



ANALYTICS IN EXTERNAL AUDIT:

A SURVEY OF CURRENT PRACTICE AND TRENDS



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CONTENTS

Introduction	3
Executive summary	5
The current landscape	9
Integrated technology	9
Tailored delivery models	15
Emphasis on data skills	20
Barriers to adoption	24
Data quality and onboarding challenges	24
Alignment of methodology, capability and platforms	31
Are auditing standards driving uncertainty?	37
Looking ahead	42
Definitions	43
Acknowledgements of interviewees	45
Disclaimers	46

INTRODUCTION

Data analytics in external audit has progressed substantially, driven by advancements in technology, methodology and skill development across firms of varying sizes. This publication explores audit firm software and methodologies, identifies current challenges, and assesses regulatory and other issues influencing the future of audit firm analytics.

In 2016, ICAEW published Data Analytics for External Auditors, to ask fundamental questions about the opportunities data analytics provides for the profession, regulators, standard-setters, investors, and academics to rethink and reimagine audit. We also wanted to raise awareness of the common issues, and to inform and educate businesses, auditors, investors, and others about recent developments in the use of data analytics in external audit.

The 2016 publication explored how audit firms, who were once constrained by technological limitations, now have choices. 10 years on, a growing number of firms are further developing their analytics initiatives and advancing their technological capabilities. Additionally, an increasing variety of vendors now offer data analytics solutions, providing the firms with more options than ever before. Standard setters, such as the International Auditing and Assurance Standards Board (IAASB), have also acknowledged the growing use of technological tools and techniques in performing audit procedures. Terminology has evolved, moving from Computer Assisted Audit Techniques (CAATs), through Automated Tools and Techniques (ATTs), towards IAASB proposing to simply use 'technological tools' in their standards and non-authoritative materials (NAM) going forward, recognising the breadth of impact that technology now has on audits.

Due to the breadth of this field, this publication defines data analytics as any programmatic approach using data to analyse and identify patterns, insights, risks and anomalies at any stage of the audit cycle.

Recognising the rapid pace of change in data analytics, perhaps faster than ever before, this publication presents an overview of the landscape of data analytics in external audit, based on interviews and discussions with firms, vendors and other stakeholders conducted between late 2024 and early 2026, detailing the use of technology, processes and delivery models employed by firms, and the evolving skillsets required in the field.

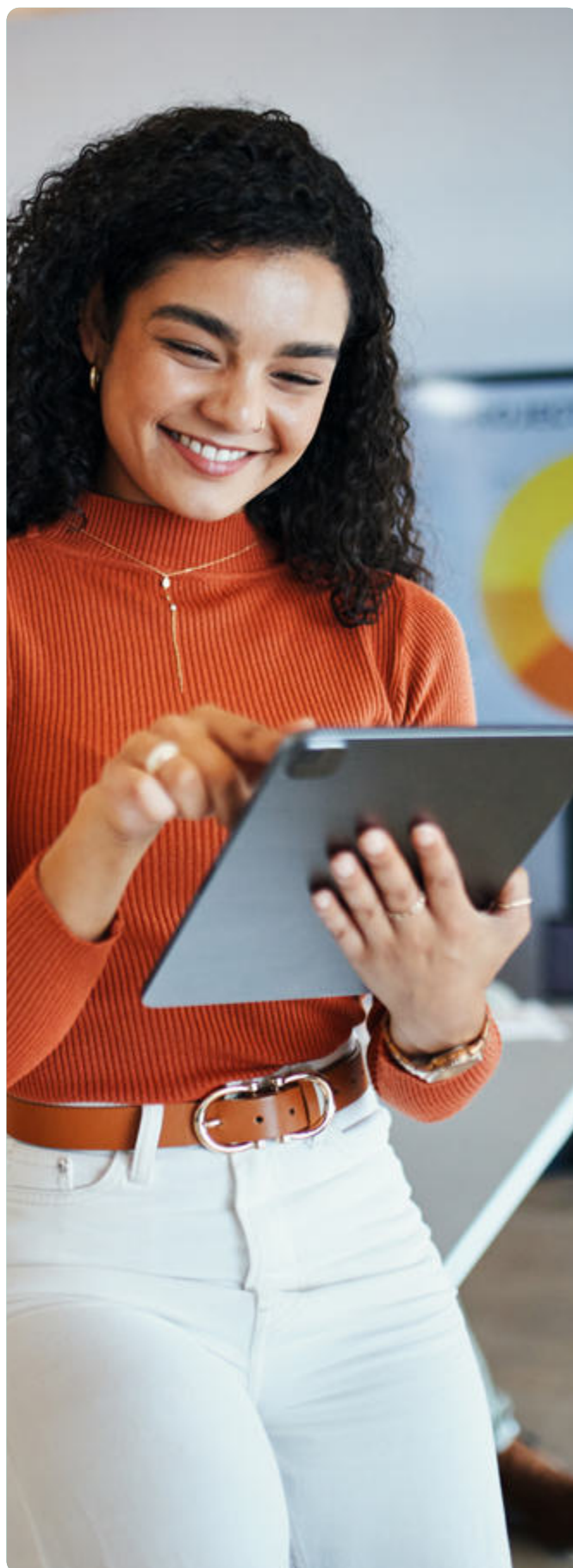
The 2016 publication focused on larger firms because data analytics was predominantly used at scale only by the largest firms at that time. However, mid-tier and smaller firms form a significant portion of the UK audit market, and technological advancements have enabled access to analytics for firms that could not previously consider them.

In this publication, we engaged with 15 mid-tier and small firms, as well as the largest firms, to gain a broad understanding of how audit firms of different sizes are adopting data analytics, developing their broader data analytics strategies and shaping their expectations for data analytics in audit.

Our findings indicate that while there are some challenges common to firms of all sizes, other challenges are influenced by scale and a firm's adoption stage. This publication also highlights potential ways forward for all stakeholders.

Understanding data analytics in external audit for this publication also necessitated engagement with experts who influence audit practice including prominent vendors, methodology providers, regulators, and standard setters. We also consulted ICAEW's Quality Assurance Department (QAD). There was consensus on the value of maintaining open, two-way communication regarding the challenges faced by audit firms when implementing analytics across these groups.

We are extremely grateful to everyone who contributed to this publication. We particularly appreciate their willingness to discuss the issues we raised candidly and to share their expertise. A full list of contributors is provided in the acknowledgements section at the end of this report.



EXECUTIVE SUMMARY

We review the current landscape of data analytics in audit and provide a detailed overview of ongoing challenges and recommended actions based on our latest findings.

THE CURRENT LANDSCAPE

Integrated technology

There has been a notable shift toward integrating and embedding data and analytics within audit platforms, making them a core part of the audit process rather than a set of standalone procedures that sit outside of the audit workflow and have to be consciously 'brought in'. The extent of integration varies. In larger firms, analytical tools are increasingly customised and integrated directly into proprietary workflow management systems as built-in, self-service analytics modules, or efforts are underway to streamline the audit process by embedding analytics into existing workflows. Uploading data into these platforms now serves as the starting point for most data analytics. By contrast, many small and mid-tier firms that previously relied on a mixture of third-party solutions are now selecting vendors offering comprehensive end-to-end audit platforms. There is an expanding market for such services facilitating the adoption of advanced tools by smaller and mid-tier firms. Vendors either offer embedded analytics capabilities, or have a close partnership with other providers to allow for tighter integration. Nevertheless, Excel remains an essential tool for the smallest firms and should not be dismissed as a viable solution for analytics, if used appropriately.

Tailored delivery models

The largest audit firms have a range of delivery models, often depending on their appetite for firmwide solutions. However, it seems that audit teams almost always take responsibility for the audit approach and the design of when and how to use analytics.

In a self-service or 'citizen-led' approach, auditors are empowered to select and use the tools most appropriate for their engagements. They are encouraged to perform tasks such as journal and revenue testing, using a variety of available tools designed to maximise the level of automation and self-service. They bring in a small team of experts only for the most advanced, bespoke analytics work.

In a 'two-team' approach, the core audit team decides when to use analytics and typically consult data specialists early in the planning stages. The specialists then manage the process of obtaining, transforming and analysing data according to an agreed set of requirements. The specialist team is typically a mix of onshore and offshore non-auditor resource, with some automation of the most widely used solutions. Firms adopting this approach encourage a strong partnership between auditors, IT and analytics specialists. While audit teams lead the process because they are responsible for the audit engagement, they work closely with specialists to shape the design of the analytics.

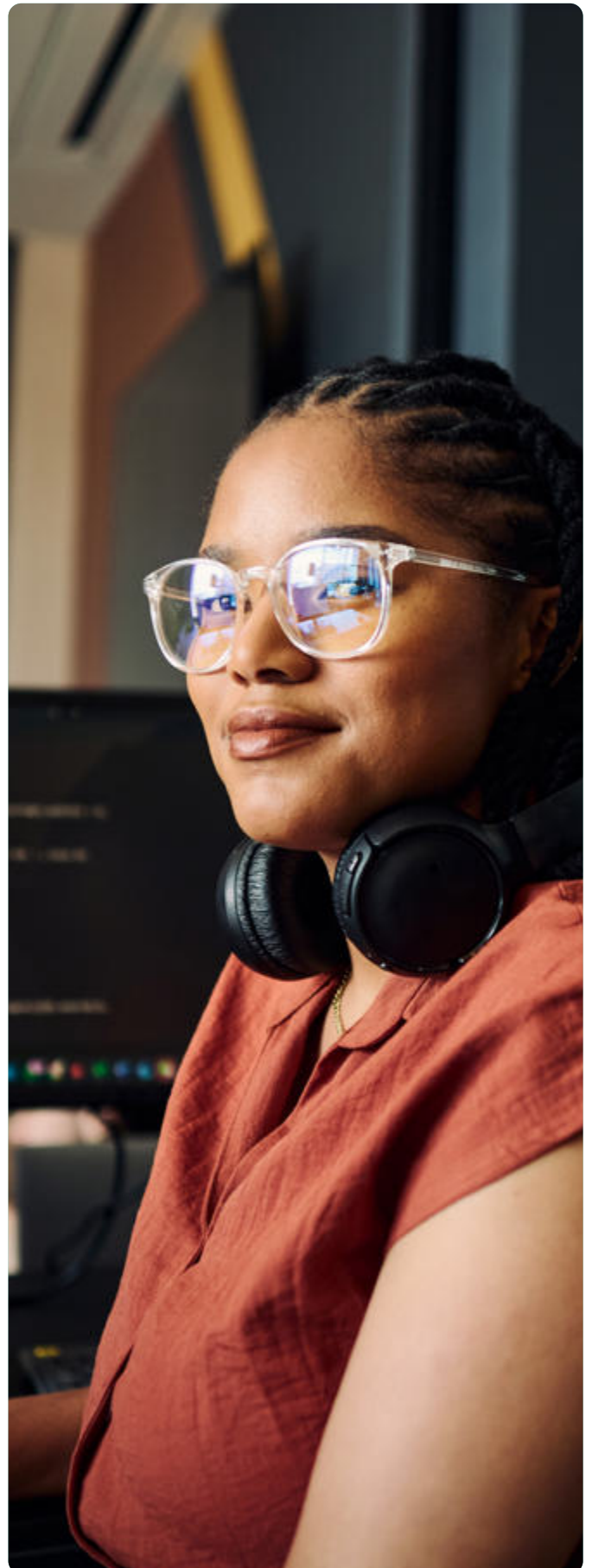
Mid-tier firms typically base their analytics deployment on available internal expertise, relying on specialist or central technical teams. Where internal resources are limited, they seek support from external vendors. In many cases, the analytics process requires heavy involvement from auditors at every stage.

Smaller firms tend to depend more heavily on third-party analytics solutions.

In all cases these tools can enhance audit quality and the competitiveness for a firm, but they also present challenges. These include ensuring consistency in the use of analytics within the methodology, and clarifying where professional judgment and accountability ultimately reside.

Emphasis on data skills

The adoption of AI and technology-enabled audits has prompted many firms to ask how they can best train their future auditors. There is general agreement that auditors require enhanced training and awareness of analytics, and while the extent of training varies considerably, broadly speaking, auditors are not expected to become advanced data or technology specialists. A three-tier approach covering when to use a tool, how to configure it, and how to interpret results, is generally seen as providing all auditors with the basic skills they need for the future – though many firms seek to support those auditors who want to develop more advanced technical skills in data analytics.



BARRIERS TO ADOPTION

Throughout the development of this publication, we also identified challenges and barriers impeding the successful implementation of analytics. We highlight below actions to address each of the barriers identified by the firms we interviewed and other stakeholders.

Data quality and onboarding challenges

A key issue for firms of all sizes is obtaining and extracting data. Difficulties arising from the complexity and variety of client systems can make reliable data access challenging. The scope for using poor quality data is limited and the time taken to obtain data can mean it is available too late in the audit process.

