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This publication forms part of the International Auditing Perspectives series. It is part of the online resources of International Accounting, Auditing & Ethics. If you would like to find out more about the issues raised in this publication, please contact Katharine Bagshaw (Manager, Auditing Standards) at kbagshaw@icaew.com

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Data analytics for external auditors

INTERNATIONAL AUDITING PERSPECTIVES

An International Accounting, Auditing & Ethics initiative
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Auditor data analytics is about enhancing audit quality. There are different angles on what this means in practice but audit quality is a common objective of auditors, regulators and standard-setters alike. A high-quality, focused and effective audit is aligned with the way the audited entity manages its data and operations. Data analytics offers a practical way for auditors to manage some important aspects of IT systems in larger audits. Competitive tendering for listed company audits has sharpened the focus on data analytics, and audit committees now routinely ask prospective auditors how they are going to use it in the audit.

ICAEW is unique in its ability to draw on the views of a wide range of experts on pressing professional matters such as these. Our knowledge of standard-setting, regulation and audit practice enables us to articulate the issues with an unusual degree of clarity. This publication is the output of interviews with 12 ICAEW members with a strong working interest in data analytics. They are listed at the end of this publication and we are extremely grateful to them for their time and candour. We have quoted them at length, to illustrate the strength of feeling, the sense of opportunity and the sheer energy that data analytics has created within the profession. The willingness of interviewees to express fear and uncertainty, and to be specific, dispels any notion that they are simply pitching for their firms. We thought that the 90 minutes we allocated to interviews might be too much; it was often not enough.

The single most important and consistent message that comes out of the interviews is that everyone with an interest in audit has an opportunity – probably a rare one – to think again about what we all want from audit, and how data analytics might be able to transform it.

This publication is about possibilities. Its purpose is to ask fundamental questions about the opportunities data analytics provides for the profession, regulators, standard-setters, investors and academics to rethink and reinvent audit, for the benefit of society as a whole. Its purpose is also to raise levels of awareness of data analytics issues, and to inform and educate business, auditors, investors and others about recent developments in the use of data analytics in external audit.

Data analytics challenges everyone. Giving serious consideration to the possibilities requires vision. We do not believe that the existing audit model is broken – far from it. But it has necessarily been constrained by many technological limitations that have now vanished. We have the chance to think again about what we want audit to be. We have choices.

In section 4 of this publication we discuss six key issues we believe need to be addressed to open the debate. This will help ensure that audit remains relevant and valuable and that the profession continues to thrive. If we do not address these issues, others will. Are they the right issues? Have we described them well?
We do not have to have this debate. If we do nothing, change will be incremental and we will probably muddle through. But new technologies always present a challenge: do we automate what we have always done, or do we redesign what we do around the new tools the technology provides us with? That challenge is also an opportunity. If we put aside, for a moment, the existing concepts of risks, controls and different types of testing, we can think about what auditing standards might look like now if data analytics had been around 30 years ago. About how we keep the value of the insights that data analytics provides to business within the external audit.

The profession has an opportunity to reinvent itself within an existing and mature regulatory regime. Regulatory change necessarily proceeds with caution but innovation in audit is essential. Without it, the ability of the profession to respond to market demands will be compromised and there is a risk that the external audit itself will be marginalised. This is a debate about what business and investors really value in audit and, in the light of the opportunities data analytics presents, how that might be achieved.
Data analytics is a new discipline for auditors. It requires a substantial investment in hardware, software, skills and quality control. It is an important part of the response of larger and mid-tier firms to market demands in the larger-company audit market. Data analytics can be applied to a wide range of assurance engagements, not just audit.

Data analytics enables auditors to manipulate a complete data set – 100% of the transactions in a population – and for non-specialists to visualise results graphically, easily, and at speed. These are its defining features.

‘… when they’re working well, the new solutions can extract all of the data from a single platform from all over the world. We’re not there yet but at some point they’ll be delivering complete data sets for our teams to analyse, all pre-structured and formatted to fit directly into our audit programmes.’

‘… we used to have small-scale solutions for individual parts of the audit in the form of CAATs1 and we could do a bit of simple sample selection with them on the basis of stock volumes, but they’re nothing like what we have today.’

Data analytics enables auditors to improve the risk assessment process, substantive procedures and tests of controls. It often involves very simple routines but it also involves complex models that produce high-quality projections. Auditors using such models need to understand them, and to exercise significant judgement in determining when and how they should be used.2

Auditors did not invent data analytics. Governance, risk and control, and compliance monitoring systems commonly used by larger companies include systems developed by Oracle, SAP and RSA Archer. Oracle and SAP also have application-side business intelligence systems centred on business warehouses. Lavastorm, Alteryx and Microsoft’s SQL server provide advanced tools for specialists such as business analysts and, increasingly, for non-specialists. All of these platforms are currently the preserve of large systems integrators, larger and mid-tier firm consultancies and specialist data analysts. It seems likely though, that over time these systems will move in-house or be provided as managed services. It also seems likely that companies such as CaseWare and Validis that currently provide data analytics services to larger and mid-tier firms, enabling those firms to offer data analytics services to their own clients, will seek to expand their client base to include other firms within the top 50.

Some businesses already analyse their own data in a similar manner to auditors and cover some of the same ground. As these business analyses become deeper, wider and more sophisticated, with a focus on risk and performance, it seems likely that they will align at least in part with the risks assessed by external auditors. That in turn will affect management expectations about the focus and scope of external audit.

Has auditing come full circle? It once involved an exhaustive examination of every transaction and balance, following all (or most) of them through the system. Auditors started to question this fully substantive approach in the 1950s. By the mid 1970s, risks analysis and controls testing, sampling and flowcharts, risk-based auditing standards and the concept of materiality were the norm. They have been the hallmarks of external auditing ever since. But had it been possible at either of those points in time to examine all of the invoices automatically, cheaply and fast, it is very unlikely that we would be where we are today. For some, data analytics challenges many established concepts,

1 Computer-assisted (or ‘aided’) audit techniques.
2 Firms are starting to experiment with artificial intelligence in data analytics but at present, iterative, learning elements have not been embedded. One day they may be and the profession will then have to think about the implications of the ‘driverless audit’.
Data analytics for external auditors

including the concept of an audit itself, as well as the way they are performed and regulated. Questions arise as to the importance of the distinction between risk assessment, substantive procedures and tests of controls when a complete data set is examined and at one level, data analytics should enable auditors to see the big picture again, more easily than they have been able to in the recent past.

The technology firms are now using to develop data analytics is rooted in software originally developed in the early 2000s for data mining in the banking and retail sectors, and for design and modelling in financial services and engineering. Enthusiasts describe the volumes of data that can be handled as ‘on an industrial scale’, and the calculations being performed ‘in a fraction of a second’. There is more than a grain of truth in both descriptions. The type of tasks such software can perform, and the connections it can make, dwarf what was previously possible.

‘... it’s not just about doing things faster. Bringing external data and non-financial elements to the risk assessment and more predictive elements are what really make the new offering stand apart. Skills have matured and the base data we’re working on is a lot better than it was.’

