TECHNOLOGY INNOVATION ALLIANCE WORKING GROUP

Current State Deliverable

August 30, 2023

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INTRODUCTION

Background: On November 30, 2022, the PCAOB announced the establishment of the Technology Innovation Alliance (TIA) Working Group and the appointment of Board Member Christina Ho as the TIA Working Group Chair. The TIA Working Group is a group of external professionals with expertise in emerging technologies, including such technologies used by financial statement preparers and auditors.

TIA Working Group has two primary functions:

1. Advise the Board on the use of emerging technologies by auditors and preparers relevant to audits and their potential impact on audit quality (Current State)
2. Make recommendations to the Board regarding how the Board's existing or future oversight programs might address the use of emerging technologies by auditors and preparers (Future State)

Methods: Background Research, TIA Member Informal Outreach and Interviews of personnel in the accounting & auditing profession, TIA Working Group Discussion, Stakeholder Roundtables (Future State).

Timeline: Current State (Aug 2023), Future State (May 2024)

In accordance with the first primary function above, this presentation provides an overview of the accounting and auditing profession's use of relevant technologies and the impact of such technologies on audit quality.

KEY MOTIVATIONS (THE "WHY")

Investors' Direct Concerns About Audit Quality

- Need to reduce the risk of type II errors (e.g., false negative – not calling out a misstatement when there is in fact a misstatement). Contributing factors may include:
  - audits became more procedural (e.g., check-the-box) and less of an exercise of judgment;
  - audits are conducted based on sampling;
  - accounting standards have transitioned toward valuation-based accounting, which is more difficult to audit than historical-cost accounting because it entails greater subjectivity;
  - in a world where business transactions are increasingly digital, some audit processes remain paper-based;
  - difficulty in identifying emerging trends/risks in a timely manner.

Investors' Other Concerns that Could Impact Audit Quality

- Limited competition: while there are over 1,600 firms registered with the PCAOB, publicly traded company audit marketplace is currently dominated by the "Big 4" firms.
- Limited informativeness of the audit report.
- The quality of talent that can be attracted to and retained in the auditing function.

HOW WE GOT HERE (EVOLUTION OF AUDITING)

Pre - 1840s (Need for "prudence" and "skepticism"): Limited documentation of commercial application of auditing. However, verification and examination activities to check for misstatement due to malintent, inherent management optimism, and genuine error already existed during this period.

1840s-1920s (Early focus of auditing on detection of fraud and errors): Established in the advent of the industrial revolution in the U.K. (Gill & Cosserat, 1996).

1920s-1960s (Development of effective audit approach at scale): Its development shifted from the U.K. to the U.S. due to the growth of the U.S. economy. The focus changed from the detection of fraud and errors to assessing the truth and fairness of companies' financial statements. The concept of materiality and sampling techniques were also developed due to the volume of transactions.

1960s-1990s (Further development driven by computerization and growth): The size and complexity of companies increased during the conglomerate boom of the 1960s, making it increasingly less practical for auditors to verify all transactions. Further, increased computerization significantly impacted auditing, especially in maintaining audit trail. Driven by the need for audit efficiency, auditors shifted from the assessment of internal control systems to analytical procedures and a risk-based auditing approach.

1990s-Present (Audit failures, need for auditor oversight, and continued digitization): The auditing profession continued to grow rapidly. Concerns over its ability to maintain independence grew because of multiple accounting scandals. The statutory establishment of the PCAOB in the U.S. in 2002 led to a new regulatory framework for auditing firms of publicly traded companies. The continued digitization in this era drove the focus on using computer assisted techniques and analytics which provided a greater degree of assurance. However, the pace of technology and big data have generated greater desire for more depth of audit coverage and insights to prevent or predict audit concerns.

Source: Origin And Development of Auditing - https://www.worldwidejournals.com/paripex/recent_issues_pdf/2015/September/September_2015_1492176620___21.pdf

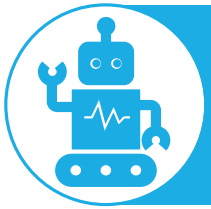
CAN TECHNOLOGIES HELP?

- Although the use of technology in auditing has increased over the years, certain audit procedures continue to be performed manually even where technological advances may be able to reduce auditing errors, lower costs, and increase timeliness. (Examples include: the use of sampling that is manually selected and reviewed, the use of ad-hoc spreadsheets with manually inputted data, and the annual nature of several audits where more-frequent assurance may be feasible.)