Audit approaches increasingly extend beyond a typical 'general ledger' dataset and sometimes beyond core finance systems, point-of-sale systems for example. This leads to higher workloads and resource demands for both the audit firm and client. Furthermore, the data available may now include other types of data such as unstructured qualitative data, adding to the challenge, but also presenting opportunities for deeper, better-quality analysis and insights.

We found that access to specialist support whether through self-service tools, third-party solutions or dedicated expert teams, is crucial for firms of all sizes, to address the challenge of obtaining and extracting data from client systems.

Larger firms often have the resources to address these issues internally, through tailored approaches or tools. Some mid-tier and smaller firms are more likely to seek support from subject matter experts or external vendors.

Alignment of methodology, capability and platforms

Firms are more confident in adopting analytics when solutions can be aligned with their audit approach and methodology. When staff and partners understand the tools and outputs, they can articulate how use of the tools meets the requirements of auditing standards. Insufficient understanding of tools and outputs has led some firms to treat outputs as conclusive evidence, rather than as prompts for further investigation.

Some firms, particularly those with greater resources at their disposal, are choosing to develop and integrate analytics in their in-house developed methodologies, allowing them to rely on well-established processes. Although some challenges with methodology persist, particularly around the ability to apply the use of analytics to specific client scenarios, these firms are leading the way in innovative audit techniques that extend beyond standard substantive testing of journals and into other phases of the audit.

By contrast, more investment-constrained firms typically rely on external methodology providers and technology vendors which significantly influences their approach to analytics. While a variety of tools are available, many often lack integration with 'off the shelf' methodologies, resulting in firm hesitancy to invest heavily in analytics. Many of these firms have adopted a 'wait and see' strategy.

There is some correlation between the size of firm and its ability to invest in data analytics, though there are examples of firms of all sizes making investments appropriate to their needs. Firms demonstrating a willingness to adapt and tailor methodologies and work programs also typically demonstrate the greatest willingness to adopt analytics.

Additionally, most methodology providers are actively working to embed data analytics into broader areas of the audit process, not simply journals testing, and are increasingly collaborating with technology vendors. Although they maintain a tool-agnostic approach, such collaborations help define problems and enable more effective use of tools as part of an integrated audit approach.

Are auditing standards driving uncertainty?

Audit firms are seeking communication and clearer guidance from auditing standard-setters and audit regulators. Firms are interested in expanding the use of analytics but they remain cautious, due to potential regulatory scrutiny and penalties in the event of errors or the inappropriate use of analytics. Consequently, many small and mid-tier firms may have tools available but are reluctant to place reliance on them in testing because of unclear guidance. They default to sampling, either at the expense of using analytics at all, or in many cases performing fully substantive procedures alongside the use of analytics, effectively duplicating effort. Many firms were uncertain about how to categorise testing conducted using data analytics, noting that it often did not neatly fit into the existing categories of audit tests referred to in auditing standards.

Regulators and standard setters do not currently believe that there are many, if any, cases of analytics being used where they should not be. Rather, challenges they identify are about the specifics of how the analytics has been deployed and the results interpreted. Regulators and standard setters are keen to encourage greater use of data analytics, but it is unlikely that they will mandate specific testing methods. Instead, the emphasis is likely to be on clarifying support for technology adoption through additional guidance, while ensuring that standards remain proportionate

and adaptable through updates to better encourage more innovative audit approaches.

CALLS TO ACTION

Firms will benefit from greater investment in upskilling, in tools and by making bolder decisions about when to use analytics. Firms should be reassured that audit regulators are largely satisfied with their ability to identify appropriate scenarios in which data analytics can be applied, and that audit regulators and auditing standard setters are looking to encourage greater innovation and adoption of data analytics.

Methodology providers should prioritise developing work plans that better support and encourage the use of analytics, without introducing unnecessary burdens.

Audit regulators and auditing standard setters can provide better support by articulating and clarifying where and how current auditing standards support the use of analytics, and by sharing more specific, detailed examples of best practice.

Software providers should focus on meaningful engagement with all stakeholders to ensure that their software and products comply with the requirements of auditing standards and integrate well with other platforms.

Professional bodies should use their central role among stakeholders, to represent and advocate for the needs of firms and members by facilitating debate about the three key barriers noted above, and explore solutions to challenges around data quality.

THE CURRENT LANDSCAPE

From discussions with firms, vendors and other stakeholders, we have gained a thorough understanding of how audit firms of various sizes are embracing data analytics and developing their analytics strategies. As a result, in the sections below we present an overview of the current landscape of data analytics in external audit, detailing the use of technology, processes and delivery models employed by firms, and the evolving skillsets required in the field.

INTEGRATED TECHNOLOGY

With advancements in technology, it is evident that a growing number of firms are further developing their analytics initiatives and advancing their technological capabilities. Additionally, a growing appetite among vendors to offer data analytics solutions provides access to analytics for firms that may not be able to develop such capabilities internally. Alongside insights from the largest audit firms, engaging with mid-tier and smaller firms has provided a broad understanding of how audit firms of varying sizes are adopting data analytics, developing their broader analytics strategies, and shaping their expectations for data analytics in audit. There is a notable shift toward integrating and embedding analytics within audit platforms, making analytics an integral part of the audit process rather than a set of standalone procedures. While the extent of this integration does vary by firm size, there has been a clear development since our last publication 10 years ago.

LARGER FIRM FOCUS ON BUILDING INTEGRATION AND SELF-SERVICE

In larger firms, analytical tools are increasingly being customised and integrated directly into proprietary workflow management systems as built-in, self-service analytics modules, or efforts are underway to streamline the audit

process by building analytics into existing workflows. An example of this includes EY's development of an integrated workflow by embedding EY Helix – their in-house data analytics capabilities – into EY Canvas, the firm's cloud-based audit management platform.

Linking EY Helix directly to EY Canvas means that data acquisition and upload has become the natural starting point for analytics-enabled audits, with data analytics then flowing through planning, execution and reporting. When data is loaded into the data analytics platform at the planning stage, teams can use intuitive guided workflows in the audit management platform to perform a data-driven risk assessment that informs scoping and the wider audit work programme. The outputs and rationale are captured in EY Canvas, creating a clear audit trail and consistent execution, while supporting sustained high audit quality and improving the audit experience.

Larger firms also tend to have more capability and resources to collaborate with vendors for more tailored solutions, allowing them to benefit from strategic partnerships.

KPMG has been working closely with MindBridge to create bespoke analytics and AI tools for their firm, including using MindBridge's transaction scoring functionality that analyses financial data and assigns it a low, medium or high score based on a machine learning determination of risk. This functionality, known as KPMG Clara AI Transaction Scoring, is integrated with KPMG's Clara audit platform, so audit teams can work directly in Clara on MindBridge-powered analytics. The functionality has now been deployed on over 1,000 audits at KPMG in the UK, and on around 20,000 audit engagements globally. The firm is also engaged in a wider roll out of [Microsoft Fabric](#) across the firm to provide auditors with access to Copilot functionality in [Power BI](#) and [Power Query](#). With this, KPMG want to enable auditors to use and prompt Copilot to transform data, write complex formulae, construct reports and prepare summaries, to support data analysis.

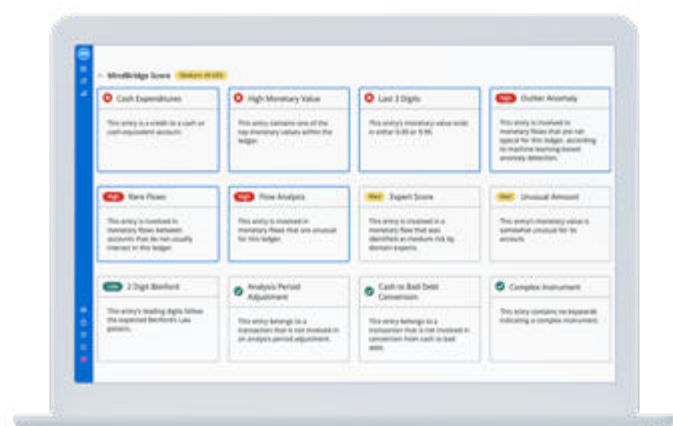


Figure 1 Illustration of MindBridge's Transaction Scoring platform.

Similarly, EY is directly embedding a new [multi-agent framework](#), integrated with [Microsoft Azure](#), [Microsoft Foundry](#) and Microsoft Fabric, into EY Canvas. These capabilities are designed to help audit teams orchestrate complex tasks, processes and technologies, and address risks dynamically, while accessing current auditing and accounting guidance.

PwC has established its own strategic partnership with Microsoft and Databricks to

collaborate in the development of tailored audit technology. The firm emphasised that the key differentiator is not merely possessing a [technology stack](#), but rather the effective integration and enhanced user experience provided to auditors. Their Acquisition Suite is an example of inclusion of data in the audit platform, bringing together a range of tools and technologies that ensure all the data provided by the client, in whatever format it has been provided, is available to the audit team in one place.

As analytics become more integrated into audit platforms and the audit process, its use across the audit cycle has naturally expanded in larger firms. Many firms now use data analytics during the planning, execution and reporting stages of an audit. Firms are also increasingly using dashboards to present findings to clients. Previously limited to journal entry testing, analytics are now applied to reviews at the planning phase and to substantive areas like revenue, enabling auditors to visualise trends and identify anomalies or outliers. Deloitte has pointed to a rapid acceleration in data-driven audit techniques used across audits. The significant experience gained in deploying centralised journal analytics at scale across their portfolio has now evolved to a point where data analytics are integrated into their audit platform, Omnia. With data [Extract-Transform-Load \(ETL\)](#) continually covering a growing range of [ERPs](#), as well as incorporating greater automation, auditors have been empowered to leverage data analytics as standard practice throughout the audit. Alongside the self-service option, more sophisticated and tailored solutions are also available for engagements with greater complexity.

Despite this positive expansion of analytics in larger firms, the extent of analytics adoption is still largely influenced by factors such as the complexity of financial systems and data, the size of organisations being audited and regulatory requirements.

MID-TIER FIRMS PROCURING INTEGRATED SOLUTIONS

Many small and mid-tier firms are also now able to select vendors that offer comprehensive end-to-end audit platforms with self-service analytics capabilities. This marks a significant shift from a time when audit analytics required deep technical capabilities and so was often out of reach for the majority of firms outside the Big 4.

An example of this shift is Inflo's digital audit platform. Initially focused on data ingestion and analysis, the platform now includes an end-to-end comprehensive suite of integrated tools. This includes risk assessment at the planning and conclusion stage with tools like Inflo Flux and substantive testing using Revenue Cascade and Inflo Explore. Inflo has also expanded into client collaboration, document request management and working papers, so that 'data' is not limited to the general ledger, but encompasses all information obtained through the audit process and is used across planning, execution and reporting. An emphasis is also placed on obtaining data regularly and to a high quality, supported by per-client pricing approaches designed to avoid penalising repeat extractions or ingestions during the audit cycle.



Figure 2 Illustration of Inflo's Revenue Cascade module

This growing market of vendors is driving innovation and the adoption of advanced tools across the profession. For example, Validis specialises in connecting to and extracting financial data from accounting software, which is then standardised to provide a basis on which firms can deploy their chosen solutions. DataSnipper – an Excel-based data automation tool – was cited by many firms as a valuable tool in their portfolios. Although some do not consider this to be conventional 'data analytics', by automating reconciliation and sample testing work using data and AI, many would argue that it is one of the more transformative data analytics tools in terms of the benefits delivered.

Alteryx, a leading 'low-code' software vendor in business analytics that can automate data preparation and advanced analytics, is being used by many large and mid-tier firms, albeit in different ways. At PwC, all auditors are trained in the use of Alteryx, which has led to its increased adoption as a self-service solution. In contrast, at many other firms, Alteryx is primarily used only by data specialists. This may be driven by licensing costs, as much as other more skill-based factors.

S&W, an example of a larger firm, has used an array of tools over the last few years, including IDEA by Caseware, Power Query in Excel and, more recently, both DataSnipper and Inflo. The firm reported cycles of switching between using well-designed off-the-shelf tools that offer little customisation, to tailored proprietary solutions that need more resources to update and maintain. As a result, the firm is now pursuing a balance between both. They observed that using a larger number of fragmented solutions made client and staff adoption more difficult. S&W are focusing on using tools that can be built into the audit workflow and can be applied to 80 to 90% of their audit portfolio through greater standardisation of approach. They have prioritised expanding Inflo's workpaper and analytics offerings as widely as possible, with plans to explore further customisation in the future. While the emphasis remains on a smooth and consistent user experience for both clients and staff, the firm acknowledges that in a minority of cases, where clients are more complex or atypical, standard tools such as Inflo may need to be used alongside alternative or customised approaches.