‘... improvements in data capture and transfer have been the real drivers. The hardest thing about data analytics is still getting the data and getting it into the tool, but this capability is our biggest asset now. The audit techniques themselves are relatively straightforward by comparison.’

Data analytics represents a large-scale and long-term investment for auditors. While third-party providers can turn some of the fixed development costs into variable costs, most large firms to date have chosen to build their own platforms. Firms have not yet achieved the efficiencies that such projects require but this should change over time as auditors, regulators and standard-setters work out how to integrate these new techniques into the regulatory infrastructure.

While audit committees remain fascinated by insights into who is working at the weekend, and what they are doing, they are also asking how the techniques can be used to improve audit quality. There is a consensus among interviewees about the main operational issues going forward for auditors, which seem to be:

• how to extract good quality audit evidence from the analyses, taking account of the quality of the underlying data;
• what type of analyses give the best audit evidence; and
• uncertainty regarding regulatory challenge.

Auditing standards are written on the assumption that it is rarely possible to test 100% of the transactions entered into by any entity. This is no longer true. One view is that the sheer scale of the work that can be performed using data analytics techniques changes everything and that, as a result, auditing standards need a root and branch modernisation to reflect the new techniques. Another view is that the basic concepts are sound and that auditing standards simply need to be modernised to reflect some powerful new audit techniques.

Everyone involved is on a steep learning curve. The challenge is not only to ensure that auditing standards can accommodate the new tools, but also to ensure that they contribute to audit quality, the level of assurance obtained by auditors and the value of the audit to investors and other stakeholders. Auditing standards, and regulatory scrutiny of their application, must also continue to encourage innovation in audit.
2. What data analytics can do and how it contributes to audit quality

2.1 Data analytics tools

Data analytics involves the extraction of data using fields within the basic data structure, rather than the format of records. A simple example is Power View, an Excel tool which can filter, sort, slice and highlight data in a spreadsheet and then present it visually in variety of bubble, bar and pie charts.¹

Visualisations are as good as the data on which they are based, and the quality of the analyses thereby facilitated depends on the underlying data that must be extracted, analysed and linked in the right way.

‘… there’s an entire industry dedicated to getting data and putting it into the right format – but all that does is get you to the starting block. At that point you have no evidence to support an opinion and no insight to give the client but that is where most of the cost still lies. The value to the audit comes from the analysis.’

These tools can be used in risk analysis, transaction and controls testing, analytical procedures, in support of judgements and to provide insights. They can draw on external market data such as third-party pricing sources, to re-price investments, for example. Interest and foreign exchange rates, changes in GDP, and other growth metrics can also be used in analytical procedures.

Many data analytics routines can now easily be performed by auditors with little or no management involvement. The ability to perform these analyses independently is important. Many routines can be performed at a very detailed level, and/or in total. The higher-level routines can be used for risk analysis to find a problem, while the more detailed analysis can be used to sharpen the focus, and provide audit evidence and/or insights.

<table>
<thead>
<tr>
<th>Commonly performed data analytics routines</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Comparing the last time an item was bought with the last time it was sold, for cost/NRV purposes.</td>
</tr>
<tr>
<td>• Inventory ageing and how many days inventory is in stock by item.</td>
</tr>
<tr>
<td>• Receivables and payables ageing and the reduction in overdue debt over time by customer.</td>
</tr>
<tr>
<td>• Analyses of revenue trends split by product or region.</td>
</tr>
<tr>
<td>• Analyses of gross margins and sales, highlighting items with negative margins.</td>
</tr>
<tr>
<td>• Matches of orders to cash and purchases to payments.</td>
</tr>
<tr>
<td>• ‘Can do did do testing’ of user codes to test whether segregation of duties is appropriate, and whether any inappropriate combinations of users have been involved in processing transactions.</td>
</tr>
<tr>
<td>• Detailed recalculation of depreciation on fixed assets by item, either using approximations (such as assuming sales and purchases are mid-month) or using the entire data set and exact dates.</td>
</tr>
<tr>
<td>• Analyses of capital expenditure v repairs and maintenance.</td>
</tr>
<tr>
<td>• Three-way matches between purchase/sales orders, goods received/despatched documentation and invoices.</td>
</tr>
</tbody>
</table>

¹ Data analytics goes beyond what was previously possible by manipulating metadata in the underlying data model to express relationships between different tables and fields. Metadata is ‘data about data’, such as who generated a document, when, and the type of content such as debits or credits, or the number of lines of text in a journal.
Some routines can provide audit evidence to support judgements relating to the appropriateness of methods used in calculating accounting estimates. If a business has a policy of writing off any receivable over 90 days, for example, an analysis of the application of the method when credit notes are removed might result in the method appearing less appropriate if the routine shows that a large number of credit notes relate to billing errors.

2.2 How data analytics contributes to audit quality

‘… it really is all about audit quality. We can perform some procedures to significantly higher standards, a great deal faster than we used to, and we can do some things we didn’t used to be able to do at all.’

‘… efficiency isn’t about “cutting hours”, it’s about getting to the things that matter quicker and spending more time on them instead of ploughing slowly through random samples that often tell you very little. These techniques shrink the population at risk. It means we’re fishing in a smaller pond and we can often go straight to the high risk areas.’

Data analytics has been developed with a view to improving audit quality. Audit quality does not lie in the tools themselves – although it clearly cannot be achieved without tools that are fit for purpose – rather it lies in the quality of analyses and judgements thereby facilitated. The value is not in the transformation of the data (however impressive), but in the audit evidence extracted from the conversations and enquiries that the analytics generates. For example, a risk assessment might involve a review of a ‘journals dashboard’ such as the PwC example below.

Figure 1 from PwC’s ‘Halo for Journals’

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The information in this dashboard might be used for comparisons with prior years and (potentially) other businesses. If the automated vs manual indicator shows a high level of manual journals, it might indicate inefficient usage of the system, process complexity or, depending on circumstances, represent a fraud risk. Metrics relating to individual users may also highlight unusual activity warranting further investigation.

It seems clear that the following unique features of data analytics have the capacity, if used appropriately, to enhance audit quality significantly:

- the ability to graphically visualise results: data visualisation is now a discipline in its own right;
- sophistication, and the breadth of interrogation options;
- ease of use by non-specialists; and
- scale and speed.

Interviewees emphasise different elements of the list above when asked about how data analytics contributes to audit quality. For some, the sophistication of enquiries generated by high-quality visualisations has resulted in better quality explanations. For others, more comprehensive and accurate analyses facilitated by the sheer speed and volume of processing are more important, but:

‘… auditing standards will eventually catch up with us on this but at the moment, they’re based on the assumption that what matters is how you go about finding needles in haystacks. Data analytics has shrunk the haystacks and in future it’ll be about what you do with those needles when you’ve found them.’

Auditors can navigate much bigger external data sets much faster than before because the biggest recent advances have been in the interfaces between client and auditor systems, software and data ie, the interfaces that facilitate data extraction. These interfaces enable auditors to run the routines not just as substantive procedures, as in the past, but earlier during the audit at the risk assessment stage in understanding processes, and in work on controls.