- **Hypothesis: Certain technological advances present an opportunity, over the next 5-10 years, to address investors' direct and indirect concerns about audit quality. For example,**
  - **New technologies could enable more comprehensive and frequent audits, potentially lowering the incidence of type II errors in auditing.**
  - **New technologies could enable smaller audit-firms to leverage third-party providers to perform routinized elements of their tasks, focusing their efforts on those matters requiring greater auditor judgment, and thereby becoming more competitive in the listed-company audit marketplace.**

OVERVIEW OF CURRENT STATE TECHNOLOGIES

SELECTED RELEVANT TECHNOLOGIES FOR FINANCIAL REPORTING AND AUDITING



Automation - Robotic Process Automation (RPA) and Internet of Things (IoT)

Definition: Use of software to perform / aid routine tasks of human workers, such as extracting data, filling in forms, capturing data using sensors or other tools.

Applications: Used predominantly for routine, consistent and repeatable rule-based tasks and processes

Big Data Analytics

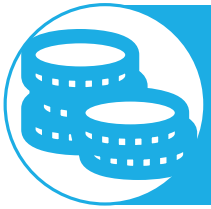
Definition: Large volume of data captured at high velocity from a variety of sources in different formats (structured and unstructured).

Applications: Uses mathematical analysis, inductive statistics, and other concepts to infer laws (regressions, nonlinear relationships, and causal effects) to reveal relationships and dependencies, or to perform predictions of outcomes and behaviors

Artificial Intelligence (AI)

Definition: advanced analytics techniques (e.g., machine learning, deep learning) used to substantially assist or replace discretionary decision making. Performance behavior of such a computational process is typically neither deterministic nor static and can evolve based on inputs.

Applications: Generates decision-influencing outputs, including scores, classifications, recommendations, and narrative or visual contents.



Distributed Ledger Technology (DLT)

Definition: DLT like blockchain are a secure way of conducting and recording transfers of digital assets without the need for a central authority.

Applications: Money transfer, smart contracts, supply chain management, credentialing, grant reporting

Note: this list of technologies is not intended to be comprehensive; rather the technologies have been selected for their potential relevance to the financial reporting and auditing process.

TECHNOLOGIES APPLICATION MATURITY LEVEL

		Maturity Level In		
Technology	**Possible Application in Auditing and Accounting**	**Management Accounting (for decision-making)**	**Financial Reporting**	**Assurance**
Automation	Labor and time intensive repetitive tasks, such as reconciliation, data categorization, data capture, can be automated.	Most common in payment processing, month end closing activities, fixed assets, and inventory monitoring (e.g. using Radio Frequency IDs and drones).	Rarely	Limited use to automate routine audit tasks such as workpaper creation, confirmation preparation, inventory observations (primarily in large firms)
Big Data Analytics	Data Virtualization - All transaction data can be recorded digitally on the cloud for easy access and use (from basic analytics to AI). Enable effective data extraction and accumulation from multiple sources to facilitate data exploration, visualization and analytics to identify trends.	Already happening in management accounting, although the data is in different formats and not easily exchangeable	Limited	Limited (primarily in large firms)
AI	AI methods can identify new trends, identify anomalies, test new hypotheses, perform risk analysis, do product valuation, help digitize and standardize data	Emerging	Rarely	Emerging (primarily in large firms)
DLT	Data can be captured in distributed ledgers, mitigating manipulation and facilitating testing 100% of the population	Rarely	Rarely	Rarely

CHALLENGES IN ADOPTING RELEVANT TECHNOLOGIES

Challenges	Preparers	Auditors
Risk Appetite	Preparers of financial statements tend to be conservative and risk-averse due to the focus on internal control compliance and do not tend to be early adopters of emerging technologies such as AI (but are thinking of use cases).	There is evidence that firms may be reluctant to apply emerging technologies to audits of publicly traded companies because they don't feel confident that there is sufficient guidance or support from today's audit standards to permit moving beyond the tried and tested. Firm tech investments appear to be occurring more in the advisory business and within private company audits.
Data	Significant challenges with data quality, standardization, and governance (e.g., large companies have multiple GL/subledger systems, acquisitions present significant challenges in merging systems and data.) There is a need to simplify access to data sources and validate them as part of the financial statement preparation.	Data quality and the logistics of getting data (e.g., data wrangling, data engineering) have been consistent challenges.
Internal Control / Guidance	Linking underlying technologies to financial statement line items is a challenge from an internal control perspective.	Guidance on the use of emerging technologies may warrant a different approach which is more iterative and flexible.
Investment Prioritization	Investments in AI tend to go more in consumer facing products, not back-office processes. Human capital investment is needed to upskill workers on emerging technologies as professionals with a blend of technology and accounting skills are scarce, e.g., many companies have no single Chief Data Officer.	Large firms appear to be making investments in AI, automation, and Big Data analytics. Although some tech companies (e.g., Thomson Reuters) offer solutions to small/medium firms, AI is not the top priority for them at this point. AICPA's Dynamic Audit Solution initiative aims to expand capabilities for smaller firms.