Azets faces a similar challenge. Although they use Inflo for most clients, certain teams still rely on manual processes for more complex situations, for instance, when journal entries are batched or subledgers require further investigation. In these cases, the firm has also developed custom solutions using Alteryx that do not require advanced programming knowledge. Within Azets, Alteryx is used to combine ledgers or datasets to overcome restrictions from certain accounting systems on report sizes for a full analysis, perform completeness checks, and in certain cases allow population-based testing across several datasets. Where workflows for particular systems or report types have already been produced for one client, the same workflow can be redeployed on any other client with the same data format, supporting a near-instant repeat analysis.

Going forward, the firm are exploring publishing these workflows to audit teams in the firm for self-service access.

Azets use Alteryx more widely in the audit service line and shared a workflow specifically created to connect to the Companies House [API](#), that allows audit teams to retrieve all pertinent information.

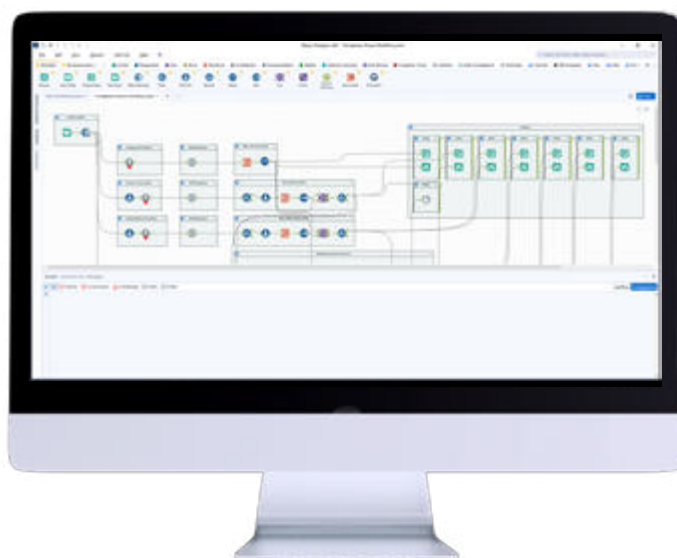


Figure 3 Illustrative example of Azets' use of Alteryx to connect to the Companies House API

Similarly, RSM use a self-service app for journals testing developed internally using Alteryx and Power BI, hosted on an Alteryx server along with just under 30 other applications. The application has been mandated for use since 2022 and is currently being used across the majority of engagements excluding pension scheme audits.



Figure 4 Example of a part of the journal's dashboard created in Power BI by RSM

Saffery has also observed that teams have encountered challenges when working with smaller clients, particularly due to reports and data being presented in less accessible formats. While the firm still uses Inflo, some of the smaller audits have also benefitted from the use of custom internally developed Power Query reports for effective data transformation.

These challenges indicate that, although vendors are moving towards more comprehensive solutions by increasing their range of offerings and closing existing gaps, in some cases by collaborating with other vendors and directly integrating functionality in audit platforms, full standardisation and integration still remains difficult because client data and models vary widely. As a result, firms still rely on custom solutions or intervene with manual processes. Some firms are considering developing their own systems internally and using third-party tools, which can help these firms build confidence and expertise. However, most mid-tier firms are cautious about making significant resource investments. The FRC have noted similar findings in their ['SME Audit Market Study'](#) stating that "smaller

audit firms generally have fewer audited entities and engagements than larger audit firms, meaning the return on investment in technology is lower"¹. Additionally, the lack of clear standards and guidance regarding specific tools and technologies means that partnering with established vendors and software tends to be a safer, more "tried and tested" strategy. Consequently, the trend is leaning towards creating bespoke solutions in collaboration with established vendors.

Most mid-tier firms are confident in applying data analytics to journals testing across the majority of their client portfolios and can comfortably deploy off-the-shelf or in-house developed solutions to do so. This is ultimately because journal entry testing is one of the most consistent and clearly data-dependent elements of the audit process, making it a very scalable and repeatable process. But where larger firms have been actively moving beyond journal entry testing into other areas, mid-tier firms are more hesitant. While these firms are gradually extending their use of analytics into areas such as risk assessment and revenue analysis, in order to use data analytics effectively there is significant dependence on the alignment of the solutions that software providers offer with methodologies and standards. Ambiguities in this area remain an obstacle, despite the assurances of technical experts from software providers. For instance, while Saffery uses Inflo for journals testing, the firm is continuing to evaluate its revenue and risk assessment modules including Inflo Explore and Revenue Cascade. Some challenges have been noted, by Saffery and others, in identifying how tools like these can positively impact the amount of testing required in other areas to meet the requirements of their methodologies.

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SMALLER FIRMS TAP INTO DIVERSE VENDOR MARKET

Smaller firms are also able to tap into the vendor market for data analytics, though many remain further back on the adoption journey. Some have reported that the platforms are still too complex and costly to implement for the size and scale of their client base. Datasets are typically smaller, with clients operating legacy systems (or sometimes still working on spreadsheets). As client teams may lack experience with new software, there is increased resistance to adopting additional processes and tools that feel cumbersome for what is required. Consequently, the use of data extraction tools does not necessarily streamline workflows for these firms; instead, they could increase time spent on gathering information and consequently, contribute to audit cycle delays. Indeed, FRC's '[SME Audit Market Study](#)', found similar findings stating that "smaller audit firms may lack resources and technical knowledge to implement and customise technology for SME audits. This can result in the firms being highly reliant on third-party technology and may limit innovative approaches to delivering SME audits. It could also reduce the ability of firms to achieve cost efficiencies and fully capitalise on technological advancements."² In pursuit of understanding these challenges, the FRC has launched a '[Audit Tech & AI Sandbox](#)' to provide opportunities of support for smaller to mid-tier audit firms who are seeking to adopt technology to improve their audit quality. The sandbox, though open to firms of all sizes, aims to enable smaller audit firms to explore, test and critically evaluate new and emerging technology in regulatory frameworks. Participants will work directly with FRC specialists to explore how auditing standards and FRC guidance, including ISQM 1³, engagement standards, and the FRC's AI guidance can be applied in practice.

A small firm noted that rather than employing additional tools for data analytics, they use existing functionality built into Caseware's audit platform. This functionality can generate five years of trend analysis based on historical trial balance data upon upload and supports the audit risk assessment at a high-level. Once again, it demonstrates the value of tight integration into the audit workflow.

Excel continues to be a vital resource for small firms and while it is easy to be dismissive of Excel as a data analytics tool, if used well it can be very effective at the smaller end of the audit market.

Many smaller firms reported using [macros](#) and Power Query to import data, followed by simple lookups to reconcile and draw comparisons. Indeed, Excel frequently serves as the starting point for analytical reviews, a fact that likely remains true in firms of all sizes. When testing journals, smaller firms also often appreciated the flexibility of being able to set very tailored risk criteria.

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³ International Standard on Quality Management (ISQM) 1, Quality Management for Firms that Perform Audits or Reviews of Financial Statements, or Other Assurance or Related Services Engagements.

TAILORED DELIVERY MODELS

The delivery models adopted by firms are significantly affected by their size, as factors such as resource availability, team skills, training capacity, and the tools used collectively shape the approach to analytics. Larger firms often possess greater capacity for innovation and diversification in their delivery models. And while smaller firms have in the past exhibited a reliance on core audit teams who depend on centralised technological guidance and vendor support, greater choice in technology and tools is allowing firms to slowly diversify their approaches.

DELIVERY MODELS VARY IN LARGER FIRMS

Indeed, larger audit firms are embracing a range of different delivery models, often depending on their appetite for developing firmwide capabilities in analytics. At the heart of every delivery model auditors possess the ultimate responsibility for the approach and decide when to use analytics. Through our discussions we have identified two main analytics delivery models used by these firms: self-service, or 'citizen-led', and a two-team approach.

In a self-service or 'citizen-led' approach, auditors are empowered to select and use the tools most appropriate for their engagements. Auditors are encouraged to independently perform tasks such as journal and revenue testing, leveraging a variety of available tools designed to maximise the level of automation and self-service. They may bring in a small team of experts only for the most advanced, bespoke analytics work. This gives auditors greater ownership over the analytics work taking place on their

audits, reduces any potential bottlenecks with reliance on a single central team, builds digital confidence and capability, and can allow for a more responsive and agile audit approach.

PwC's audit analytics approach is a good example of a 'citizen-led' delivery model. A defining feature of PwC's model is its 'Innovation and Data' team, which has been embedded into the audit practice. This team blends auditors and data engineers who work alongside engagement teams to develop bespoke, engagement-specific solutions, and then scale those solutions across markets and industries – combining deep audit judgement with engineering capability at the point of delivery. In recent years, the firm has also prioritised upskilling its entire audit team in analytics, empowering auditors to select and implement appropriate tools based on their needs. Auditors receive training to perform tasks, such as journal testing using self-service platforms, and are encouraged to leverage a variety of centrally developed tools accessible directly from their Aura audit platform. In addition, auditors are empowered to develop data wrangling and processing solutions using software such as Alteryx, with support for teams to clearly document the ETL process of performing analytics, reducing reliance on additional specialist teams. Where such auditor-developed solutions have been successful across several audit engagements, they can then be prepared for release in the firm's Digital Lab to surface them to the wider audit community. Assets are taken on by a specialist central team, where further development is made to make them scalable and self-service while improving user guidance, documentation, support and maintenance.

The firm is committed to fostering a digital mindset among teams, acknowledging that while training and technology provision are essential, hands-on experience and experimentation can enhance the use and adoption of new technologies. As a result, PwC has introduced a gamified technology adoption platform called 'Quest' for auditors, that encourages teams to explore various tools on their engagements and understand how tech and analytics can solve different audit problems, tailored to the specific needs of their clients. Quest tracks each team's digital score and effectively grades teams based on how well they have adopted technology in their audits, which engagement leads monitor in line with their objectives. This approach moves away from 'pushing' specific technology solutions to teams, and towards allowing them to 'pull' the technology they think will be of most use to deliver effective and efficient audits.

Conversely, in a two-team or hybrid approach, while the core audit team decides when to use analytics, teams will typically consult and work with data specialists in the planning stages. The specialists then largely manage the process of obtaining, transforming and analysing data according to an agreed set of requirements. That specialist team, often comprised of non-auditors, may also be a mix of onshore and offshore resource, with some automation of the most widely used solutions. There are advantages to this approach too. Roles are clearly defined, with the core teams able to focus on using their technical audit expertise. The specialist team can enforce a high level of control over the quality of analytics work across all audits, as well as having strong visibility of analytics requirements across the whole audit portfolio, minimising the risk of a 'cottage industry' approach through high levels of standardisation.

EY's operating model can be described as a hybrid model. While the analytics workflow involves a specialist Data and Intelligence Delivery (DID) team who play a central role in data acquisition, data analysis activities continue to be largely performed by audit teams themselves, supported by a wide range of self-service technologies. The firm uses its internally developed data analytics capabilities integrated in the global audit platform. The global audit platform is further supported by EY Atlas, which contains EY's global audit methodology as well as all technical accounting and auditing information. The methodology and global platform can be further interrogated using the EY Assurance AI Assistant capability.

Similarly, KPMG delivers most analytics through a dedicated central team split between offshore and onshore units. Offshore teams focus on extracting and transforming data, while onshore teams work closely with audit teams to scope and analyse the data. Over time, the size of the central data team has increased, and the firm now employs more than 180 specialists in data analytics. Approximately 40% of these specialists have an audit background, with the remaining 60% being data specialists.

The offshore team is principally responsible for managing ETL processes, after which the audit team uses proprietary tools such as KPMG Clara analytics, as well as Microsoft Excel or Power BI to perform its analysis. Documentation of ETL procedures is maintained in the audit file using standardised workpapers, which outline required information and a description of the process followed to extract, validate and transform the data. These workpapers also include tables of results or screenshots of dashboards.

While the final documentation is a collaborative effort between the audit and specialist teams, with both parties providing approval, the degree of specialist team involvement is dictated by the complexity of analytics required for each engagement. For example, in instances necessitating the use of [SQL](#) databases, the analytics team takes an expanded role in documenting data extraction and transformation processes, after which outliers are referred to the audit team for further investigation.

Additionally, to address variability in complexity, KPMG use tailored scripts specific to different accounting systems to support data extraction. Audit teams are encouraged to reference a central library of examples of previous use of analytics on engagements and may request new types of analysis, subject to approval by the methodology team. Approximately 20 to 30% of audit engagements require bespoke analytics for testing purposes. The firm has established a formal request system for such needs, overseen by the methodology team.

While KPMG continues to invest heavily in its specialist data analytics team, there are signs of bringing in elements of the citizen-led approach too. In 2025 the firm conducted a pilot programme to train auditors in data literacy and the use of analytics tools through the Microsoft Fabric platform; the program was rolled out for all audit staff as part of the annual 'KPMG Audit University' training in the same year.

Grant Thornton is another example of a firm using self-service analytics with specialist support, enabling auditors to engage directly with data while drawing on deeper technical expertise where needed. Inflo is one significant audit analytics tool used by the firm which is supported by a suite of other in-house applications.

