Financial Reporting Council

AUDIT QUALITY THEMATIC REVIEW

THE USE OF DATA ANALYTICS IN THE AUDIT OF FINANCIAL STATEMENTS

JANUARY 2017

The Financial Reporting Council (FRC) is the UK's independent regulator responsible for promoting high quality corporate governance and reporting to foster investment. The FRC sets the UK Corporate Governance and Stewardship Codes and UK standards for accounting and actuarial work; monitors and takes action to promote the quality of corporate reporting; and operates independent enforcement arrangements for accountants and actuaries. As the Competent Authority for audit in the UK the FRC sets auditing and ethical standards and monitors and enforces audit quality.

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Contents

Introduced in 2013, thematic reviews supplement our annual programme of reviews of individual audit firms. In a thematic review we look at firms' policies and procedures in respect of a specific area or aspect of the audit or firm-wide procedures to make comparisons between firms with a view to identifying both good practice and areas of common weakness. The reviews are deliberately narrow in scope, and are chosen to focus on an aspect of audit or firm-wide procedures in greater depth than is generally possible in our review of audits.

The FRC believes this thematic review will be valuable to audit firms in developing or enhancing their use of data analytic tools in the audit, contributing to their own processes of continuous improvement to enhance audit quality. It should also be of interest to audit committees, other audit regulators and audit standard setters.

Our previous thematic reviews are as follows:

- Root Cause Analysis – September 2016
- Engagement Quality Control Reviews - February 2016
- Firms' audit quality monitoring – January 2016
- The audit of loan loss provisions and related IT controls in banks and building societies – December 2014
- Fraud Risks and Laws and Regulations – January 2014
- Materiality – December 2013

Reports on these reviews can be found at **www.frc.org.uk/Our-Work/Audit/Audit-Quality-Review/Thematic-inspections.aspx.**

1 Overview

1.1 Objectives, scope and structure of this report

The use of data analytics in the audit of financial statements (audit data analytics or ADA) is increasing in the global audit market including in the UK market. The FRC's overall objective in undertaking this review was to increase our understanding of the stage that audit firms have reached in developing their tools in this area and how frequently these are being used by audit teams. As this is a developing area our review has focused on what is working well so that good practice can be shared with the objective of promoting continuous improvement in audit quality. We will also use the information gained to inform the development of auditing standards and in continuing to develop our inspection staff's knowledge and skills in this area.

The review was undertaken by the Audit Quality Review (AQR) team of the FRC. We reviewed the use of ADA at the six largest UK audit firms[1] (the firms). Section 1 sets out an overview of the use of ADA in audits by these six firms, along with a summary of our findings and examples of good practice observed. Section 2 sets out details of our findings. Appendix 1 summarises our approach to the review.

All findings arise out of our observations of executed audit work unless noted otherwise. Nineteen examples of executed ADA were reviewed by our specialist IT audit inspectors, selected judgementally to provide coverage of ADA tools and techniques in use. The audits concerned were of financial statements with year ends in 2015. Sixteen of these examples arose from our normal inspection of 109 audits. A further three audits were nominated by audit firms to demonstrate a particular ADA tool in use. In addition, we incorporated relevant findings identified by our non-IT specialists during our normal ongoing inspection activity.

We have focussed our review on audit quality. The capture, storage and processing of entity data presents audit firms with challenges in relation to data confidentiality and security as set out in section 1.8. However, these matters are outside the scope of this report.

1 BDO LLP, Deloitte LLP, Ernst & Young LLP, Grant Thornton UK LLP, KPMG LLP and KPMG Audit plc and PricewaterhouseCoopers LLP

1.2 A brief history of audit data analytics

We have chosen to use the definition of the data analytics adopted by the International Auditing and Assurance Standards Board (IAASB) Data Analytics Working Group (DAWG) in their Request for Input dated September 2016. This, in turn, is based largely on a definition used in an American Institute of Certified Public Accountants (AICPA) publication titled Audit Analytics and Continuous Audit, Looking Toward the Future.

Definition of Audit Data Analytics

Data Analytics, when used to obtain audit evidence in a financial statement audit, is the science and art of discovering and analysing patterns, deviations and inconsistencies, and extracting other useful information in the data underlying or related to the subject matter of an audit through analysis, modelling and visualisation for the purpose of planning and performing the audit.

Auditors have used computers to analyse data in performing audits since companies first computerised their accounting systems. Such procedures, referred to as CAATs (computer-assisted audit techniques), were typically used to analyse sets of data to identify data meeting certain characteristics for further testing by the audit team. These CAATs tended to be tailored very specifically to the entity being audited, requiring a significant investment of time, and, as such, were not widely used across all of the firms' audits.