KEY TAKEAWAYS

- In the next 5-10 years, technologies such as RPA, IoT, Big-Data Analytics, AI, and DLT could, if used properly, reduce errors, lower costs, and increase timeliness of audits. Using these technologies could also refocus the human auditors away from routinized tasks toward those matters requiring greater auditor judgment.

- There is noteworthy use and interest in some of these technologies by preparers and (primarily larger) auditors, but their focus has been on using the technologies to improve management accounting (i.e., non-regulated performance-measurement activities). They appear to be less keen on using the technologies in regulated financial-reporting and auditing. This can be due to:
  - Risk aversion from the (perceived) high cost of an error in regulated reporting and auditing;
  - A sense that there is little return to doing so, given other investment priorities;
  - Concerns about data quality, as some of the technologies are still new;
  - A desire for more proactive guidance from regulators over acceptable uses of technology in regulated reporting and auditing.

- Without policy intervention (e.g. identifying core principles in using technologies in assurance, updating auditing standards, laying some foundation for accessible innovation), the technologies may not be embraced in a way that addresses investors' direct and indirect concerns about audit quality, and audit errors and market-concentration may persist.

SAMPLE QUESTIONS TO BE ADDRESSED IN NEXT PHASE

(NOT INTENDED TO BE AN EXHAUSTIVE LIST)

- What are the core principles for driving adoption?
- What are the key risks in adopting emerging technologies?
- What are the policy enablers to accelerate technology adoption that promotes more informative, accurate and independent assurance?
- How can the Board's current and future programs address the use of emerging technologies in auditing?

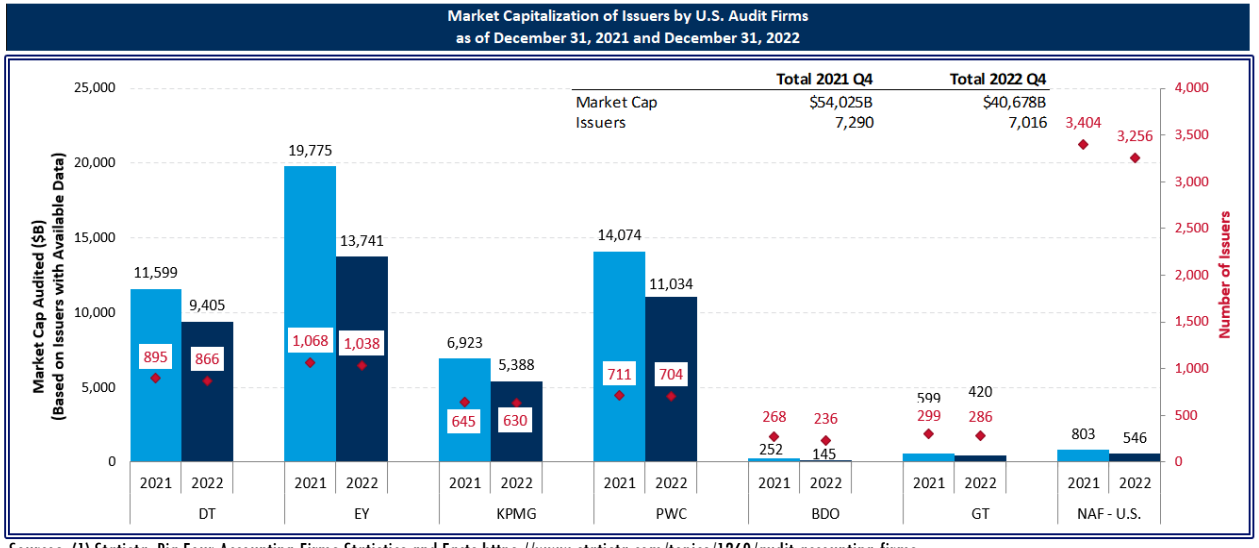
APPENDIX

CURRENT AUDIT LANDSCAPE

- ~1,600 PCAOB registered audit firms*
  - Over 750 in the United States, over 800 foreign firms