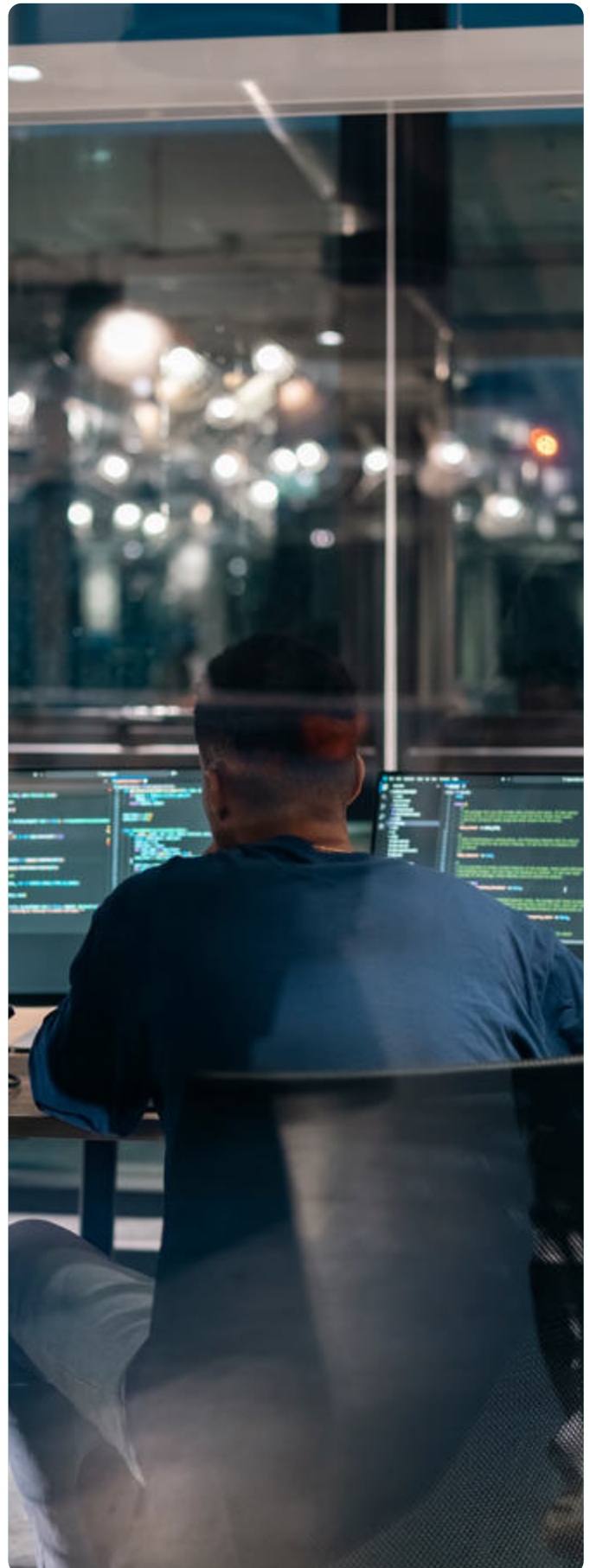
The firm's 'AAA' platform gives auditors access to a range of 'apps' that can perform a range of analytics, including payroll and cost of sales analytics, designed to embed analytics in day-to-day audit activity. A central 'Digital Audit' team that spans product, service, skills, and research capabilities, provides support across data extraction, transformation, custom analytics and new application development. While most audits use Inflo with self-service features, more complex requirements can be addressed using tools such as KNIME, enabling targeted, specialist intervention.

To further drive and build on their self-service capabilities, Grant Thornton is investing heavily in a more digitised client experience, leveraging integrated, technology-enabled and citizen-led approaches to audit and analytics. Analytics is also being increasingly integrated into their 'Leap' audit documentation system, supporting a more seamless and embedded approach.

Furthermore, at Deloitte, the firm employs a hybrid model, with a mix of self-serve capabilities for auditors as well as strong partnerships with data analytic specialists. Auditors have been upskilled to perform analysis leveraging centrally developed tools through their Omnia audit platform. These tools allow auditors to perform a range of tasks including journal testing and data analysis as well as more advanced predictive capabilities. Auditors have been trained to select the right tools for the task and are supported by a network of auditors with enhanced knowledge and skills of the available capabilities.

Alongside the standard capabilities, data analytic specialists can support auditors in obtaining, preparing and analysing data to specific requirements. Audit teams lead the process, working closely with specialists to shape the design of the analytics. Data analytic specialists have assigned responsibilities, but since most are not auditors, control of the process remains with the auditor from start to finish. Deloitte have put significant effort into standardising and automating solutions where possible to control the quality of solutions and allow for as wide deployment as possible.

The two-team approach is beneficial for audit quality and scalability as it ensures that analytic tasks are performed by staff with the right level of data and technology expertise - skills that not all auditors will inherently have. Areas such as data acquisition, ingestion and controls is where the skills gap is likely to be larger. However, with two distinct teams, there is a risk that some of the responsibilities for performing follow up tasks and evaluating the overall analytics process in line with engagement risks and objectives might be passed back and forth between teams and fall through the gap. It may be that in 'citizen-led' approaches where auditors are trained in the use of tools and technology for analytics, the risk may be reduced.



SPECIALIST TEAM SUPPORT IN MID-TIER AND SMALLER FIRMS

While the largest firms continue to evolve their delivery models drawing on years or even decades of data analytics experience, other firms including some mid-tier firms are more likely to shape their analytics deployment based on available internal expertise, relying on specialist or central technical teams. Where internal resources are limited, or investment is focused on external software, these firms may seek support from external vendors. While previously in many cases the analytics process was largely manual with auditors heavily involved at every stage, greater choice in technology and tools from innovation in the market is allowing firms on the larger end of the mid-tier scale to diversify their approaches and consider developing their own self-service solutions too.

Indeed, some mid-tier firms are moving towards more tailored delivery models. Moore Kingston Smith previously collaborated primarily with an external software provider for its audit analytics capabilities, but the firm now prioritises its internal capabilities through establishing its own [data warehouse](#) to centralise storage and promote consistency. Having built up their experience working with external vendors, the breadth of available options has empowered them to focus on developing in-house tools tailored with advanced analytics for specific client sectors. The in-house analytics platform, 'CARE,' uses [Python](#) for analytical processes, [Django](#) for its framework, SQL for database management, and [Java](#) for the front end, all hosted securely on Azure cloud infrastructure. This approach supports auditor self-service through an intuitive interface. Audit teams are continuously upskilled in data competencies through annual core audit

training, with access to platforms such as KNIME. While most analysis is performed in a self-service manner, an offshore team plays a significant role in data transformation and upload, complemented by a centralised specialist team that manages complex audit engagements. It is a delivery model that shares many similarities with those of the biggest firms and demonstrates the way data analytics technology has become significantly more accessible in recent years.

While these examples showcase mid-tier firms embarking on the development of in-house capabilities, many mid-tier and smaller audit firms continue to depend on and invest in third-party analytics solutions, vendor support and an approach to analytics that is led largely by core audit teams, with limited involvement of internal data specialists. As the delivery models rely on audit teams, smaller firms are focusing more on their learning and development approaches. This ensures their staff are trained to understand what performing analytics can achieve through working effectively with specialist audit analytics platforms such as Inflo and MindBridge, or using analytics capabilities increasingly built into the firms' audit platforms. While the availability of more tools and solutions introduces greater competition and can benefit overall audit quality through wider choice, it also presents challenges. These include ensuring consistency in methodology, a lack of firm or client-specific tailoring and innovation and clarifying where professional judgment and accountability ultimately reside.

EMPHASIS ON DATA SKILLS

Most firms agree that auditors require foundational technology and data analytics skills; accordingly, these skills are now sought during recruitment or prioritised in initial training programs. Auditors routinely have to engage with various technologies and software, ranging from audit workflow platforms used for audit documentation to analytics applications and client accounting systems and reports. The successful adoption and use of new tools depends on structured support, clear direction, and comprehensive training provided by central functions and firms. In the absence of such support, it may be unrealistic to expect audit teams to independently explore new tools or to possess confidence in their application.

APPROACH TO FOSTERING DATA SKILLS

The approach to support and training is what varies among firms. Many larger firms prioritise the development of general technology and data skills across audit service lines, who are then frequently supported by dedicated data and technology specialist teams. For instance, KPMG have mentioned that they want all audit staff to have at least basic proficiency in data literacy and digital audit skills, to enhance auditors' capabilities in using analytics tools to facilitate data-driven audits. In early 2025, the firm conducted a pilot programme which focused on data literacy, addressing common data challenges and analytics training. This initiative was designed to provide auditors with the essential skills to use data effectively in their audit processes – to understand what can be achieved using analytics and know what the key considerations are.

Following the success of the pilot programme, the firm rolled out this training for all auditors as part of the annual 'KPMG Audit University' training. The training involved detailed hands-on experience of how to manage, analyse, visualise and document the use of advanced data techniques using Microsoft Fabric, allowing all audit staff to build foundational expertise.

Some firms have been looking to take this training further, developing individuals with strong proficiencies in both auditing and technology to address increasingly complex challenges. As seen in our exploration of delivery models, the adoption of citizen-led initiatives has resulted in auditors playing a more prominent role in analytics adoption. At PwC the majority of audit staff have access to Alteryx (subject to completing some foundational training), as well as internally developed tools for effective data management. AI tools to assist with simple data analysis have also been deployed, with all staff members having access to [foundation models](#) from OpenAI, Google and Anthropic to build tools and execute audit tasks – including ChatPwC and Microsoft Copilot and Copilot Studio for building agents. Claude (Anthropic) is being released across PwC as part of a strategic partnership. Teams can choose between these models as relevant to their use case. PwC's 'AI Pod' in the audit line of service embeds 'Forward Deployed Engineers' directly into engagement teams to develop bespoke solutions that accelerate audit execution while increasing focus on risk and quality. This has driven significant uptake of AI in audit teams – marking a shift from AI assistants towards AI 'co-workers.' The approach's success has led to similar pods being established across the business.

PwC focuses on cultivating a digital mindset that accelerates its people's journey to adopt technology, including AI. The firm encourages teams to experiment, and to learn, relearn and unlearn as tools evolve – alleviating the fear of technology and fostering a growth mindset, supported by the gamified Quest platform. Quest provides staff with a structured pathway to explore, adopt, and apply new technologies to their specific audit challenges tailored to their audit, sector, and specific audit areas, while tracking progress via a digital score system. Rather than mandating and 'pushing' specific technologies, PwC empowers teams to identify and 'pull' solutions that best suit their needs. The Quest platform assigns each team a bronze, gold, or diamond rating based on their digital engagement and on how well they have adopted technology in their audits, motivating continuous improvement. Additionally, the firm promotes self-service analytics tools to build employee confidence and a sense of empowerment in using data analytics. Ultimately, these initiatives support staff in building additional skills beyond traditional audit skills, to become digitally literate professionals.

The development and adoption of AI tools is also influencing how firms approach training and upskilling of their audit capabilities. At KPMG, all auditors have access to Microsoft Copilot and Clara AI, the firm's internally developed AI tool, with 95% of audit staff already using these tools regularly in their day-to-day work. KPMG Audit University therefore includes training on the effective and responsible use of AI, helping auditors at all levels build practical capability while reinforcing the digital duty they must understand and take responsibility for when using these tools. To develop this further, KPMG have recruited data scientists and data engineers into audit 'AI squads', a multi-disciplinary group of individuals including auditors, methodology specialists

and technology specialists, to work with engagement teams and central teams to identify how AI can be used to enhance the work they perform. The solutions are then tested and accredited before being deployed further. 'AI squads' have successfully delivered a number of AI solutions that are now in use across the business.

Firms are also partnering and investing in external training providers. Grant Thornton, for example, has partnered with the Data Literacy Academy to roll out a firmwide 'digital mindset programme', called '3D (data-driven digital learning)'. The programme is aimed at all staff, from associates to partners, and is designed to embed data and digital concepts into how people think, work and create value. Through the investment in this programme, the firm aims to build confidence and capability at every level, encouraging audit professionals to think data- and digital-first, and challenge established ways of working.

Some firms have adopted a more discretionary approach to developing technology and analytics skills, ensuring it is available for those who want to upskill, but not mandating it for everyone. At EY, technology training, including on the latest releases, is made available to all professionals with mandatory completion. Additionally, EY offers an optional on-demand learning programme that awards auditors with [EY Badges](#), enabling those interested in technology and analytics to cultivate relevant skills. The firm subsequently provides opportunities for individuals to further engage in this field internally through EY-sponsored Masters programmes, essentially fostering in-house technical specialists. At the end of FY25, one third of badges that had been awarded to EY audit professionals globally were awarded for analytics and data strategy learning.