The development of standard tools for general use by audit teams can be traced back to early 2005 following the introduction of the specific requirement to test the appropriateness of journal entries as part of the auditor's responsibilities in relation to fraud (ISA 240). Firms introduced standard tools to facilitate the audit of journals in line with ISA 240 together with specialised support to aid in capturing the data and loading it into such tools.

Continuing technological developments mean it is now easier (although not without challenge) for an auditor to capture, transform, store and analyse entire datasets than previously, allowing for the interrogation of 100% of the transactions within a population. Audit teams continue to develop bespoke ADA in relation to specific auditing issues. However, a key characteristic of the current increase in the use of ADA is the roll out of standard ADA tools and techniques, coded and tested by specialist staff and deployed with central support. This means that ADA use becomes more efficient, consistent and reliable.

Many of these standard ADA tools employ data visualisation techniques. These provide insights to the data being analysed by placing it in a visual context. Graphs, plots and information graphics may be used. These enable patterns, trends, correlations and outliers that may go unnoticed in text based data to be identified more easily. In addition to helping the auditor execute the ADA, visualisation techniques may also be useful in communicating insights arising from the ADA work to the audit committee.

Some of the most successful and widely used ADA tools started out as bespoke CAATs for use on individual audits. They were subsequently developed further and standardised for wider application.

Firms have told us that the introduction of mandatory retendering in the UK has provided additional incentive to accelerate the development of ADAs, as their use is seen as a key differentiator.

Firms' strategies in respect of the roll out of ADA differ, with some focusing intently on adoption of a limited tool set and others providing a wider range of tools. Within the market we have seen ADA implemented that:

- analyse all transactions in a population, stratify that population and identify outliers for further examination
- reperform calculations relevant to the financial statements
- match transactions as they pass through a processing cycle
- assist in segregation of duties testing
- compare entity data to externally obtained data
- manipulate data to assess the impact of different assumptions.

We are aware that some firms are considering further ADA techniques but, to our knowledge, these have not been developed or deployed for use on audits of financial statements. These include continuous control monitoring, benchmarking of data between audit clients at a transactional level and unstructured data analysis.[2]

1.3 How can ADA contribute to audit quality

Audit quality was cited by all firms as a driver for the implementation of ADA. The ADA we have seen in practice offer the potential to improve audit quality in a number of ways, including:

- deepening the auditor's understanding of the entity
- facilitating the focus of audit testing on the areas of highest risk through stratification of large populations
- aiding the exercise of professional scepticism
- improving consistency and central oversight in group audits
- enabling the auditor to perform tests on large or complex datasets where a manual approach would not be feasible
- improving audit efficiency
- identifying instances of fraud
- enhancing communications with audit committees.

2 The automated analysis of unstructured data such as the content of emails or word processing documents

1.4 Summary of our findings

The following summarises our findings, further details of which are set out in section 2.

Subject	Summary of findings
The use of data analytics in the audit is not as prevalent as the market might expect (2.1)	Audit firms and teams feel pressure to promote the use of ADA techniques on audits to meet audit committee expectations, to achieve efficiencies and to win competitive tenders. This may result in the pace of ADA development and usage being overemphasised.
Audit quality can be enhanced through the use of data analytics (2.2)	Thoughtful use of ADA techniques can provide audit evidence that is more focused to the audit risks and provide useful insights to an entity's management and the audit committee.
Supported roll out of standard ADA tools (2.3)	Where firms focus deployment efforts on supporting a small number of ADA tools, use is more successful and uptake by audit teams increases. As auditors gain more confidence they are more likely to use the tools again in subsequent years and on other audits. Where audit teams are able to choose from a wide variety of ADA tools, their use on audits is reduced.
Specialist, dedicated support for data capture for use in ADA tools increases effective use (2.4)	Where audit teams are able to obtain entity data efficiently they are more encouraged to use ADA tools, improving their successful use on audits. This is facilitated by the use of specialist resources.
Appropriate use of standard ADA techniques in audits (2.5)	Audit teams need to have a clear understanding of the purpose of the ADA technique within the audit methodology to ensure that they obtain sufficient and appropriate audit evidence.
Evidencing of ADA (2.6)	An experienced auditor should be able to understand the nature, timing and extent of the audit procedures performed, including where ADA tools have been used. We observed a number of instances where such evidencing was insufficient.
Audit regulators' approach to standard ADA tools (2.7)	Audit regulators need to consider how they assess the integrity of ADA tools used by audit teams and in particular whether they are functioning as intended.
Globalisation of ADA tools (2.8)	Where ADA tools are adopted globally, group teams can instruct that specific tools are used. Where entities use global systems, ADA can be used to execute testing centrally. This promotes efficiency and central oversight, but provides additional evidential challenges for component auditors.