- "Big Four" firms (PwC, EY, Deloitte, KPMG) account for over 60% of the audit market (2022)
  - Deloitte: ~400k global employees, ~$60 billion total revenue, ~$18.4 billion audit
  - PwC: ~300k global employees, ~$50 billion total revenue, ~$18 billion audit
  - EY: ~350k global employees, ~$45 billion total revenue, ~$14.38 billion audit
  - KPMG: ~250k global employees, ~35 billion total revenue, ~$11.85 billion audit

- "Smaller" firms (BDO, Grant Thornton, RSM US)
  - BDO: ~10,000 global employees, ~$540 million audit revenue
  - Grant Thornton: ~10,000 global employees, ~$300 million audit revenue
  - RSM: ~15,000 global employees, ~$300 million audit revenue



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LARGE AUDIT FIRMS ARE INVESTING HUGE SUMS IN EMERGING TECHNOLOGIES

- **Deloitte, PwC, EY, and KPMG have announced billion - dollar investments in technology** over the next few years, setting ambitious goals for the integration of AI in their products and services.

- **Hypotheses:**
  - Most investment will go toward advisory services and audits of private firms, not publicly traded company audits
  - About 80% of this money will go to maintaining and updating current state tech including data preparation for new tech; 20% will go toward newer tech investments
  - Investment in AI will increase as data quality improves and profitable use-cases are proven

Sources: (1) KPMG Plans $2 Billion Investment in AI and Cloud Services - WSJ https://www.wsj.com/articles/kpmg-plans-2-billion-investment-in-ai-and-cloud-services-e4fd0dd5%20 (2) PWC AI Investment – Bloomberg Tax https://news.bloombergtax.com/financial-accounting/pwc-us-partners-with-microsoft-in-1-billion-ai-investment (3) AI Investments - NY Times https://www.nytimes.com/2023/06/13/business/dealbook/accenture-ai-billion-consulting.html

INVESTMENT BREAKDOWN

Hypothesis: Initially, much of this investment will go toward maintaining, preparing, and updating current state technologies so they can be successfully integrated with emerging technologies such as AI.

For example, investments will need to be made in:

- **Data Digitization and Standardization:**
  - Cleaning, preparing, integrating disparate and messy data is a necessary step for using advanced data analytics like AI
- **Human Capital**
  - Hiring, outsourcing, and training employees to implement and use emerging tech
- **Contracts, licensing, and leasing agreements with Tech Firms**
  - Partnering with tech firms such as Microsoft (Azure Cloud and OpenAI) to provide out of scope services
- **Developing relevant in-house tools on audit-specific data**
  - Examples: KPMG's strategic alliance with MindBridge, Deloitte Canada's partnership with AuditMap AI, Deloitte's "AI Robot", EY Virtual Internal Auditor

Sources: (1) Comments from TIA Working Group members (2) AuditMap.ai and Deloitte Canada Leverage Latest In Artificial Intelligence To Enhance Internal Audit – Cision PR https://www.prnewswire.com/news-releases/auditmapai-and-deloitte-canada-leverage-latest-in-artificial-intelligence-to-enhance-internal-audit-301211395.html (3) Explore audit innovation with Deloitte AI Robot #6 – Deloitte https://www2.deloitte.com/cn/en/pages/audit/articles/explore-audit-innovation-with-deloitte-ai-robot-vol-6.html (4) EY Internal Virtual Auditor – EY https://www.ey.com/en_us/consulting/virtual-internal-auditor (5) 1KPMG Plans $2 Billion Investment in AI and Cloud Services - WSJ https://www.wsj.com/articles/kpmg-plans-2-billion-investment-in-ai-and-cloud-services-e4fd0dd5%20

SMALLER FIRMS' TECH INVESTMENT

- Hypothesis
  - Smaller firms do not have sufficient capital to build in-house AI platforms and instead will subscribe to off-the-shelf technology from providers such as Thomson Reuters. Technology may have the power to level the playing field and allow smaller firms to compete with larger firms.