EY suggests that investment in technology solutions should sit alongside the firm's investment in the skills and capabilities of its professionals. As a result, the firm has also significantly invested in using the capabilities of AI to develop and integrate tools into their audit platform. EY also provides all auditors with access to enterprise-level AI capabilities for use in their day-to-day responsibilities. This is supported by a firmwide AI governance framework, which is available to all auditors and establishes the principles, controls and guidance to encourage responsible use of AI.

At Moore Kingston Smith, the emphasis is placed on enhancing the skillset of the core audit team. Data analytics and technology are integrated into the CPD programme, with the expectation that all staff attain a foundational understanding of the technology they will use. Basic data science training is made accessible to all employees, but with the acknowledgment that interest and proficiency levels may vary among staff. Consequently, the firm aims to maintain balanced teams, comprising of members with expertise in core audit skills as well as those with specialisations and interests in audit technology and data analytics.

NAVIGATING SKILL GAPS THROUGH EXTERNAL SUPPORT

It is important to understand that these enhanced training programmes can be a challenge for firms that do not have the resources or in-house capabilities to develop them. In such instances, some mid-tier and smaller firms often seek assistance and support from external vendors, training providers or membership bodies. Smaller firms have also indicated that they need more help in understanding and identifying what technology and data skills they should be looking for and building in staff. Proficiency

in Microsoft Excel remains important across many firms, particularly for tasks involving smaller clients and datasets, with firms valuing staff who are skilled in data transformation and manipulation using tools in Excel such as Power Query and macros, and an increasing level of interest in Power BI.

In some small to mid-tier firms, where external vendors typically provide ETL capabilities and the delivery of standard sets of testing using general ledger data, the skills emphasis pivots towards the need for audit staff to understand processes, interpret results, and make informed judgments. A key challenge lies in understanding the functions and capabilities of each tool, as well as determining the validity and scope of conclusions drawn from their outputs. Regulators like the FRC, as well as some software vendors, have raised concerns about limitations in consideration of how applicable the 'default' settings of tools are to individual audit engagements, before being applied and used. Over-reliance on standard outputs from tools means that those outputs may not be properly evaluated and followed up on, including documentation around the determination of 'exceptions' and the actions taken to address items flagged, as well as how comfort has been obtained over the wider population. Training must therefore focus on how to use third-party tools effectively and responsibly.

Furthermore, updates to standards such as ISQM 1⁴, which requires firms to establish a quality objective that appropriate technological resources are obtained or developed, implemented, maintained, and used, which may include the use of audit software and data analytics tools, and ISA 315 (Revised 2019)⁵, which requires auditors to understand the audited entity's information-processing systems and identify IT-related risks, have introduced an additional layer of complexity.

⁴ International Standard on Quality Management (ISQM) 1, Quality Management for Firms that Perform Audits or Reviews of Financial Statements, or Other Assurance or Related Services Engagements.

⁵ ISA 315 (Revised 2019): Identifying and Assessing the Risks of Material Misstatement.

Auditors are now required to develop relevant skills to ensure compliance with these evolving standards. The gap in skills is not limited to enhanced IT understanding, as an understanding of analytical procedures and data analytics approaches can improve risk assessments and the capacity to identify and document risks to meet ISA 315⁶ requirements. While larger firms will typically manage ISQM 1⁷ requirements centrally with limited scope for auditors to use tools on engagements that have not been approved at a firmwide level, smaller firms need their auditors to be more aware of the risks relating to technological tools used on specific engagements. In response, some smaller firms have developed internal training programs and monthly workshops to enhance staff expertise, recognising that vendor-provided training typically focuses on operating and using a software rather than its application and interpretation in an audit context.

ADDRESSING THE GAP

The initiatives and examples outlined above illustrate the growing importance of technology and analytics skills in the industry.

While most firms are not requiring or expecting auditors to become data specialists, it is evident that all professionals must possess some skills and knowledge tailored to their respective roles. This expectation extends to all levels of the firm, not just new auditors.

For instance, while auditors are expected to develop proficiency with the technologies they use, partners should have the knowledge necessary to make informed decisions about technology adoption and be able to effectively review the work performed using technological tools.

In discussions with the FRC on skills, they mentioned three key aspects when thinking about technology skills for auditors, with the skills broken down into the following areas.

- When to use the tool - an understanding of how and when to use the tool in particular audits.
- How to use the tool - an understanding of the configuration of a tool.
- How to interpret the results - an understanding of how to read results and the nuances of any anomalies and errors.

Depending on the role and level of the individual, the mix and level of detailed understanding of these three aspects will vary.

ICAEW acknowledges the important role membership bodies play in advancing auditor training and awareness in analytics. Progress has been made in this regard, with Inflo analytics well established in the ACA exam platform for certain modules, and wider data and technology initiatives across the qualification. A growing library of data-related learning opportunities continues to develop for members too.

⁶ISA 315 (Revised 2019): Identifying and Assessing the Risks of Material Misstatement.

⁷International Standard on Quality Management (ISQM) 1, Quality Management for Firms that Perform Audits or Reviews of Financial Statements, or Other Assurance or Related Services Engagements.

BARRIERS TO ADOPTION

Drawing on insights from firms of all sizes, we have gained a comprehensive understanding of how data analytics is being adopted across the audit profession.

Our work has also helped us to identify some of the key barriers firms are facing in this area. Again, there are common themes and challenges faced by firms of all sizes, but there are also distinct issues, and the resulting impact, which are influenced by scale and stage of adoption. Identifying these key challenges is essential as it enables the profession and key stakeholders to consider ways to address and overcome them moving forward.

DATA QUALITY AND ONBOARDING CHALLENGES

A significant majority of firms both large and small still encounter challenges in the first stage of the data analytics process: the acquisition and ingestion of data. There are a number of different reasons for such challenges, which include the following issues.

THE COMPLEXITY AND VARIETY OF CLIENT SYSTEMS

Larger ERP systems used by the largest clients have extremely complex and often heavily customised data structures. Simply knowing what data tables to extract can require deeply technical knowledge. At the other end of the spectrum, smaller clients may use comparatively immature or outdated systems that are not designed to provide data in the way it is needed for modern audits. Firms of all sizes note that their clients are on an extremely wide range of systems and system versions, and it is simply not practical for any firm to have expertise that covers every single system and version.

DATA REQUIREMENTS

Increasingly, audit approaches require more than just general ledger data, and may need subledger information, data from other systems or even data held by third parties such as data from bank accounts or payment platforms. The more data needed, the more complex the 'ask' is to obtain that data. Furthermore, with new technologies like AI, availability of data may change to also include other types of data such as unstructured qualitative data which may add to this challenge but also pose opportunities for the depth of the analysis and insights that can be obtained.

EXPERTISE

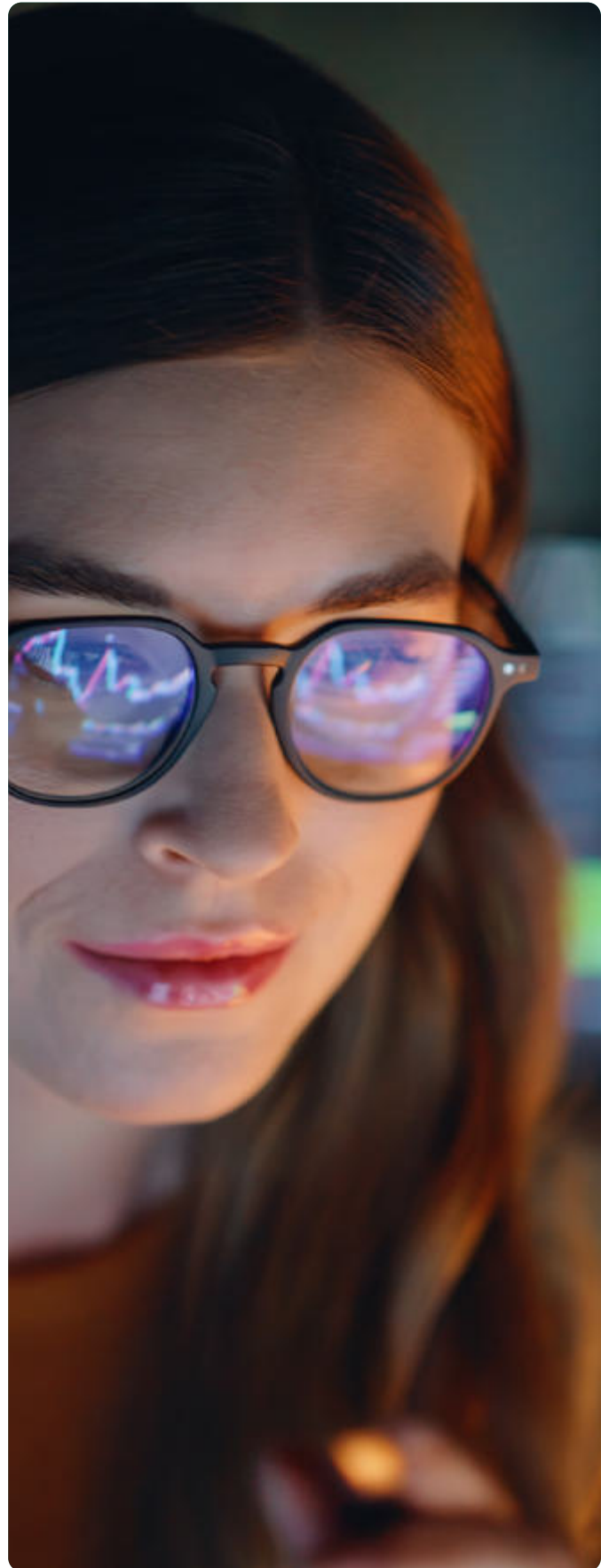
To obtain good quality data requires coordination between the audit team and the client (and sometimes also an [IT MSP](#) or software vendor). Many firms – but especially smaller firms – lack sufficient knowledge of the data structures of GL systems to be able to ask for the right information, but equally, the clients' audit contacts (typically Finance teams) also often lack knowledge to be able to provide this in the most effective way. There can be a reluctance to engage IT teams on both sides due to cost and capacity issues.

ACCESS LIMITATIONS

Clients are often, understandably, reluctant to provide auditors with direct access to their systems to obtain the required data. But again, the clients' finance teams often only have access to run reports in the front-end of the system, which may not include sufficient detail for the auditors to perform their desired tests.

DATA STANDARDISATION

Even once the data has been obtained, it then needs to be ingested into the analytics solution. With data arriving in many different formats, even if from the same version of system, it can be very time consuming for data specialists to get the data into a format where the auditors can actually perform the testing. Most larger firms have developed a standard data model that their analytics solutions use, and platforms like Inflo have adopted a similar approach, but the mapping process from source to data model can be extremely complex and labour-intensive.



DATA RICHNESS AND QUALITY

Often, the quality of the data received can only properly be assessed once it has been fully ingested into the analytics platform. It is at this point that issues with completeness, inconsistencies or missing key values may be identified. It can then become an iterative process to work with the client to resolve issues, which further delays delivery of the actual analytics work. With many clients still providing data manually, data extracts often lack consistency and are prone to human error which, if left unresolved, impact the ability of the audit team to place reliance on any outputs from the analytics process. Furthermore, even once the data is of fundamentally sound quality, issues with 'batch' journals (where a client's systems and processes have posted transactions to the general ledger on a highly aggregated basis) can limit the ability to accurately determine what is happening at a transactional level, which is increasingly important in data analytics approaches.

CHALLENGES FACED BY SMALL AND MID-TIER FIRMS

At the smaller end of the audit market, the sheer variety of client systems in use can make consistent data access and extraction more challenging. Furthermore, some accounting systems used by clients have constraints that impact data extraction, and software vendors of these systems may not readily provide client teams with direct access, which can result in data that does not align with auditors' required format or level of detail. This can be a problem particularly with cloud-based systems but also applies to more legacy desktop-based systems. Mid-tier firms may also be exposed to more complex ERP systems where they do not have sufficient knowledge of the system or resources to access the data. In certain cases, complex client engagements require customised

approaches, which can result in increased workload and resource demands, particularly for mid-tier and smaller firms.

As a result, it is unsurprising that mid-tier and smaller firms often require additional support for data extraction, as they may lack the necessary internal expertise to acquire and load data into their systems. Vendors recognise these challenges faced by firms and have created specialised tools or processes to provide support in this area. For example, Inflo has prioritised data acquisition through a wizard-based workflow that clients and auditors complete together, beginning with the selection of the client's accounting system. The workflow tailors each step according to selections made, provides the client with detailed extraction instructions, scripts or connectors, and once ingested transforms the source data to a common data model. Audit teams are then required to review system generated quality, completeness and accuracy checks, with analytics only available once verification is complete.

While designed to be as self-service as possible, Inflo also provide audit teams access to data specialists to provide ETL support where it is required. This three-way cooperation is identified by Inflo as one of their key features, and also links to their pricing model, which is on a per client, rather than per extraction basis; an unlimited number of data extractions are allowed per client and audit cycle, demonstrating a commitment to supporting audit teams in obtaining high-quality data at regular intervals.