1.5 Good practices observed

We have observed a number of good practices at one or more firms, which we consider contribute to the effective use of ADA techniques on audits. These are set out in section 2 and include the following:

- focused roll out of a specific tool, enabling audit staff to build experience and confidence in its use (2.3)
- clearly positioning the use of ADA techniques within the firm's audit methodology (2.5)
- testing or trial running the use of ADA tools at an interim date, particularly in the first year (2.2)
- using specialist staff and standard scripts for data capture and loading ADA tools, while clearly defining roles and responsibilities between data analytic specialist staff and the core audit team (2.4)
- centrally running ADA for group audits (subject to component documentation requirements) (2.8)
- clearly documenting the ADA tool using flowcharts, where applicable, to aid understanding and subsequent reperformance (2.6).

1.6 Firms' plans for the development of the use of ADA and next steps

All firms are continuing to extend their use of ADA across their audits and they should reflect on our findings and the good practices we have noted. Outlines of the firms' plans for ADA have been disclosed in the firms' transparency reports, available on each firm's UK website.

As a member of the Global Audit Quality (GAQ) working group of International Federation of Independent Audit Regulators (IFIAR), we have been discussing the use of data analytics with representatives of the six largest audit firms at a global level regarding the current status of ADA. To date, the tools developed by the global firms have focused largely on risk assessment procedures, through analysing populations of data to identify which items to test. This is consistent with the tools we have seen in practice during our thematic review.

We will continue to monitor and to report on the firms' use of ADA through our annual 'Developments in Audit' report. We plan to perform a follow up thematic review within the next three years to report on the progress of firms in using ADA across their audits.

1.7 Standard setters and impact of audit regulators

We asked each firm to tell us about any concerns that they had with current auditing standards and how they may be applied to the use of ADA. The IAASB is considering the use of ADA on audits. The IAASB DAWG has recently issued a paper, 'Exploring the Growing Use of Technology in the Audit, with a Focus on Data Analytics' and a 'Request for Input' which appears to recognise the firms' concerns. These include (but are not limited to) the need to fit ADA techniques into the auditing standards framework of risk assessment, tests of controls, substantive analytical procedures and tests of details and to what extent each exception should be investigated if an entire population has been tested. As the IAASB DAWG will be considering these concerns directly, we encourage firms to respond to the IAASB paper. Responses are due by 15 February 2017.

Given the global approach that the large firms are adopting to developing, implementing and potentially executing ADA, we believe that a consistent international approach to any future changes to auditing standards is important. We will be providing our own response to the IAASB paper which will be published on the FRC website. Therefore we will not expand further on this area in this report. We will continue to liaise closely with the IAASB, other regulators and professional bodies.

In addition to the work of the IAASB we have had regard to other relevant papers and reports in this area as referenced in Appendix 1 and referred to in the body of the report.

1.8 Data security and confidentiality

The capture, storage and processing of entity data presents audit firms with challenges in relation to data security and data protection, particularly for international group audits. The EU Audit Directive, as embodied in ISCQ1 para 46D-1, sets out that firms shall establish policies and procedures designed to 'ensure that the firm complies with applicable legal and regulatory requirements relating to the confidentiality of information received in the course of the engagement'. Entities need to have confidence that their data will be held and processed securely, so that they can fulfil their own legal and regulatory obligations in making the data available to auditors. The implementation of appropriate policies and procedures in relation to data security is, therefore, a necessary part of the effective deployment of ADA techniques. In addition, audit firms risk reputational damage should a security breach occur. We are aware that firms are considering and responding to the challenges in this area and intend to monitor that they do so. However, these matters are outside the scope of this review.

2 Findings of our review

2.1 The use of data analytics in the audit is not as prevalent as the market might expect

Why is this important?	Audit firms and teams feel pressure to promote the use of ADA techniques on audits to meet audit committee expectations, to achieve efficiencies and to win competitive tenders. This may result in the pace of ADA development and usage being overemphasised.
Summary of findings	Mandatory audit re-tendering is promoting the firms' development and use of data analytics in the audit. The UK audit firms are at the forefront of the global firms' development and usage of data analytics. Although the use of data analytics is increasing, more rapidly at some firms than others, the pace of change is not as fast as thought by audit committees and investors. Audit firms are investing heavily in ADA tools, but some firms are not actively monitoring the level of usage by audit teams or whether the use of the tool was successful in providing appropriate audit evidence. Audit teams, in some cases, have overemphasised their use of data analytics in audit committee communications.
Good practices observed	Half of the firms are actively monitoring the usage of ADA tools by audit teams to some extent. Good practice was observed where the automatically generated ADA usage data was supplemented with insight regarding the success of the tool in providing audit evidence.

The large UK audit firms are investing heavily in ADA capability, be that hardware, software or skills. ADA capability forms part of the firms' offering to the market, featuring in the audit and assurance sections of some firms' websites and in their most recent audit transparency reports. As a result of mandatory audit re-tendering, audit committees are increasingly requiring bid teams to be explicit about their ADA capabilities and audit firms are promoting their use of ADA tools and techniques to build or maintain their market share.