Many analyses performed are not fundamentally different to those performed in the past but they are now more granular and applied more widely at the same time. For example, the risks highlighted by the journals dashboard noted above might enable auditors to drill down into further detail as part of the substantive testing, by performing routines that analyse large journals and unexpected users, for example, which in turn facilitate further investigation.
Figure 2 from PwC’s ‘Halo for Journals’

A question arising from this PwC graphic might be whether someone from outside the finance department is posting journals. Auditors can use the tool to drill down into the data to identify specific journals which may need to be tested.

Figure 3 from KPMG’s journals flow analysis

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6 © 2016 KPMG LLP, a UK limited liability partnership, and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative, a Swiss entity. All rights reserved.
This KPMG graphic is a ‘visual ledger’ summarising entries posted through an entity’s general ledger. It allows auditors to map the flow of transactions through a client’s financial processes and to identify unexpected double entries (the red arrows). The volume and value of entries is shown for each flow, enabling auditors to identify higher value, higher risk populations of transactions. Auditors can then drill down from this screen into the detail of the individual transactions making up each population.

2.3 How business benefits
Interviewees report a relationship between the maturity of an entity’s IT systems and the extent to which management is open to the new techniques. Data analytics seems to work best where a business has been through a process of transformation, where ‘… the cadence is more real time than quarterly’, particularly if management is in investment mode and is at a sufficiently mature stage of development to deal with risk through management controls, rather than focusing on transactions and data.

Auditors take a broad view of the benefits of data analytics to management. They talk about enhancing the quality, transparency and granularity of the audit report, audit execution and communications with management as well as insights. Many report talking more regularly with management, communications becoming easier, and audit effort being spread over the year rather than concentrated at the year end.

Management wants more than the data it provides presented back in a different format. The sort of insights management is looking for include:

• views on control gaps: if there are control deficiencies that are subsequently remediated, are the outcomes as expected or hoped for? Have the blocks been removed? Is the right data released?

• quantification or measurement of the impact of manual interventions, control failures, the extent to which process is being applied and the consistency of controls application;

• the root causes of exceptions;

• internal benchmarking; and

• visualisation, often through dashboards.

Management is also looking for ‘… intelligent comment on integrity of management information six weeks after the year end, instead of three months.’
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3. Routines, tools and solutions: the technical challenges of data analytics

3.1 Data capture, extraction, validation and transformation

Many large audit firms have had read-only user accounts within client systems with their own user names and passwords, to serve themselves with reports, for some time. In jurisdictions in which a standard chart of accounts is used, this is a very efficient method of generating information for audit purposes. This is not the same as the extraction or transformation of data, though.

Auditors sometimes obtain the data themselves, but they sometimes use data that management has extracted and validated. Auditors perform a suite of controls testing around management’s data extraction and validation processes, and then use what management has produced for their own analyses. Routine aspects of this work are moving offshore. In all cases, management has to perform extensive security and integrity checks before auditors do anything at all.

Three-way matching: a comparison

Which is the best approach:
- extract and validate all of the raw data and perform the match; or
- test management’s automatic matching process?

Entities performing automatic matching processes normally produce databases or tables of matched and unmatched items. Auditors can extract the unmatched items for further analysis.

A controls-based approach (test management’s process) should in theory be quicker, but it may not be. Data volumes and the complexity of controls testing required need to be considered and it is easy to miss important elements of controls testing. For example, if there is a tolerance threshold for matched items, auditors need to consider whether the threshold was changed during the year, and if a certain amount of testing of the matched items is needed to ensure that matches are correctly identified.

The 100% re-performance approach is in theory more straightforward and the evidence is obtained directly by auditors. But it may take longer and there are likely to be many exceptions. These may be addressed in part using similar tolerance thresholds to those used by management but that can be a complex exercise.

Larger systems such as SAP, Oracle and JD Edwards involve ‘blocks’ from which a company can build its own database. This is what gave rise to the basic technical problem experienced by larger firms in the late 1990s – extracting data from systems in a usable format. Auditors have had to map all of the coding for each of these systems, in every permutation, for every large client, in order to develop a usable interface. They also have to do this for fully bespoke systems. Auditors are developing multiple strategies to enable them to interface with this myriad of systems. This is the first and most important hurdle they have to clear when tailoring an offering. One interviewee reports 450 different accounting systems in its auditable client base, although 60% of those are represented by a small number of systems, including SAP and Oracle, both of which accommodate a great deal of core scripting.

Auditor investment in mapping all of these variations should mean that firm offerings will be scalable as well as efficient. Mapping involves articulating data attributes and understanding how they transcribe into the real world, and understanding the importance of differences between, for example, the date an item is initiated, the date it is keyed in, and the date it is approved and posted, all of which may be different. Understanding
how systems use such dates is no small task. But this level of detail brings depth to the risk analysis that was not previously possible. It also provides the basis for insight.

Auditor mapping of a system shows that an inventory provision calculation is skewed because it is driven by goods despatched notes. Unbeknown to the client, moving inventory around the warehouse generates goods despatched and goods received notes. The new information provides focus for the risk analysis as well as helping the client.

Software vendors specialising in data extraction, standardisation and analysis can extract information using web links, from proprietary accounting systems widely used by smaller and medium-sized companies. Such packages rarely permit much tailoring. Vendors can produce information suitable for audit, and analyse it.

Data and transactions can be analysed in many different ways – by transaction type, by account or activity code or with reference to many different data components. **Transformation** is about making the data useable. One emerging issue is the extent to which data has to be changed (often simplified) in order to do that. Key decisions firms always have to make before making any such changes, which require careful thought and consume resources, are about the quality of audit evidence that is likely to be obtained from the routine, and whether management is able to transform the data, which makes life a great deal easier from a regulatory standpoint. Nervousness about ‘changing’ client data is an issue but sometimes it is unavoidable. For example, data extracted from ledgers which erroneously denominate transactions in currencies that stopped being legal tender many years ago instead of euros, has to be altered to make any sense of it.

### 3.2 Confidentiality and security

Auditors acknowledge that confidentiality and security are, and always will be, critical issues. They report that they are highly sensitive to the risks, but that the risks have to be managed appropriately, not least to avoid the dysfunctional behaviour that can arise when security is over-engineered and users start working outside the system altogether to get the job done.

All firms have data-handling protocols in place covering what sort of personal information they take, why, how they handle and archive it and what they delete and when. This is often agreed with management. Teams are encouraged to minimise the amount of personal data they capture. But there are degrees of risk in this area and as one interviewee puts it: ‘... B2B generally isn’t a problem but with payday loan companies, there is sometimes a genuine risk’.

Issues auditors have to consider include the potential creation of new personal data when analyses refer to individuals. Not all routines applied to personal data necessarily create new data. Interest recalculation in banking audits involve taking personal data from a mortgage book but they do not create new data. Analysing the authorship of journals, even when user IDs are used, may involve creating new personal data.

Areas that continue to present challenges include:

- data stored in the Cloud;
- revised EC guidance on data handling and protection; and
- regulatory hurdles, especially those relating to the transfer of data and information across borders (bank audits almost always have to be performed locally, for example).