Firms are also exploring dedicated data extraction and standardisation tools. Validis is one such example, which specialises in connecting to and obtaining data from a range of mid-market accounting platforms.

Similar to Inflo, this data goes through a set of quality and validation checks, with the data then made available in a consistent format either through downloading it in the Validis application, or through API connectors, to feed directly into a firm's own analytics solutions. Another prominent example of tools includes those of Circit, which use direct API connections with financial institutions to standardise the process of obtaining structured and verified transactional data.

While some mid-tier to smaller firms have focused on standardising their audit processes by using a single data tool throughout their client portfolio, other firms have adopted hybrid strategies. In this approach, firms may use a range of tools tailored to individual clients, noting that certain tools may not be suitable in all instances. For example, when working with smaller clients using systems like Sage 50 and QuickBooks, Saffery has developed Excel templates incorporating Power Query to automate the transformation of standard data reports from these systems into usable formats, and into a Saffery data model for use in its analytics tools.

However, even with specialised tools, logistical issues can make this process more challenging. Several firms have reported challenges stemming from the late integration of data extraction and transformation tools in their audit process. As a result, audit timelines are delayed while client teams, unfamiliar with the underlying systems and databases, refer audit requests to their IT departments. Consequently, the required data may only be available weeks after proposed audit sign-off deadlines.

Firms also emphasise the importance of recognising that the data acquisition and transformation process is a collaborative process involving the audit firm, the client and vendors on both the client and audit side. Therefore, it is essential to engage

proactively and early with clients, ensuring they are informed and included throughout the entire process. When detailed data access is required, clients may express concerns regarding the security of third-party connections to their systems and the nature of the data being accessed. Additionally, clients often lack comprehensive awareness of how their systems are interconnected, which can complicate the audit team's understanding of data processes. Working with smaller clients can present further challenges due to limited training, controls, and technical expertise. Currently, there is no standardised method for clients to provide requested data to auditors, with the process and format in which the data is provided often determined by each client. Further complexity arises from the absence of requirements regarding how finance software providers give auditors access to data from their systems, leading to a substantial variation in the format of the data available. Consequently, client education and buy-in remains critical with firms noting that a key takeaway from these experiences is the need for a more structured and managed approach to the overall process.

Lastly, it is also important to note that challenges faced by smaller to mid-tier firms in extracting data and working with data has broader consequences on their overall audit approach. Circit suggested that they have noticed this in the use of their API for open banking. Larger firms with more advanced and higher-quality data structures in place are shifting towards using bank data throughout the audit cycle including in planning and assessing going concern. The majority of smaller and mid-tier firms, however, who are still in early stages of developing this, often focus on reducing sample sizes or simply streamlining the traditional bank confirmation process, rather than using transactional bank data to enhance testing in higher-risk areas like revenue.

CHALLENGES FACED BY LARGER FIRMS

Larger firms often possess greater resources to address these challenges but require these resources due to greater levels of complexity. Many large firms now have 'data acquisition' teams, focusing on helping teams get good quality data at the first attempt. PwC has developed an Acquisition Suite, the platform that supports the integration of all data services and the end-to-end data journey into PwC's audit solutions. Integrated into the document request (Connect) and audit workflow (Aura) platforms, it provides a seamless ETL experience for clients – reducing extract-and-load effort while creating integration work with PwC's solutions.

PwC also offers secure integration between a client's data platform and PwC's own environment. This provides an opportunity to leverage the client's existing investment in their data estate, while addressing the cost and implementation challenges of deploying dedicated data solutions. Processing data closer to the source minimises transfer challenges (inconsistencies in access and format) and supports a repeatable process that can accelerate continuous auditing.

Other large firms encounter similar challenges. EY has observed that many companies they audit increasingly expect audit teams to deliver broader business insights and perspectives derived from audit analytics. Data quality can remain a challenge where companies struggle to provide data that meets the standards required for robust analysis. EY has invested significantly in data extraction technology and established data extraction guidance for audited entities, which has enabled successful extraction and use of data in many engagements, including the use of techniques such as batch breaking. Data issues do not solely arise from

companies' extraction methods; in some cases, they are driven by inherent limitations in the richness or structure of data available within company systems. To mitigate these risks, EY promotes early discussions on data requirements during the audit planning phase, allowing feedback to inform and improve subsequent data extractions at year end. Additionally, performing analytics at the interim stage helps to validate data completeness and quality, identify gaps early, and work collaboratively with companies to address issues in advance, supporting more effective analytics and insight delivery.

Beyond data extraction, similar approaches are used by firms to address issues related to data quality and transformation. Batched and unstructured data from client systems is a common problem. To address these issues, Grant Thornton has developed an internal app store that offers audit teams self-service applications and tools designed to support audit processes. The firm collaborates with various vendors, for example employing Inflo for data extraction. One in-house built tool specifically addresses batched data, enabling auditors to split and resolve issues with batches as needed. This approach applies to most audits, and a team of developers and data specialists provides additional support for more complex client data and systems, managing bespoke analytics, extraction and transformation work as required.

LOOKING AHEAD

Although firms are actively pursuing innovative solutions to these challenges, many report having to manage a multitude of different systems and data formats. This leads to a lack of standardisation and consistency in general ledger data, creating a barrier that demands substantial planning time and resource allocation. Various initiatives have sought to address this issue, with mixed results. Engine B, previously a UK-based organisation, had advocated for audit data standardisation through its open-sourced Common Data Model. Similarly, other jurisdictions such as the US have proposed the use of standard data models, though widespread adoption remains limited. On the other hand, Sweden has successfully developed the [SIE file format](#) – an open standard for transferring accounting data which is supported by most accounting platforms used in the country. Consequently, some firms in the UK are turning to standard-setting bodies and regulators, asking whether the introduction of mandatory standards in data formats could be an effective solution.

Many firms have also noted that the lack of any enforced standards in the formatting of accounting data means clients with outdated or legacy systems lack motivation or incentive to transition to updated systems or provide the quality of data needed for sophisticated analytics. As a result, the responsibility falls on the auditor to work within the limitations of these systems and the data they are given. Not knowing in advance the standard of data they will receive, or only being able to obtain poor quality data lacking in detail, further adds to the lack of confidence individuals and firms have in relying heavily on data analytics procedures.

Although acquiring quality data continues to be a significant challenge, discussions with firms and vendors reveal a strong commitment to overcoming these difficulties, and as a result we have observed notable innovation in this field. More generally, this is important because extracting, preparing and transforming quality data is a necessary step for using advanced data analytics that uses AI, which many firms and vendors are aspiring to work towards, or they are already working on building these capabilities.

Recently, AI itself is increasingly being used to enable this innovation, as AI-tools can now be used to support data mapping and quality checking and extraction processes, when presented with data dictionaries and sufficient information about the client's systems.

Indeed, [many companies](#) want their auditors to use new technologies, like AI, to gather data, for data analysis and in turn value-added insights.

Our research revealed that across all firm sizes, access to specialist support and skills, whether through user-friendly self-service tools, third-party solutions or dedicated expert teams, is crucial to address the challenge of obtaining and extracting quality data from client systems.

Our findings also highlight that beyond using specialist tools and teams, firms should prioritise audit planning and consider their approach to working with client teams. Firms may find it useful to identify the required data earlier in the audit planning process and allocate sufficient time to understand the client's systems and available data. As a result, it is also important to take clients on the analytics journey by ensuring they understand the relevance of quality data to the audit process and are aware of expectations and requirements, not only for insights but also for a timely audit process.

Furthermore, while auditors and accounting professionals are not expected to be data specialists, it is essential that they understand data extraction processes and possess the ability to assess the reliability and quality of data, as well as to be confident enough to have conversations with clients about this. As more business models increasingly depend on and generate vast amounts of data, proficiency in these areas may become a critical competency for both audit and finance functions in the future. This may also influence professional bodies and future qualifications for accountants.

Ultimately, it comes back to the question of whether standards defining data formats and quality could be an effective solution. Data continues to play an integral part in the audit process but the lack of clarity and guidance from standard setters has left the firms and the profession responsible for navigating these challenges. As there is an absence of explicit guidance, there is an opportunity for standard setters to clarify how effective data acquisition and processing can be achieved, before it is used and relied upon as part of the audit procedures.

ALIGNMENT OF METHODOLOGY, CAPABILITY AND PLATFORMS

When performing data analytics on an audit, it is important that the work being performed through the tool or solution being used fits into the firm's audit methodology and workflow. This alignment helps firms and auditors understand how the analytic procedures they are performing contribute to their overall audit approach. When multiple, uncoordinated analytic tools are used and the methodology does not encompass all approaches, justifying and using analytics becomes a challenge. This lack of alignment has also led some firms to misinterpret analytics, treating outputs as conclusive evidence rather than as prompts for further investigation. Consequently, it is no surprise that firms demonstrate greater confidence in adopting analytics when solutions are fully aligned with their audit approach and methodology, and when the staff and partners have sufficient understanding of the data analytics tools, and the outputs, to articulate how they meet the audit requirements.

PERSPECTIVES FROM LARGER FIRMS

Larger firms, in particular, possess the resources to develop and integrate analytics within their own methodologies, allowing them to rely on internally established processes. Although some ambiguity and a lack of clarity in current standards persist, these firms are leading the way in innovative audit techniques; for instance, most of the Big 4 have expanded their use of analytics beyond journal entries to using other data across a range of audit risks, and into the planning and reporting phases of the audit.

KPMG, for example, has broadened its application of analytics, incorporating it into the risk assessment phase through to evaluating controls and substantive testing. The firm notes that certain data analytics tools and techniques align well with traditional audit practices. For instance, a typical statistical sampling-based procedure can be substituted by using a tool capable of matching transactions. This technique can be incorporated into substantive procedures, while also complying with the standards. However, when employing such methods, it is essential to embed the performance of sufficient procedures to verify the completeness and accuracy of the underlying data used in the procedure.

Key to supporting the adoption of analytics at KPMG has been the use of a central 'clearing house' for any new tool or technique. This evaluation process gives the methodology team a chance to review and approve requests before they are implemented, providing assurance to teams that any new procedures will align to established standards and will provide appropriate audit evidence. This has built trust and minimised reluctance among audit teams to embrace analytics, while also ensuring the firm has a centrally managed library of approved analytics-related procedures, supporting consistency.

Instead, the primary challenge lies with innovation and central-level development, especially where bespoke and more advanced analytics are required for a specific audit engagement.

More effort is then required from expert teams to establish the link between approach, audit risk and methodology, and clarify how a tool or technique being used in a complex engagement provides sufficient audit evidence and aligns with standards.

Grant Thornton is another large firm that uses internally developed audit methodology. The firm has emphasised the importance of working with its audit professional standards team to support the adoption of tools and compliance with relevant standards. Where they use third party data tools, the firm has developed methodology wrappers that directly address the nuances associated with the tools' implementation. An example of this is the firm's adoption of Inflo's 'Revenue Cascade' module. With the methodology wrapper in place, a training initiative was launched, technical teams were upskilled to provide appropriate support to auditors, and a consultation process was established to provide tailored support and guidance to build confidence in the tool's application. Over time, as the tool has become embedded in the approach on audits, the firm has been able to scale back the consultation approach to be more focused on areas of greater risk.

methodologies with each tool and its outputs requires significant effort and documentation, especially in the context of current audit standards that have not anticipated the current level of technological sophistication. This can diminish the advantages of using analytical tools over traditional methods. For example, some firms have encountered instances where digital solutions have demanded considerable extra work to ensure mapping to methodology, leading their audit teams to question whether the evidence provided by these tools justified the resources invested compared to existing approaches. Further complexity is added when larger, more complex audits require a personalised approach. Indeed, firms have noted that audit teams are more likely to embrace and implement digital solutions when the associated improvements in efficiency and audit quality are clearly demonstrated and understood. Many audit firms continue to work on this by ensuring that all methodology developments undergo review by their audit professional standards teams to confirm their alignment with established standards.

Firms in the industry have further benefited from sharing ideas and exploring what other firms are doing, through sessions hosted by ICAEW or at conferences and events aimed at auditors, FRC's Technology Working Group or good practice examples across firms outlined by FRC in their Audit Quality Reviews. This level of sharing builds confidence that the majority of firms are using tools and applying methodology in a similar way.

Despite the progress made by many firms in developing their own methodology wrappers for analytical tools, some firms have also identified challenges. Although most firms would like tools to be self-service with integrated methodology, aligning

MID-TIER AND SMALLER FIRM VIEWS

In contrast, mid-tier and smaller firms typically rely on off-the-shelf methodologies from external providers, as well as leaning heavily on technology vendors for support. Given the challenges noted by larger firms even when using their own methodologies, it is unsurprising that these smaller firms typically encounter significant obstacles in adoption of data analytics. While a variety of tools are available, many lack integration with some of the most popular methodology providers. This means firms hesitate to invest further and rely on analytics. Accordingly, many of these firms have adopted a cautious 'wait and see' strategy regarding future developments.

