Zero Trust Model" dramatically lowers the attack surface.



EDGAR AUTHENTICATION
+ CORPORATE DIGITAL SIGNATURE(S)
+ AUDITOR DIGITAL SIGNATURE(S)
= PERMITTED FILING

3. Enhance Trust and Accountability

- Use of digital signatures encourages accountability as they are permanent and immutable. Altering signed documents is immediately visible. *Process* of digitally signing documents *is a new form of accountability*.
- The vLEI offers up an interesting framework, as it permits official role credentials (e.g: a Firm's Head of Audit) to be provided after independent review. *That person can then provide cascading credentials* to others within the organization. A manager could use that standardized signature to sign electronic work papers, for example.
- EU regulators are currently experimenting. vLEI holds promise, while still new.

IMMINENT D6 SPEC PERMITS SIGNATURES OVER DIFFERENT PARTS OF INLINE XBRL DOCUMENTS BY DIFFERENT ROLES.

D6 IS SIGNING TECHNOLOGY NEUTRAL BUT vLEI OFFERS INTERSECTION BETWEEN ORGANISATION, ROLE AND PERSON. CASCADING APPROVALS MEANS LOW BURDEN, HIGH SECURITY ACROSS AN ORGANIZATION

Prepare by TIA member for discussion purpose only and does not necessarily reflect the views of the PCAOB, any Board Member or PCAOB Staff

Note: This is v.1 of the policy. GAO has set up a governance structure to regularly evaluate/revise policies as necessary.

GAO's Policy for Using Third-Party Generative AI Tools

Purpose

GAO provides Congress with objective, non-partisan, fact-based information and products to enable government savings and operational efficiency. This policy addresses GAO use of third-party generative artificial intelligence (generative AI) tools in support of GAO's mission.[1] The purpose of this policy is to ensure that GAO uses generative AI in a responsible and appropriate manner, while avoiding objectionable effects and mitigating associated risks.

Background on Generative AI

Since 2022, several generative AI tools have come into widespread public use—with ChatGPT, Google Bard, and Dall-E being perhaps the most well-known. These generative AI tools can create content based upon user prompts. Their output draws from algorithms using massive amounts of training data, though the sources for this data vary widely and are often unknowable.

Risks from Use of Generative AI

Though generative AI has the potential to increase efficiency, potential benefits from its use are often outweighed by significant security risks and the additional work necessary to ensure accuracy, since its outputs must be considered incomplete, biased, misleading, and inaccurate *by default*. In addition, information entered into a prompt to any third-party generative AI tool should be considered as a public disclosure. When considering use of a third-party generative AI tool, GAO employees must exercise professional judgement with careful deliberations on appropriateness of inputs and quality of outputs. The table below highlights some of the specific risks and their potential impacts.

RISK	POTENTIAL IMPACT
• Incomplete, biased, misleading, or inaccurate outputs generated by third-party generative AI tools.	• Significant damage to GAO's reputation for consistent quality and objectivity if questionable outputs are directly used. Unwittingly promulgating incomplete, biased, misleading, or inaccurate information.
• Remote servers and computer infrastructure hosting third-party generative AI tools are owned and operated by commercial or foreign entities.	• Non-vetted third-party tools are a cybersecurity risk stemming from embedded malware, the risk of data captured subsequently leaking, and the creation of new attack vectors to government entities. • Insecure network traffic and storage as well as inability to control dissemination of sensitive nonpublic contents used in prompts. • May violate GAO's duty to keep drafts, information received from outside entities personally identifiable and other nonpublic information confidential.

The table below illustrates some examples of permissible and prohibited use of third-party generative AI tools. Note that even for the permissible uses, staff must in all cases conduct rigorous and careful fact-checking to verify results for accuracy and completeness before use.

PERMISSIBLE USE	PROHIBITED USE
• Drafting generic templates in spreadsheets, presentations, or letters without the input of sensitive or nonpublic information. • Summarizing speaking points or presentations using publicly issued GAO work. • Summarizing what is publicly known about an audited entity without inputting sensitive or nonpublic information. • Acquiring background information about a topic, recognizing that the information received may be inaccurate and incomplete. • Coding assistance and generation.	• Producing text for inclusion in GAO products. • Using images, graphics, audio, or video created by any third-party generative AI for any reason because it presents an unacceptable risk of copyright infringement. • Prompting a third-party generative AI tool with nonpublic or sensitive information for any reason, as this violates GAO's duty to keep drafts, agency, personally identifiable and other nonpublic information confidential.

Using generative AI in ways inconsistent with **GAO's core values** and other policies is prohibited. In addition, GAO employees:

1. Are prohibited from downloading any third-party generative tools to GAO's network or GAO furnished equipment, including workstations and mobile devices.
2. Are prohibited from entering sensitive nonpublic or personally identifiable information into any third-party generative AI tool.
3. Must continue to comply with applicable data protection laws and security standards when using any third-party generative AI tool.
4. Are required to review outputs from any third-party generative AI tool for quality, accuracy, and completeness.
5. Must disclose the use of any third-party generative AI tool to their supervisors as part of the normal or typical review process for their work. Disclosure should identify the third-party generative AI tool used and the prompts entered that generated the output.

Violations of this policy may result in discipline, including employment termination.

Access

Staff may use web-based generative AI applications as part of their official duties consistent with the policies above and only when using GAO furnished equipment or when inside GAO's virtual desktop (VDI). Staff may not use generative AI for official duties on their personal devices outside GAO's VDI environment.

Resources

For questions and technical consultations on appropriate use of any third-party generative AI tool, contact either the Chief Quality Officer, the Office of General Counsel Ethics Office, or the GAO Chief Data Scientist as appropriate.

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[1] This policy does not apply to GAO-developed or -deployed systems with an Authority-to-Operate.