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7 The General Data Protection Regulation is a major EU overhaul of data protection legislation and is set to be introduced in 2017. The current requirement to register with the Information Commissioner is to be scrapped and the emphasis will be on accountability and documentation. Class actions will be permitted, fines may be linked to turnover and some compensation will be unlimited.
3.3 The quality of data analytics tools and routines

Auditors emphasise the extensive quality assurance procedures they apply to the development of tools and routines. Procedures often include pilot and parallel running with the ‘normal’ audit process, and all firms have contingency plans should the software crash during the busy season.

One interviewee describes auditors as ‘… throwing resources at secure storage, ISA compliance, data governance and secure infrastructure, especially in financial services and the public sector’.8

Auditors also point to extensive quality controls over the processes that ensure that the people using the tools do so properly.

3.4 Data retention

There are issues with large volumes of data provided to auditors by management that do not ‘belong’ to the firm. The issue is not new, but the scale and reach of data analytics keeps it in focus. The audit quality issue is about the need to keep documentation that supports key thought processes, in the context of the legal and practical issues associated with high volumes of data storage. The infrastructure auditors require to accommodate terabytes of data and to analyse many millions of transactions from hundreds of reporting units goes beyond the capacity of standard servers.

There are differing views on the manner in which data should be retained to meet the documentation requirements of auditing standards, which are essentially about sufficient information to identify the individual transactions tested. Some take the view that retention of large volumes of data is both expensive and unnecessary to comply with auditing standards. Others say that the data analysed will be kept for many years anyway, because that is the way their platforms are structured and because they do not believe that the risk profile associated with data retention has changed.

Some believe that the risk profile associated with data retention has changed as a result of the sheer volume of data used in data analytics but all interviewees agree that while the quality of the platforms on which the data is analysed has an effect on data retention, the criteria for what should be retained have not changed. If an item has been tested, information about it should be retained such that it could be identified again if necessary.

3.5 Developing a data analytics offering

Data analytics may be about audit quality but auditors have to justify their substantial investment in it. Data analytics has been promoted by audit firms for some time and there is now an expectation among listed companies that when tendering, auditors will include a description of how they will use data analytics in the audit. It seems that the quality of the data analytics offering is a key factor in some cases. Clients want to use the output from auditor data analytics because it provides information that they cannot easily prepare themselves. This creates independence problems.

‘… we can’t do data analytics without management’s help but it’s difficult to avoid raising expectations. We have a problem when they want to know what we found. The insights we produce are part of our audit evidence, and we often can’t feed them back to management even though we couldn’t get them without their help in the first place.’

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8 Firms also point out problems with unregulated competition in the advisory market in the form of consultants who grow organically, with little planning, change control, or product design. Some are passing themselves off as having audit expertise without the discipline of repetition – having performed the same routines in different contexts many times.
3.5.1 Mid-tier firms
For mid-tier firms considering entering the listed company audit market without a developed data analytics offering, the up-front investment is a significant issue. Such firms may find it hard to withstand the investment burden combined with fee pressures and low recovery rates in the short term. However, some such firms, through subsidiaries, have been providing managed non-audit data analytics services and capacity building suitable for a range of widely used standard systems for some time now. Services offered by a number of firms associated with the mid tier, as well as larger firms, include predictive analytics, data mining, IT consultancy and helping management build its own analytics within finance functions.

Managed services providing controls assurance cannot be provided to audit clients but firms can help management design and set up its own assurance infrastructure, and hand over the keys. Some firms in the mid tier are happy with this situation and have no desire to enter the listed company audit market.

3.5.2 Smaller firms
At present, many smaller audit firms have limited knowledge or experience of data analytics. But some software vendors are beginning to approach firms within the top 50 with a data analytics offering that is integrated with the software providers’ proprietary audit systems. Software vendors have now successfully mapped many of the widely used proprietary accounting systems such as Sage, Intuit, Xero, TASBooks FreeAgent and KashFlow, with which their own software must interface.

CaseWare Analytics’ ‘IDEA Data Analysis’ offering is a large, technically complex tool for internal and external auditors, currently used by mid-tier and larger firms and in local and national government for continuous monitoring of transactions. From this beginning, CaseWare has developed a bank of hundreds of analytical tests which it has integrated with its audit ‘AdvancedAudit’ system through CaseWare International. Validis specialises in data transmission software and deals with the ‘hard’ part of data analytics – data extraction and transformation, as well as analysis. These companies emphasise the fact that their clients use their services for efficiency gains and to develop new services, as well as to enhance audit quality.

They also think that this market is unlikely to catch fire overnight. Of those smaller firms that are aware of developments in data analytics, it seems that more than a few are resistant to the idea of such a fundamental change to the way they do things. Data analytics might make the audit more interesting for management and the audit itself more efficient in the long run, but the initial investment in reskilling and retooling, and the potential loss of billable hours generated by the current approach are a barrier. Uncertainties regarding recovery rates, compliance issues and whether the expected efficiencies will in fact be realised, and within what time frame, mean that some smaller firms will take a lot of persuading to agree that this is the way to go. Nevertheless, several interviewees think that this may be the market in which data analytics will eventually take root and flourish, and larger firms seeking a foothold in the small audit market may help quicken the pace.

3.5.3 Developing data analytics technologies
Some firms have formed alliances with third parties, others have bought in technologies and others again have developed their own platforms either from scratch or on top of existing platforms within forensics or consultancy practices. Most have done a bit of everything. In all cases, user interfaces have been designed to be operated by audit staff with a minimum of training. But the breadth and depth of technical specialisation required to develop or adapt systems that can deal with myriad different accounting systems, and be operated by non-specialist users, is substantial.
Firms may pay national or global licence fees for using third parties, or their software, to capture data. Alternatively firms may cost their own offering to have a zero marginal cost for an additional client or take a hybrid approach. The picture is complicated by the fact that some software is becoming increasingly commoditised, and is offered either at a low cost or free which, over time, will mean that the way firms monetise their intellectual property will change.

OPTIONS FOR FIRMS

- **Buy in established techniques from providers outside the firm, maintain alliances with third parties or work with a captive provider?** This takes away some of the worry about technical complexity.

- **Build something from scratch or on top of an existing platform?** Bespoke routines can be commissioned by audit teams as well as those in charge of methodology. Changes can be made to the core package of routines relatively easily. The flow of data between audit and data assurance teams can be streamlined and everyone should be clear about when it is appropriate to use a routine, and what it can and cannot be used for. This approach may work more easily for businesses operating standard rather than bespoke systems but it may be harder to remedy systemic shortcomings if systems are all developed by the same people.

**Auditor approach to developing specific data analytics tools**

Auditors often use some combination of the following approaches to development:

- take the tools and consider how they can be used in the audit;
- ask what has been performed before that might be automated and expanded; or
- commission completely new routines.

The first approach is probably the most creative and has long-term value. The second is safer, more focused, compliant and probably less wasteful. While the third approach may appear ideal, it is only just becoming possible.