The majority of mid-tier and smaller firms agree that fit-for-purpose methodology, integrated with the tool, is essential not only for a scalable solution, but also for maintaining high audit quality. Nonetheless, many encounter difficulties in this space. For example, Azets has noted that such methodologies are often lacking when they seek to implement or adopt new tools. While these methodologies align with established standards, they rarely account for the specific tools that will be employed, making it challenging to provide highly prescriptive guidance. Other firms also noted that in some methodology and audit workflow platforms, in recording the intention to use data analytics on an engagement, the number of additional documentation steps substantially increased, leading many to question the value and efficiency of such an approach.

Some firms, such as Azets, are moving towards a hybrid approach that combines off-the-shelf methodologies with a tailored workpapers solution, to complement their chosen analytics tools. For example, Azets have recently developed guidance and

supplemental attachments to bridge ISA requirements with the functionality of Inflo's Detect module, which is commonly used for journals testing. This guidance aims to clarify how the outputs from this module should be interpreted, how they contribute to risk identification and audit evidence, and how teams should document their responses in accordance with the firm's methodology. The firm aims to expand this approach for other tools, including Inflo's Revenue Cascade.

Meanwhile, other firms are considering external options like the adoption of Inflo 'Working Papers', which provides an integrated methodology designed to better align with their tools and solutions, and an approach that enables better cohesion in a firm's audit technology ecosystem. It was noted by several firms that while this solution would support a broad range of typical engagements, some engagements require additional firm-specific tailoring or supplementary procedures due to the breadth of scenarios and business types encountered. This situation will continue to evolve over time, however, challenges persist as externally developed methodologies are ultimately unable to address all possible scenarios in the context of a particular firm, whether from a technological or audit approach standpoint.

Many firms, including Kreston Reeves, have made it a blanket principle to involve audit methodology specialists early in the process when scoping out external audit analytics software providers. While vendors may offer innovative solutions capable of performing audit tests, these products have limited value and are unlikely to be widely adopted if they cannot demonstrably align with the firm's methodology, a view that was echoed by several firms.

It has been observed in the industry that some accounting firms may adopt a methodology and adhere to it strictly. The rationale is that following an established methodology is perceived as reducing the risk of penalty or scrutiny if an audit encounters issues. That being said, there is a clear correlation between a firm's willingness to adapt and tailor an off-the-shelf methodology, and that firm's adoption of data analytics. While this potentially reflects a firm's appetite for innovation, it also highlights the vital role that methodology providers need to play in encouraging greater adoption of analytics.

A FOCUS ON COLLABORATION

In recognition of this, some methodology providers are proactively advancing the integration of data analytics into wider aspects of the audit process beyond journal testing. For instance, although Mercia's previous methodology primarily concentrated on journal testing, updated methodology that was released in July 2025 provides additional support for firms

using Audit Data Analytics (ADA) in their audit work, and an expansion of the tests provided in the audit programmes to include examples incorporating ADA. While the updated methodology explores further areas, Mercia recognises the complexity of their user base which ranges from small to large mid-tier firms, from digital first to still maintaining paper files, as well as the range of tools being used by their user base. While technology is a constant on their roadmap, the provider is taking a dynamic approach to identify where support might be needed in the future, and how to minimise the burden of documentation when using technological tools.

Interest from technology vendors in this field is also growing – as gaps related to methodology and integration are identified, solutions are starting to appear. Caseware, for example, has developed embedded analytical solutions with the aim to strengthen the connection between analytics and the audit workflow platform, which they hope will in turn deliver benefits from a methodology perspective, while also allowing firms to customise their approaches as needed.

Collaborations between providers are also starting to gain traction. Methodology providers such as Mercia and Croner who have had long-standing partnerships with software vendors such as Caseware, are broadening collaborations with other vendors such as Inflo, Wolters Kluwer and MyWorkpapers, in efforts to embed and integrate methodology into various tools; Validis has partnered with Thomson Reuters and Circit to integrate its data extraction capabilities. There is a growing willingness to listen to users to understand where additional support is needed.

For example, after working with Circit to understand the technology and how it fits into the audit process, Mercia's updated methodology has also introduced new ADA audit plans that support a bank confirmation process using API feeds such as those offered by Circit, or other versions that can be adapted to any analytics tool. Mercia has also worked with Inflo to develop a tailored 'digital-first' methodology that is embedded in the Inflo platform and designed to promote the use of available tools. Although Mercia ultimately maintain a tool-agnostic approach, such collaborations help define problems that are addressed by specific solutions and ensure those solutions can be developed with a clear purpose and align with a firm's audit methodology.

From a vendor perspective, integration into methodology is warmly welcomed as it gives firms confidence during adoption and can help avoid common pitfalls of initial implementation. Vendors believe that firms leveraging such integrations are seeing measurable improvements in quality, efficiency and insights, helping to prove the ROI for adoption of data analytics platforms. A thorough technical review of the application of the tool can also encourage firms to maximise the use of the tool's capabilities. For Circit, embedding the tool into methodologies also aligns with the vendor's objectives of assisting firms in standardising procedures and ensuring usage aligns with or exceeds expectations. From Circit's perspective, this can often accelerate additional firm or engagement-specific projects that are linked to or require structured bank transactional data.

Vendors also acknowledge the challenges faced where methodology does not fully align with analytics tools. For instance, MindBridge has observed that many smaller firms are still early in their advanced analytics journey, with journal testing often serving as the initial entry point before expanding into

wider risk assessment, substantive analytics, and other auditing use cases. The software vendor noted that while some firms are exploring how analytics outputs can support areas, such as sampling and risk assessment, adoption can become more challenging when firms rely on external methodology providers to evolve audit workflows and approaches. This highlights the need for continued collaboration between firms, methodology providers, regulators, and technology vendors to modernise audit methodologies for advanced analytics-enabled approaches.

Furthermore, the vendor notes that as firms build analytics maturity, training and methodology alignment remain critical to ensure outputs are interpreted consistently and effectively to reinforce auditor judgement throughout the analytical process, including threshold calibration, interpretation of outputs, and evaluation of results in the audit context.

It is worth noting that methodology providers, like any third-party solution provider, are driven by demand from their customers. Croner, who primarily serve small and mid-tier firms, currently refer to analytics in their methodology, but have noted relatively low demand for such content from their customer base, as well as a lack of guidance from standard-setters around how simple analytics could be adopted by auditors. As noted by firms that are developing their own methodology to support analytics, such projects require significant investment. Croner are looking to the future, including investing in AI technology, to develop methodologies that work for the SME client base without significant cost barriers.

ADDRESSING THE FEAR OF REGULATORY SCRUTINY

Furthermore, the fear of regulatory scrutiny contributes to hesitancy in many firms in adopting analytics. Our conversations have highlighted where methodology providers can help with this. As an example, Mercia ran a pilot programme where firms that had implemented analytics for the first time were invited for a hot file review. The review included an evaluation of the planning phase, fieldwork and conclusions, with feedback provided. This proactive simulation of regulatory review can boost confidence in a newly implemented audit approach. The file review service is now offered more widely to firms who can choose to have a review that is focused primarily on technological tools. Similarly, the FRC and ICAEW's QAD have also demonstrated openness to being contacted by firms who want to discuss conceptual approaches and analytical procedures they are seeking to adopt, noting that methodologies and approaches will never be formally 'pre-approved'.

Despite the advancements in this area, methodology providers also receive comments on a lack of guidance in the standards. Providers recognise that standard-setters also face challenges in adapting standards for the changing technology landscape in audit, and are therefore focused on supporting their users and developing approaches which encourage the use of technology that maintain audit quality without introducing unnecessary testing and documentation burdens.



ARE AUDITING STANDARDS DRIVING UNCERTAINTY?

While firms express interest in expanding the use of analytics, some remain cautious due to a fear of regulatory scrutiny and penalties from deploying analytics inappropriately or incorrectly. With firms still lacking clarity in terms of when or how to use data analytics, particularly beyond the common journal testing use case, the approach taken in some cases is risk-averse. Firms fall back on tried and tested methods, even when analytical tools are available.

As many small and mid-tier firms have fewer opportunities to engage with the regulators and standard setters directly to explore new approaches in detail, hesitancy is widespread for fear of getting it wrong, despite efforts from regulators to engage with firms in this area. In our conversations with small and mid-tier firms, many cited situations where analytics tools are available but reliance is not placed on them, defaulting to traditional substantive testing approaches either at the expense of using analytics at all, or in some cases performing procedures alongside the use of analytics, effectively duplicating effort with almost no benefit.

For example, Gilberts Chartered Accountants, noted that possessing the skills and knowledge to understand how analytical tools work does not always translate into confident application. Determining when analytics provide sufficient audit evidence to justify reducing sample sizes is particularly problematic. To demonstrate this further, the firm shared an example of heat maps identifying outliers and unusual patterns. Ideally, after the initial analysis, outliers should be investigated through additional substantive testing to permit reliance on analytics to support audit conclusions.

However, audit teams have often not relied on that initial analysis to make judgments. Gilberts is instead evaluating the use of data analytics on an individual engagement basis.

Other firms facing the same challenges opt for low to moderate levels of reliance on analytics, while in some firms, any judgement regarding the extent of reliance on data analytics requires senior-level approval before proceeding with testing. Most firms point to an absence of clear guidance and real-world end-to-end examples demonstrating industry practices as contributing to them being cautious. This lack of open dialogue between small to mid-tier firms and regulators on how data analytics can be relied upon throughout the audit means that for most firms, adoption is largely limited to journals testing.

While larger firms may have more direct engagement with regulators and standard setters, they are also hesitant. Larger firms are generally able to develop approaches using analytics and articulate their rationale clearly, confident that they comply with auditing standards but there are limitations. There are examples of larger firms being reluctant to adopt innovative analytics solutions, particularly those involving AI, fearing that they might not withstand regulatory scrutiny. The initial excitement around the use of analytics has often subsided in the face of demanding documentation requirements, designed to minimise regulatory push back. This makes analytics-led approaches less appealing to audit teams.

CATEGORISING PROCEDURES

When interviewed, KPMG noted that introducing innovative approaches into the audit is where challenges with standards and regulation often arise. While this challenge is not limited to a specific tool or technology, in certain cases analytics procedures do not always clearly align with existing categories of audit procedures. The type of testing can combine risk assessment, analytical procedures, substantive analytical procedures, and test of details, making it difficult to match with current standards. While the standards do not prohibit the use of certain tools and remain non-prescriptive, firms must develop their own interpretations for integrating these practices. In such cases, the firm has to work with internal technology and methodology teams and may engage with external standard setters and regulators, to develop and pilot any new technology solution before it can be used.

Other firms express similar concerns about the categorisation of procedures, noting that it often does not neatly fit into the existing categories used in auditing standards. Firms using commercially available data analytics solutions also note that with the advanced capabilities on offer, it is not always easy to categorise the procedures performed within auditing standards. Specifically, whether the procedures can be categorised as analytical procedures, substantive analytical procedures or tests of detail remains unclear.

This ambiguity complicates the application of such tools in audit and makes it challenging to precisely define the type of evidence or assurance they provide. There is a sense among many firms that rather than being truly outcomes-led, the current wording of the standards expects any individual audit test to fall into only one category, even if that is not strictly the case. It is still difficult to engage the full potential of analytics effectively in audit.

Firms believe that new and advanced forms of analytics can transform how audits are performed by performing different types of procedures (such as tests of controls and substantive procedures) concurrently. This is permitted by auditing standards but in practice there is a lack of explicit acknowledgement from audit regulators, resulting in the unnecessary repetition of procedures.

ASSESSING THE RISKS ASSOCIATED WITH DATA ANALYTICS AND AI TOOLS

Technology vendors have also observed challenges in how audit firms engage with their tools. For example, although MindBridge's AI-based platform provides various options for analytics, most auditors and firms tend to concentrate on a sub-set of the available services where they are familiar with existing practices. Vendors also note that evolving standards and guidance can contribute to ongoing implementation challenges. When interviewed, MindBridge acknowledged the progress made by the FRC's recently [published AI guidance](#), but noted that practitioners would continue to benefit from extended guidance on the varying risk levels associated with different types of AI. Without this granularity, compliance with ISQM 1⁸, which requires that auditors evaluate the audit software and tools used, remains especially demanding for smaller firms that may not have the resources or expertise to assess and document those risks with confidence.

⁸ International Standard on Quality Management (ISQM) 1, Quality Management for Firms that Perform Audits or Reviews of Financial Statements, or Other Assurance or Related Services Engagements.

The FRC recently published guidance, referenced above, focused on the risks associated with the use of Gen AI and Agentic AI systems in audit. While this does not cover all uses of AI – in particular machine learning, which is perhaps more relevant to the use of data analytics – the guidance and illustrative examples are a start in supporting practitioners with assessing risks associated with this technology.