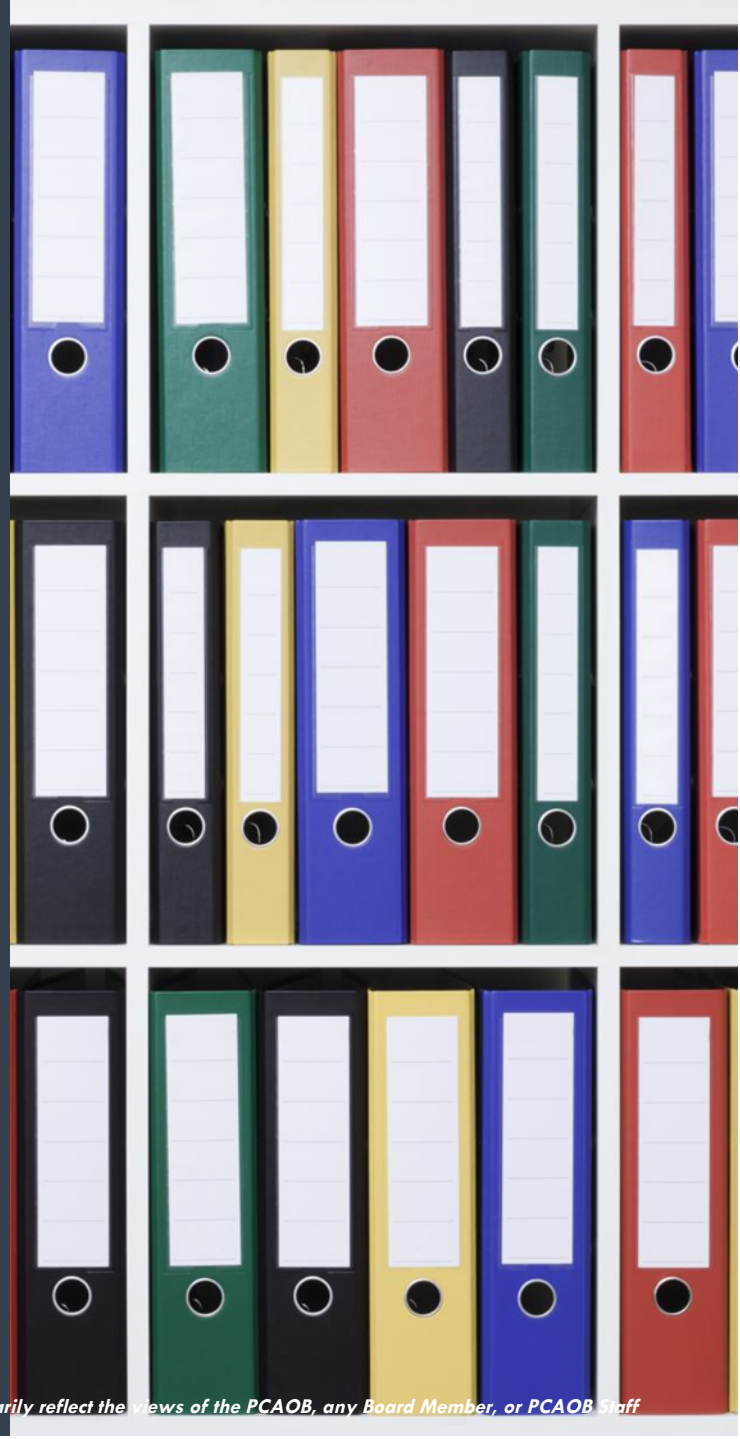
- Examples:
  - Garbelman Winslow CPA (<20 employees) uses Ai Auditor by MindBridge
  - BDO uses Ai Auditor by MindBridge
  - Other tech used by smaller firms: Inflo Treasury, Thomson Reuters' Confirmation.com
  - Key point: these firms do not build their own in-house platform

Sources: (1) BDO Partners with AI Firm MindBridge for Audit (cpapracticeadvisor.com) (2) The future of audit technology, part 1: small firms | ICAEW

EXISTING AUDITING STANDARDS POTENTIALLY IMPACTED BY EMERGING TECH

- 1105 (audit evidence)
- 1215 (audit documentation)
- 2110 (identifying and assessing risk)
- 2201 (ICFR)
- 2301 (response to risks of material misstatement)
- 2305 (substantive analytical procedures)
- 2310 (confirmation process)
- 2315 (sampling)
- 2401 (fraud)
- 2510 (inventory)
- 2601 (service organizations)
- 2810 (evaluating audit results)

Note: this list only focuses on auditing standards. Other PCAOB standards and rules (i.e. QC, Ethics & Independence, Attestation) may also be impacted.



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