However data analytics tools are developed, they have to be merged with practice methodologies, but they often permit staff to be creative about how they go about achieving an audit objective. This means that staff also need to be very clear about the audit objective of every routine they run and how it fits with auditing standards.
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4.1 Smarter testing: sharpening the focus of data analytics

Data analytics tools are sensitive and can cause problems if handled clumsily. Auditors need to be clear about exactly what it is they are looking for when using them. Sampling requires thresholds for what is ‘important to the audit’ to be set very low because the characteristics of the sample have to be extrapolated to the population as a whole. If, however, auditors look at everything, they have to be very precise indeed about what is of interest, and set a higher threshold to avoid having to deal with ‘5,000 exceptions’.

Data analytics requires a great deal more sensitivity and intelligence than sampling when determining exactly what ‘failure to authorise an invoice’ or an ‘incorrect price’ really means. For example, in a substantive procedure, is an incorrect price taken from an out-of-date file incorrect if it is in fact identical to the right price (ie, the price hasn’t changed)?

On the face of it, testing a full population of 50,000 items has to be preferable to testing a sample of 60. The purpose of sampling is to draw conclusions about a population by testing a small part of it. Auditors commonly reduce the risk of the sample being unrepresentative of the population from which it is drawn (sampling risk) to 2% or 5% by adjusting sample sizes, although the sample sizes used by firms are sometimes questioned by regulators.

Testing the entire population eliminates sampling risk but it can create other problems. Hundreds, and sometimes thousands of so-called ‘exceptions’ can be produced if care is not taken. On investigation, it often transpires that many of these ‘exceptions’ were not in fact exceptions at all, and that the test was not configured properly (because parameters applied were not properly calibrated, for example) or because the population was not in fact homogeneous (ie, it was in fact two populations to which different control procedures were applied, for example).

Some firms stratify or segment the ‘5,000 exceptions’ to determine which are genuine – often a small proportion – and then follow up a proportion of those to resolve the issue. Other firms take the view that if the test is performed properly in the first place, this sort of situation should not arise.

Auditing standards require that all exceptions, whether exceptions to the application of a control procedure or substantive errors, are dealt with. But auditing standards are predicated on sampling, and auditors who ‘sample’ the exceptions argue that had they taken a sample in the first place, they would have found a tiny number of exceptions (or none at all) and that it is not necessary to follow up every single exception in detail provided that all of the exceptions have been considered and disposed of appropriately. They believe that this approach is in line with the spirit of auditing standards, that ticking every item is unnecessary as well as impractical, and that auditing standards need to be updated to reflect these developments.

Regulators point out that auditing standards were never intended to cover all situations and that the requirements cannot simply be changed to fit each new development. Auditors should therefore explain how they have dealt with all exceptions and be able to articulate how their approach satisfies the requirements of auditing standards.

All interviewees agree that educating audit staff is important: if data analytics routines throw out thousands of exceptions that must be followed up, the routines need to be changed if the exceptions are not really exceptions. But they also point out that while they can and do refine the techniques, educate staff and scope the routines so that they do not throw out such a wide range of so-called ‘exceptions’, if they go too far down that route and scope the routines very narrowly, some of the value of the new tools will be lost and, perversely, anomalies are more likely to be missed.
Quite who has the last word here is unclear. Regulators and standard-setters remind auditors that they need to be clear about the objectives of data analytics routines. If they are really part of the risk analysis, exceptions do not have to be followed up. If they are genuinely tests of controls or substantive procedures, they do.

The audit risk model, and the assumptions about sampling on which it is based are not intended to stifle innovation, but it is possible that as they stand, and as they are interpreted, they may in practice be inhibiting it. More dialogue between auditors, regulators and standard-setters is required in this area.

4.2 Thinking again about why and how we test internal controls

Developments in business, IT and audit methodologies in recent years mean that high-level management controls over the financial reporting system as a whole are now more important than they once were. The focus of many audits is increasingly on these, rather than on lower-level transaction processing controls which are well established and mature, as are the tests of controls applied to them by auditors.

‘… management controls over the completeness of related party transactions are always an issue, but related-party transactions are only a risk if those controls aren’t there. Other risks are less of an issue now because we interrogate the entire data set – the only controls we think we should have to look at in this case are controls over completeness.’

When sampling is a necessity, the need for risk assessment and the evaluation and testing of internal controls makes sense, but data analytics has refocused the risk assessment and internal controls evaluation in some ways. For example, stratifying a population, important in sampling to deal with controls applied in different ways to different strata, is less important from a risk analysis point of view if an entire population is being tested for a single characteristic representing increased risk, such as the understatement of transactions with related parties.

If auditors can see what has happened to all of the transactions finally recorded in a system, why test controls applied during processing, if data analytics show transactions to be properly valued and recorded? However, this does not mean that controls can be ignored altogether. For example:

- a good understanding of the system producing the data on which the analytics is performed is important in order to be able to design the relevant tests;
- three-way matching requires a clear understanding of ISA requirements as well as the relevant systems;
- up-front processing controls which prevent errors in the first place are often more important than detective controls applied later, acting as checks on the former; and
- management controls over completeness often need to be tested, even in a data analytics context.

When thinking about control procedures, the boundaries between auditor and management controls over data are important. The terminology used across different firms is confusing. Terms such as ‘IT controls’, ‘management controls’, ‘transaction-processing controls’, and ‘general controls’ overlap, and auditing standards refer to the ‘control environment’ and ‘control procedures’.
One simple categorisation emphasising important boundaries in the context of data analytics might look like this:

1. transaction processing controls;
2. controls over the financial reporting system as a whole; and
3. management and auditor controls over data capture/extraction and transformation.

Auditors may want to test management’s controls in all of the categories above but there appear to be questions about the continuing relevance of certain IT controls to the external audit in a data analytics context. Do auditors still need to test certain IT controls, as they always have done?

One view is that they do not because data analytics tools stand alone. Some IT controls are irrelevant because auditors are testing the full data set and, importantly, checks on the validity and integrity of the data are built in both by management and auditors when the data is extracted and transformed for audit purposes.

Tests of controls are at one level intended to compensate for the fact that auditors cannot test all of the transactions. Where they can, some consider that certain tests of controls are redundant. Drawing indirect conclusions about the operation of internal controls from substantive procedures does not make sense in the context of sampling9 but when substantive procedures cover the entire population, standard-setters should question whether it is possible to take some limited comfort regarding the operating effectiveness of controls when substantively testing a full population shows up few, if any, exceptions.10

In extracting all of the journals from the general ledger, auditors reconcile opening and closing balances and perform other internal consistency checks. The data is then checked back to source documentation and documentation from independent sources, numerous exception reports are produced and each exception is followed up. Is there any point, when this amount of work is being done on the integrity of the data, in performing further tests of controls over that data?

The other view is that no matter what advances are made, in all audits, an understanding of the design and implementation of controls is necessary to properly understand the business and perform an adequate risk assessment, regardless of whether auditors intend to take a fully substantive approach. This is because understanding the quality of the control environment is essential to confidence in the integrity of the data set.

It is not uncommon to be given the wrong set of data, such as the backup, by accident. A reconciliation of key totals to the trial balance on which the financial statements are based will detect this and this is a standard routine classed either as an auditor control or as a substantive procedure. However, while auditors may test cash receipts using data analytics, analytics will not prove that the records really represent cash. Only understanding and testing management’s controls over the processing of cash receipts will provide audit evidence that the data in the system represents real transactions.