Furthermore, changes reflected in ISA 315 (Revised 2019)⁹ and ISA 240 (Revised)¹⁰ mean that standard setters are pushing for more thorough risk assessments. MindBridge noted that advanced data analytics may play an increasingly important role in supporting these requirements, particularly for more complex engagements. In response, the vendor has adopted a ‘glass box’ approach intended to help users build a clear understanding of the tool and its outputs. More broadly, this reflects the importance of explainability and transparency in AI systems used in assurance contexts. MindBridge added that, while regulators in the UK have shown encouraging support for innovation in this area, additional illustrative examples of good practice could further support firms, methodology providers, vendors and regulators in developing a shared understanding of effective implementation.

Despite the fear of potential regulatory scrutiny among firms, the sentiment from regulators and standard setters is that there are currently few, if any, cases of analytics being used when they should not be.

Rather, any challenges they identify are more about how the analytics have been deployed and the evaluation of the results in terms of how much assurance can be obtained from analytics. Most problems arise in the assessment of ‘exceptions’, and the procedures performed in addition to the analytics to provide comfort. Notably, these are not new issues, with the FRC publishing guidance on how to address [exceptions in 2021](#).

DEFINING, DOCUMENTING AND EVALUATING DATA

When interviewed, the FRC suggested that audit teams may need to document the process of clearly defining the data they’re using, explaining why it is suitable, and identifying its source. This allows audit teams to effectively determine the necessary procedures to verify both the completeness and accuracy of the datasets, whether obtained from the entity or extracted by the team themselves. For example, if analytical procedures are performed directly on specific financial statement balances sourced from the general ledger, the analysis itself may provide assurance regarding data integrity. In such cases, assessing the accuracy and completeness of the dataset may be more straightforward. Conversely, if data is extracted from elsewhere, such as a point-of-sale system, more extensive testing may be required to ensure both the completeness and accuracy of the data subjected to analytics. Any data analytics specialists involved in the process will also need to ensure the entire dataset has been properly uploaded into any tool they’re using. Audit teams are generally expected to document the details of the process in the audit file, demonstrating the team’s understanding of the data’s origins, its sources, and confirming that it was correctly uploaded into the analytical tool. Again, this is nothing new, as the need to demonstrate the integrity of extracted data was identified by the FRC in a [report from 2020](#). It may be, however, that these concepts need to be continuously reiterated as more firms look to adopt advanced data analytics for the first time.

⁹ ISA 315 (Revised 2019): Identifying and Assessing the Risks of Material Misstatement.

¹⁰ ISA 240 (Revised), The Auditor’s Responsibilities Relating to Fraud in an Audit of Financial Statements.

PAVING THE WAY FOR INNOVATION

When interviewed, regulators such as the FRC are seeing some firms scale back on the number of tools being used. There are many reasons for this, including firms navigating towards a more integrated technology stack and a standardised, consistent approach across their audit portfolios. Standard setters and regulators recognise that the increasing use of third-party tools that firms do not directly control can make compliance with ISQM 1¹¹ much more complex. ISQM 1¹¹, which was effective from the end of 2022, requires the evaluation of the appropriateness of technological resources, including audit software and data analytics tools, being used by the firm. Many firms that use AI-based tools and solutions do so by developing their own applications on licensed foundation models rather than developing these models independently. The technology is then applied in different ways specific to individual engagements, resulting in added complexity when assessing the appropriateness of different tools used on audits engagements in line with the firm's quality objectives as informed by ISQM 1¹¹, as different teams or parties manage various elements.

Firms are realising that expecting teams to experiment independently with data analytics tools and technologies, without sufficient support from central functions, may have been overly optimistic. When a firm has central teams available to provide comprehensive support, including guidance on what tools to use, how to use them, when to use them and how to apply methodologies and standards to them, audit teams are more likely to adopt those tools. For firms with limited central resources, this approach is only practical if it involves a smaller set of tools, with broader use cases and a greater focus on training and fully embedding them in the audit approach.

Despite the challenges, regulators and standard setters are keen to encourage innovation and greater use of data analytics, without mandating specific testing methods that might impact the accessibility and longevity of the standards. The emphasis is on ensuring the standards remain proportionate, flexible and adaptable in the context of a rapidly evolving technology landscape, recognising that the use of data analytics tools depends on the quality of data available. Standard setters such as the IAASB are interested in enhancing technology-related terminology in the standards, with an emphasis on broader technology concepts rather than current market-specific terms, while clarifying the support for technology adoption and innovation through additional guidance. For example, the IAASB noted that the term "automated tools and techniques" currently used in application material and non-authoritative guidance of the IAASB may require further clarification to ensure understanding and application. There are proposals for IAASB to clarify in definitions that technological resources that are used directly by engagement teams may serve multiple purposes in planning and performing engagements and that this includes technological tools that facilitate the design or performance of engagement procedures in obtaining evidence.

The IAASB is also exploring how different technological tools and resources might serve a multi-purpose approach to performing audit procedures – a challenge that many firms have cited. In response to this, the IAASB emphasised a continued focus on principle-based requirements and are proposing to broaden definitions, use application material to clarify terminology and principles, and issue non-authoritative materials to address how technology can be used to obtain sufficient appropriate evidence in multiple ways.

¹¹ International Standard on Quality Management (ISQM) 1, Quality Management for Firms that Perform Audits or Reviews of Financial Statements, or Other Assurance or Related Services Engagements.

There are also [proposals](#) in the IAASB's major Audit Evidence, Risk and Response project to revise the wording of standards that describe audit procedures in ways that open the door to more innovative types of audit testing.

A significant challenge identified in the 2016 publication and yet to be resolved, lies in whether data analytics align with existing conceptual frameworks or require new ones. Data analytics can both enhance current procedures, by improving targeted, automated sample selection and testing using tools such as DataSnipper, and act as more radical alternatives to traditional processes, such as revenue transaction flow analytics. The way analytics are described may shift based on their context and use, but what remains important, and what standard setters such as IAASB are keen to emphasise, is the intended purpose of an audit procedure, including when a technological tool is used, when deciding where it fits.

Technology agnostic standards are also giving way to a more proactive approach that supports and encourages adoption. To clarify this transition, the IAASB is providing direction through standard setting as well as developing non-authoritative materials that are grounded in the standards. These materials may cover practical guidance on how to apply the standards, with clearer expectations especially regarding tool onboarding and certification, ongoing monitoring, acceptable use, documentation, and accountability, with the aim of helping to ensure implementation is consistent and proportionate. While largely focused on quality management of emerging technologies like generative AI, the concepts will be no less applicable to more programmatic data analytics.

There is a strong interest among firms for guidance from the IAASB and FRC, especially regarding how quality management standards apply to new technologies. There has been some progress on this already, with [FRC publishing guidance](#) for audit firms on the use of generative and agentic AI tools in audit engagements. Guidance also needs to be scalable, since not all firms have dedicated technologists or built-in infrastructure, with many smaller firms depending solely on third parties or off-the-shelf software platforms with little to no customisation at the infrastructure level. In recognition of this, firms highlighted the need for approaches that allow smaller and mid-tier firms to comply with auditing standards without having to build the extensive infrastructure seen in larger firms. Furthermore, standard-setters as well as methodology providers and vendors should consider the burden of evaluation and documentation requirements on smaller to mid-tier firms and consider how this can be reduced and supported to enable focus on how the platforms integrate into the audit approach.

LOOKING AHEAD

Our observations of the current landscape and our exploration of the key barriers to the broader adoption of data analytics, highlights implications for all stakeholders. Our findings identify the challenges firms face while recognising the constraints faced by methodology providers, regulators, standard setters, software vendors and professional bodies. These barriers need to be addressed collaboratively. All stakeholders have a role to play in enhancing the use of data analytics by firms of all sizes.

Firstly, **firms** stand to gain by investing in upskilling their workforce, in tools, and by making bolder decisions about when to use analytics. Investment in upskilling includes not only training on the technical aspects of analytics but also encouraging a more confident and proactive approach in deciding when and how to apply analytics. Firms should take comfort in the fact that regulators and standard setters recognise their ability to make sound judgements about the use of analytics. Moreover, both regulators and standard setters support innovation and the broader adoption of analytics, and are seeking to create an environment in which firms can experiment and develop their audit practices without undue hesitation or fear of regulatory sanction.

For **methodology providers**, there is a clear need to develop work plans and guidance materials that facilitate and encourage the use of analytics. This includes streamlining procedures and making them more adaptable to a broad range of audits. In essence, methodology providers need to reflect on how the introduction of testing that uses data analytics can eliminate the need for other types of testing, so that data analytics is not simply layered on top of the existing audit approach. By prioritising the support and integration of analytics, methodology providers can help ensure that auditors are equipped with tools that promote efficiency, rigour and consistency in the application of data analytics across engagements.

Audit regulators and auditing standard setters, such as the FRC, IAASB, ICAEW's own QAD and other professional bodies play a crucial role in supporting wider analytics adoption. They can help clarify expectations and foster confidence among practitioners by providing clearer guidance on how current auditing standards accommodate the use of analytics and sharing detailed examples of best practice. Furthermore, principles-based requirements and clear definitions within auditing standards will help ensure that auditors can adapt to new technologies and methodologies as they emerge.

Software providers should engage meaningfully with other stakeholders to ensure that their solutions are fit for purpose. This includes aligning their products with current, widely used methodologies, audit frameworks and auditing standards, providing means for integration with other platforms, and responding to the specific needs of auditors. By maintaining open dialogue with regulators, methodology providers and firms, software vendors can facilitate the development of tools that are both practical and compliant, supporting the broader adoption of analytics, ease of use and interoperability.

Finally, **professional bodies**, including ICAEW, are uniquely positioned to act as conveners for the audit profession. With their central role and strong relationships with all stakeholder groups, professional bodies can help provide a safe space to foster collaboration.

DEFINITIONS

API: API stands for Application Programming Interface, which is a set of protocols that enables software applications to communicate with each other.

Data warehouses: Data warehouses are central repositories of data integrated from various sources, designed to enable and support querying and analysis.

Django: Django is a Python framework, providing built-in tools for routing, database management, user authentication, and security. Django makes it easier to create web sites using Python.

ERPs: ERP stands for Enterprise Resource Planning which is often used to describe a business management software tool that brings core business functions into a single system.

Extract-Transform-Load (ETL): Extract-Transform-Load (ETL) is a data integration process that refers to the extraction of data from multiple sources, transformation into a usable format and structure, and the loading of the data from multiple sources into a data warehouse or other unified data repository.

Foundation models: Foundation models are artificial intelligence (AI) models trained on vast datasets and are capable of performing a broad range of tasks.

IT MSP: IT MSP stands for IT Managed Services Provider. It refers to an outsourced third-party company that manages, monitors, and supports an organisation's technology. Rather than relying on an internal team, organisations pay a subscription fee for an MSP to manage their networks, cloud infrastructure, cybersecurity, and help-desk support.

Java: Java is a widely-used programming language for coding web applications.

Low-code: Low-code software allows users to develop applications or perform tasks with visual and more user-friendly interfaces and templates with minimal coding required.

Macros: Macros are a sequence of actions or commands that are recorded to execute a complex or repetitive task with a single click or keyboard shortcut. These are commonly used in Excel and spreadsheets to automate tasks.

Microsoft Azure: Azure is Microsoft's cloud computing platform, providing businesses with AI and cloud services that can be used to build, run and manage applications across the cloud environment.

Microsoft Fabric: Microsoft Fabric is a unified, cloud-based data and analytics platform delivered as software as a service (SaaS) for enterprise use. It provides end-to-end capabilities, from data ingestion to visualisation, while integrating components from Microsoft Azure and other services to create a seamless user experience.

Microsoft Foundry: Microsoft Foundry unifies AI agents, models, and tools within a single management framework. It includes enterprise-ready capabilities such as tracing, monitoring, evaluations, and configuration management. The platform also provides unified governance through role-based access control (RBAC), networking, and policy management, all within a single Azure resource provider namespace.

Multi-agent framework: A multi-agent system consists of multiple AI agents working collectively to perform tasks on behalf of a user or another system.

Power BI: Power BI is Microsoft's business analytics platform that helps users turn data into visual dashboards and derive insights. Power BI offers integrated tools and services to connect, visualise, and share data across the organisation.

Power Query: Power Query is a data transformation and data preparation tool. It includes a graphical interface for getting data from sources and a Power Query editor for applying transformations. By using Power Query, you can perform the extract, transform, and load (ETL) processing of data.

Python: Python is often described as a high-level computer programming language often used to build websites and software, automate tasks, and analyse data.

SQL: SQL stands for Structured Query Language. It is a domain-specific standard language used to manage data, especially in a relational database management system.

Technology stack: A technology stack is a set of technologies that are stacked together to build a cohesive and efficient software solution or system.

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PwC
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RSM
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globalaccountingalliance.com

ICAEW

Chartered Accountants' Hall
Moorgate Place
London
EC2R 6EA UK

T +44 (0)20 7920 8100
E generalenquiries@icaew.com
icaew.com



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