9 This is not currently permitted by paragraph 16 of ISA 330, The auditor’s procedures in response to assessed risks.
10 In this context, auditors also point out that the requirements to test journals in paragraph 32 of ISA 240, The auditor’s responsibilities relating to fraud in an audit of financial statements, were never intended to deal with the many thousands of journals that are now routinely produced when closing accounting periods.
A final view is that some controls are relevant in some situations. In three-way testing –
between purchase orders, GRNs and purchase invoices, for example – where three systems
are being checked against each other it is very unlikely that they will coincide by accident.
Provided that controls over completeness are also covered off independently, other controls
testing may not be necessary. But that is not always possible.

4.3 Encouraging innovation and respecting the value of data analytics
In most disciplines, innovation is regarded as a good thing. Improved telephony and better
medicines make the headlines and the ability to do away with a more cumbersome way
of doing things is usually regarded as progress (provided it is not prohibited). The same
ought to apply to audit but the failures tend to hit the headlines, rather than improved audit
techniques and it is important that appropriate recognition is given to what is genuinely new
and improved as, for example, with auditor reporting in the UK.

Interviewees agree that when developing data analytics tools, some discipline is needed to
ensure that they do not become solutions in search of a problem. Being able to run a test
more quickly with a greater level of coverage is not always necessary, or even desirable, any
more than the ability to run any routine that may provide some interesting insights but
produces no audit evidence. As one interviewee puts it, ‘... we could clean the floor if all we
wanted was to add value. We have to stay focused and relevant and avoid doing things just
because we can, or because audit committees tell us another firm says it can’.

Nevertheless, interviewees also believe that more debate is needed about how to fold
valuable insights into the external audit even if they do not produce audit evidence in the
way that we currently understand it under extant auditing standards. They believe that
existing concepts of risk analysis, tests of controls and substantive procedures may need to
be examined to ensure that they are in fact still useful.

Is looking at the entire data set for purchases for different types of outliers a risk analysis
procedure, a test of controls by re-performance, a substantive procedure or does it just
provide some interesting insights for management? The answer in practice depends in part
on the quality of the base data, and the interface between auditor and client systems, but the
short answer is that it can be any or even all of these. Regulators emphasise the importance
of auditors being completely clear as to how the procedures performed achieve the various
objectives and specific requirements of auditing standards, but there are questions for
standard-setters to consider in this context. Auditing standards do not prohibit the use of
data analytics but nor do they readily facilitate them. 100% testing and the wider effects of
straightforward data interrogation are not well addressed.

Auditors used to take a random sample of, say, 60 items from a population of invoices,
representing less than a single percentage point, and check them for characteristics of fraud
and error, such as items posted outside normal working hours, round sum amounts or
negative amounts. Auditing standards require the use of judgement but sampling procedures
are read by some regulators as giving auditors the same ‘credit’ in terms of audit evidence
that they get for testing 99.8% of the entire population for the same characteristics, and
several more. Some auditors are dissatisfied with this. They argue that classifying a test of
the entire population in this way solely as a risk assessment procedure, a mere attempt to
find a problem, may be a narrow interpretation that does not reflect the greatly increased
substantive audit ‘comfort’ provided by such exercises by comparison with what has gone
before. The gap between what auditing standards require, and what auditors are in fact
doing, is growing. There is also a gap between what auditors believe they are required to do
by auditing standards, and what they believe they should have to do to get the right result.
The answer cannot be for auditors simply to go back to what they were doing before.
The international standard-setter, the IAASB,\textsuperscript{11} the AICPA\textsuperscript{12} in the USA and the Financial Reporting Council in the UK all have projects on data analytics. It will not be clear for some time whether changes will be made to the requirements and application material of auditing standards, or if guidance material will be produced. Standard-setters are also considering the effects of offshoring and cloud analytics for central service centres. These are important issues in the public sector as well as for private companies.

4.4 Reconsidering the audit approach to fraud

The profession has long argued that the cost of requiring auditors to find fraud is simply prohibitive. The 1998 APB publication \textit{Fraud and audit: choices for society}\textsuperscript{13} notes that most material frauds involve senior management and that where management colludes with third parties, the statutory audit is unlikely to detect it. While society expects auditors to find such frauds, the likely price is far too high. That analysis stands and the tension still exists, but data analytics has opened up the possibility of fraud detection in a manner not previously possible.

The responsibility for fraud prevention and detection may always remain with management but the pressure exerted on auditors to share their data analytics outputs with management – to help it fulfil that duty – will only become stronger. This gives rise to some important ethical dilemmas that auditing and ethical standard-setters need to consider. Furthermore, almost all interviewees highlighted ISA 240\textsuperscript{14} on fraud and ISA 520\textsuperscript{15} on analytical procedures as problem areas as they stand, and both of the following issues warrant consideration by standard-setters.

- ISA 240 explicitly identifies analytical procedures as a method for assessing the risk of fraud. Interviewees note that the procedures it suggests are out of date, and no longer widely used in the context of fraud, although they may be used to show up certain basic errors. Another emerging area in fraud risk assessment not yet reflected in auditing standards includes industry sharing of information about actual fraud, sometimes via regulators and sometimes through large, closed seminars.

- In the context of analytical procedures, ISA 520 requirements for expectations to be developed that are sufficiently precise to identify a material misstatement do not sit well with the very granular procedures permitted by data analytics. This renders those procedures invalid for the purposes of substantive testing.

4.5 Enhancing the dialogue between auditors and regulators

Auditors and regulators are working together with standards that never envisaged data analytics. This is a novel situation and a positive approach to the dialogue is important to ensure that all involved remain focused on the improvement of audit quality.

There are a number of areas in which continuing dialogue is needed to ensure that the common objective of audit quality is achieved. Issues that can be presented in a very different light, depending on your perspective, include the following:

- enhancing audit quality by improving efficiency and adding value to clients all at the same time;
- centralising and industrialising audit procedures, including investing in automation in well-tooled and lower cost locations;

\textsuperscript{11} International Auditing and Assurance Standards Board.
\textsuperscript{12} American Institute of Certified Public Accountants.
\textsuperscript{13} https://www.frc.org.uk/Our-Work/Publications/APB/Fraud-and-Audit-choices-for-society.pdf
\textsuperscript{14} ISA 240, \textit{The auditor’s responsibilities relating to fraud in an audit of financial statements}.
\textsuperscript{15} ISA 520, \textit{Analytical procedures}.
• the types of work performed offshore;
• the legitimacy of insights also serving as audit evidence;
• a shift from a business model based on hours worked to one based on a return on investment; and
• audit fee calculations being based on the quality of client data.

Data analytics, which remains work in progress, is used less on higher-risk audits and there are concerns about:
• the output of auditor data analytics becoming part of management’s internal control;
• the level of challenge regarding the appropriateness of the use of certain tools or models on any given audit, as well as the quality controls over the development of such tools and models; and
• how much credit in terms of audit evidence can be taken from data analytics routines.

Relatively junior staff do not always properly understand the limitations of the routines they can use or the evidential requirements of auditing standards. Interviewees acknowledge that enthusiasm for the more interesting insights provided by routines available to staff needs to be balanced with routines providing clear audit evidence. They are at pains to encourage their staff to think carefully about the need to commission, develop and test new routines that fulfil those requirements.

The interaction of auditing standards and data analytics is clearly open to interpretation. The development of new authoritative material will take time and in the meantime, auditors are looking for clear indicators of the regulatory position on that interaction. In turn, the development of a sound regulatory position depends on a proper understanding of what firms are actually doing. The ongoing dialogue between auditors and regulators needs to be honest. Patience is needed on both sides. Regulators have to develop positions that accommodate a variety of approaches to data analytics and meet the expectations of those who rely on the work of auditors. There are few experienced ex-auditors in this field to help them – firms are hanging on to them. Developing acceptable boundaries in an environment that is shifting is not easy.

Regulators are both expected and required to ask challenging questions. Firms have invested a great deal in data analytics. Regulators cannot ignore this and they have to look at what firms are doing, as well as listen to what they say they are doing. But this is not the same as assuming that everything firms do is solely with a view to cutting costs or maximising profits. Auditors have a legitimate stake in the regulatory infrastructure, including auditing standards, and they are entitled to challenge boundaries. They are also obliged to help regulators understand exactly what the problems are.

Observations from interviewees about these issues include the following.

‘… we talk to regulators all over the world and they’re keen to understand. There’s a lot of innovation among our clients at the moment and everyone is struggling with the pace of change. It’s a business issue for our clients and their regulators too, and it’s a global challenge. A lot of it is about getting standards up to speed quickly enough and that’s hard on a global basis.’

‘… we know it’s hard for a regulator to see less effort as anything other than a quality issue but it’s just wasteful to perform the same test on 100% of a population and still take a sample, simply to comply with the letter of specific ISA requirements, but sometimes we feel we have no choice.’
‘… we’re encouraged to innovate but every time we try and change anything we’re accused of cost-cutting and that’s cynical, it isn’t true and it isn’t fair! Efficiency isn’t the same as cost-cutting. We certainly don’t set out to reduce the overall audit effort but if we do, because we’ve invested and been efficient we shouldn’t be penalised. It’s no reason to go around looking for more “things” for us to do.’

‘… we have to hold back sometimes because we know that whatever we do is likely to be looked on with suspicion. We don’t get any credit for the huge expansion in the volume of transactions we test. If we feel inhibited and we hesitate to bring in new techniques that we think will improve audit quality, just because they involve a lower level of manual effort, there’s something wrong somewhere.’

‘… we’re using data analytics because we have to, to keep up with our clients, and because they result in better quality audits overall. It really is that simple.’

One interviewee points out that ultimately, the market drives innovation in business. Business drives what auditors do and firms have to provide a data analytics offering as part of the mainstream audit, as the market now expects it. Then regulators come in, and they need to get up to speed, and finally standard-setters step in to codify best practice. It’s no one’s fault that these various stakeholders get out of kilter from time to time.

Auditors want regulators to engage more and to understand what auditors are doing differently, and why. They point out that audit procedures are a means to an end, not an end in themselves. Regulators say that they are now focused on the manner in which data analytics techniques are developed and quality assured, as well as the routines themselves, but that firms cannot ignore existing requirements simply because they seem less important than they used to be. It seems that to date, auditors have been fairly good at explaining what the data analytics do, but in some cases regulators are still unclear about how they work, or how auditors are applying them to achieve the specific requirements of auditing standards.

4.6 Determining the skills needed in the next generation of auditors

How much understanding of statistics is necessary to use data analytics today? How much more will be required by 2026?

Many data analytics routines involve a distribution analysis. Some understanding of how to interpret them is already important. For example: tails always attract attention in distributions but it is important to understand that (a) what they represent may be of little relevance to the audit, and (b) genuine outliers, unusual items that are relevant to the audit, may not always show up within the tails. An analysis of the times at which emails are sent or journals are posted might show some at 02:00. This may be interesting, but all other things being equal, the mere fact that some employees are insomniacs is not necessarily relevant to the audit. Someone seeking to ‘hide’ a series of journal postings to cover a fraud might do so ‘in broad daylight’, at 14:00, instead of drawing attention to them by posting them in the middle of the night. Outliers are not always in the tails and statistics can be used to help determine whether a tail has significant outliers, or whether they are elsewhere. While this can be dealt with through firm methodologies, it is important that there is widespread understanding of the issue among firm staff and regulators.
Firms are starting to think about the skills they will be looking for and how they ensure that audit remains a training ground for the CFOs of the future. Examining bodies need to consider whether it is enough to take in data analytics as part of regular and routine syllabus updates, or whether they need to think more broadly about the implications of data analytics for the student cohort, what it takes to be a chartered accountant, and what mix of people the profession needs.

The audit of revenue may be about the past, but determining what the past should have looked like and assessing the risk of fraud is aided by developments in predictive modelling. Quality control over the development of models makes it unnecessary as well as impracticable for each member of the audit team to understand the mechanics, but users still need a clear understanding of the limitations of such models, the real meaning of risk, and they still need to be critical of the output and not to assume that it is right.

It seems likely that these models and the databases to which they are applied will be developed further to deal with issues such as impairment. Artificial intelligence is being brought into the mix. The increasingly complex models on which valuations of assets and liabilities are based means that auditor skills will need to keep up. Auditors will not only need to understand accounting, they will also need to understand information process flows and data, and they will need to have modelling skills, all of which involve maths and statistics. Firms are also starting to talk about the need for creativity. An understanding of how to develop visualisations such as those below, as well as how to interpret them, is likely to be more important as time passes.

**Figure 4: Payroll Analytics, EY UK&I Assurance Analytics**
Basic clustering in a professional services business: average pay by role by department
Data analytics for external auditors

This EY graphic helps auditors explore payroll risks. Tools permit auditors to define their risk lens, then segment and drill down into the data to assist with their testing (for example, by risk type, gender, location, variable pay make-up and deduction rates).

Figure 5: Revenue Analytics, EY UK&I Assurance Analytics

In this EY graphic, colours represent the type of product that a business is selling, analysed by sales and margin. Such analytics help auditors to understand and identify risks relating to revenue, margin and standard costing. Unusual trends in performance can be appraised, prompting higher-quality questions to be raised and more appropriate and efficient audit tests to be designed.

The willingness and ability to learn fast and exercise judgement remain at the top of the list of desirable qualities in trainees. But some firms are clear that the statistical and mathematical skills needed to understand and manipulate the complex models underlying some of the new technologies will, in the long run, play an increasingly important role in making those judgements. Recruits already have to be more computer literate than they once were.

16 Used with the kind permission of EY. © EY 2015, Payroll Analytics, EY UK&I Assurance Analytics.

17 True clustering, using statistical models such as K-means and multivariate analysis in a trading business might organise data into ‘self-organised’ clusters to help auditors explore known or previously unknown or unrecognised relationships, as well as highlighting abnormal behaviour and outliers.

18 Used with the kind permission of EY. © EY 2015, Revenue Analytics, EY UK&I Assurance Analytics.
Do we train auditors to understand the data analytics, or do we need to recruit those who already have an understanding of the subject? Do we look for people unfazed by the graphics in this publication because they ‘have dealt with that sort of thing before’, or do we recruit others with higher-quality analytical skills who have not? What mix of people do we need? What sort of specialists will we need to recruit or train, to understand not just fair valuations, but to challenge the statistics in the underlying models? Will we continue to train generalists? Firms are not yet changing the qualities they say they are looking for in audit recruits, but larger firms are certainly changing the mix of skills required in the audit practice as a whole, recognising the importance of data assurance specialists.

One interviewee describes the biggest challenges for firms as being about ‘ … driving a more analytic mindset in the average auditor.’ This is probably less about having the technical skills to develop data analytics routines and more about the ability to articulate a problem and then solve it. For the time being, UK firms are still recruiting good quality theologians and herpetologists ‘ … provided they can do something straightforward with an Excel spreadsheet.’

Until recently, firms have trained teams of chartered accountants by having everyone in the audit team do a bit of everything. As in many professions, working your way up from the bottom is perceived as a virtue. But the last 30 years have seen an ever-increasing level of specialisation in all of the professions. Training everyone to do everything, even within a single discipline such as audit, may not be sustainable in the long run.

Many larger firms have specialist centres dealing with bank confirmations, for example, and some work is performed by ‘centres of excellence’ outside the UK. If this trend continues, such firms will probably need fewer trainees and there will be less demand for graduates because there will be less routine work to do. It means that the auditors that are trained will spend more time on judgemental areas. However, overcoming resistance to the idea that audit trainees should ‘get their hands dirty’ may take time.19 The firms’ argument is that it is simply wasteful to have highly qualified UK graduates performing routine work in preparing requests for bank reports for audit purposes, for example, or routine checks on inventory records, when that work can be, and often is, performed by administrators or back offices that specialise in such checks.

‘ … there’s a body of evidence building up that well-controlled service centres outside the UK can do some things a great deal better than we can here. They operate to very high standards, their security is better, their main strength is process, and we don’t offshore the judgemental elements. And yes, they’re cheaper – but that’s not the main issue.’

4.7 Looking forward

External auditors did not invent data analytics but they do have a history of demonstrating to management how new techniques work, before management gets the hang of it. Businesses are currently learning about data analytics from auditors at the same time as ERP providers are developing the sort of analytics that particularly interest business. It is possible that auditors will be providing fewer insights within less than five years because management will be doing it, having embedded the techniques it has learned or developed as management controls. But auditors will be commenting on the processes management uses to produce those insights as part of their audit work. The audit of 2026 may be a hybrid of current methods and the new tools.

19 Firms believe that resistance, which is replicated in other professions, arises from failure to accommodate increasing specialisation generally and an outdated belief that specialisation works in one direction only. Most of us would prefer to have our root canal work performed by someone who does them every day, rather than a more general dental practitioner. It may not be so obvious that we should have our teeth descaled by a hygienist rather than the dentist, even if it should be.
The pace of change is fast: a short time ago, audit committees were asking whether firms had data analytics capabilities at all, and were not quite sure what to do with the answer. Now, audit committees are asking meaningful questions about what insights firms can provide, and some are providing tendering firms with anything from ‘a million lines of IT escalation helpdesk data’ to a small sales ledger in an owner-managed business, and asking them to ‘do something interesting’ with it.

Some interviewees take the view that data analytics is truly game changing and transformational, a disruptive technology which will ultimately change the fundamentals of audit. Others say data analytics enables firms to do what they have always been able to do better, faster, and much more widely, but that it remains a bolt-on capability enhancing the existing offering, and that many of the new routines are likely to be internalised as management controls.

Standard-setting is evolving. The existing standard-setting model, which involves consolidating best practice, works well in a relatively stable and slow-moving audit environment in which audit innovation is incremental. But that environment is changing and faster moving and we do not know, nor can we easily predict, what best practice will look like in five years. Setting hard-to-change standards while the environment is still in a state of flux is always difficult but data analytics stands out. The extent and depth of change it may bring have important implications for enhancements to audit quality, but premature, hasty or narrow changes to auditing standards may act as a potential brake on innovation.

The issue for standard-setters is not just about how to manage the challenge of data analytics within auditing standards – including ensuring that its value is retained within external audit – but about how standard-setting itself needs to evolve. Standard-setters have looked at alternatives to existing processes on several occasions in recent years but have not considered the subject matter or timing right for radical change. Data analytics is different and presents an opportunity for standard-setters to experiment and to be bold. Rather than looking to see how data analytics can be disposed of within existing standards, there is an opportunity to demonstrate to the world that standard-setters can also innovate, in their role as guardians of audit quality and in the public interest.

Data analytics brings real uncertainty and vulnerability to the profession. There is a need for shared thinking, in a safe space in which the tension between proprietary strategy, competition issues and regulatory challenge can be put aside. Firms are necessarily moving ahead in the interests of competitive advantage, and regulators are necessarily dealing with what the firms are doing, but in many ways they are all on their own in uncharted territory. Audit is a social product, a public good and audit innovation is more likely to succeed if it can be developed in a safe environment, before it is exposed to the perils and uncertainties of the open market and regulatory challenge. ICAEW has the capacity to provide this sort of safe space, hence this publication and we welcome the opportunity to help nurture data analytics in audit for the benefit of society as a whole.

Firms, regulators and auditing standard-setters acknowledge the challenges data analytics presents to how they work together to enhance audit quality. ICAEW is greatly encouraged by the extent to which all involved seem keen to engage to take the audit quality partnership forward. The level of investment, hard work and enthusiasm in this space is unusual.
### ICAEW members interviewed for this publication

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<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Firm</th>
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<tbody>
<tr>
<td>Sue Almond</td>
<td>Partner, Head of Audit and Assurance</td>
<td>Grant Thornton</td>
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<tr>
<td>Mark Babington</td>
<td>Deputy Director, Audit Policy</td>
<td>Financial Reporting Council</td>
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<tr>
<td>David Chopping</td>
<td>Partner, Audit Technical</td>
<td>Moore Stephens</td>
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<tr>
<td>Jon Gray</td>
<td>Director, Department of Professional Practice</td>
<td>KPMG</td>
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<td>David Isherwood</td>
<td>Audit Advisory Ethics Partner</td>
<td>BDO</td>
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<td>Gareth James</td>
<td>Partner, UK&amp;I Assurance, Data &amp; Analytics</td>
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<td>Simon Leech</td>
<td>CEO</td>
<td>Validis UK</td>
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<td>Geoff Swales</td>
<td>Director, Assurance Risk &amp; Quality</td>
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<td>Simon Warren</td>
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<td>Andy Whitton</td>
<td>Partner, Data Practice</td>
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<td>Steve Williams</td>
<td>Partner, Governance, Risk and Assurance</td>
<td>Moore Stephens</td>
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<tr>
<td>Alan Young</td>
<td>Partner, Global Assurance Standards, Methodology &amp; Implementation</td>
<td>EY</td>
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