All six firms routinely use ADA to assist with journal entry testing in support of work carried out to address the auditor's responsibilities in relation to fraud (ISA 240). With the exception of one firm, ADA techniques are not yet being used routinely on other audit areas that we generally look at in our annual audit inspections. We therefore asked the firms to provide us with information of where ADA had been used so that we could direct our thematic review appropriately. Given the amount of investment by firms in ADA tools, we were surprised that the firms were unable to provide reliable data regarding the extent of their use by audit teams. Some firms were able to share automatically generated management information regarding which teams had accessed certain tools, however this did not identify where the tools were used effectively to generate audit evidence. Firms did endeavour to collate information for the purposes of this review, but in some cases this was limited to the audit of FTSE 100 or 350 companies, was not wholly reliable and was not directly comparable between firms.

The following table aims to give an insight into the use of standard ADA tools at the six firms reviewed. However, it is subject to certain caveats:

- Our main data collation exercise took place during 2016 and was based on completed audits. Hence tools launched for December 2016 year ends may not be reflected.
- As we were unable to obtain reliable comparable data from the firms regarding the extent of use of ADA to obtain audit evidence we have made some generalisations for ease of comparison and to preserve anonymity.
- Our inspections focus on risk areas of the audit and hence ADA used on less risky areas may not have been reviewed by our inspection team.
- Our inspection scope includes public interest entities and other large AIM entities – hence where firms have chosen to roll out tools to smaller entities first we may have observed a lower incidence of use.
- In addition to the standard tools we have seen some use of bespoke analytics across all six firms. The most complex examples of the use of ADA are, by their nature, bespoke.

Standard tools by ADA type	Firm A	Firm B	Firm C	Firm D	Firm E	Firm F
Journal Entry Testing	W	W	W	W	W	W
General Ledger Analysis/third party tools		R F	R F	L F	R F	L F
Revenue Analytics (α)	W F			L F		P
Process Analytics (β)		L		L	L	
Derivatives Valuation		L F		L	R F	
Impairment modelling		P F				

W wide use, accepted norm

R regular use, part of standard auditor 'tool kit'

L limited use

P pilot use

F FRC has observed use of this tool or had exposure to use of the tool during the thematic review

(α) for the purposes of this table, "Revenue Analytics" refers to the deployment or central tailoring of a specific tool expressly to perform Revenue Analytics work in a structured way across multiple audits.

(β) some tools, such as process analytics, are not designed for wide deployment at this stage so it is not surprising that their use is limited at this time. Process analytics involves the analysis of data drawn from different points in a transaction flow (e.g. re-performance of a three way match). It typically involves larger and more complex datasets than those involved in general ledger analytics and a higher level of specialist involvement.

The term audit data analytics or ADA may be used in a wide variety of situations from the interrogation of a fairly small and limited dataset to a complex analytic interrogating several hundred datasets. ADA tools are also used to obtain audit evidence in conjunction with other auditing techniques. The weight of audit evidence obtained through the use of ADA will vary depending on the audit team's overall audit strategy. There is therefore a risk that audit teams may overemphasise their use of ADA. While we have seen no cases where representations as to the use of ADA in audit reports or audit committee reports are technically incorrect, we have identified a small number of instances of audit committee reporting which we believe 'overemphasise' the significance of the procedures undertaken.

To achieve audit efficiencies when implementing ADA, audit teams need to review their existing audit approaches to identify the testing the ADA replaces. It seems that audit teams are cautious about getting this wrong. One of the reasons cited by two firms as explaining why the usage data for ADA tools is unreliable is that audit teams are experimenting with the tools prior to using them to generate primary audit evidence.

We have seen one instance where an ADA was run only to provide insight to the audit committee. We have also seen two instances where audit committee reports include details of where audit teams are investigating or piloting ADA – this may well be of interest to audit committees and demonstrates that ADA is in the early stages of wide adoption. However, it may also bring ADA to prominence where no audit evidence is actually being produced with the tools. Audit committees may value the insights provided, particularly where they cannot be generated using the entity's own analytics capability. However, auditors must take care that insights provided via the audit process that do not generate audit evidence do not 'cross the line' into providing non-audit services. We have also seen one instance where a tool described as 'launched' in the firm's transparency report was subsequently described to us as being in pilot stage.

For journal entry testing, firms have used standard tools and techniques for a number of years and this remains the most common form of ADA we see in practice. This review focusses on the use of ADA in areas other than journal entry testing in relation to ISA 240.

The next most common class of ADA we have observed involves analysing the same population of general ledger journals in different ways to perform specific tests over specific accounts. Three firms in particular have developed, or are developing, specific revenue analytics tools using this approach. At one firm, the most widely adopted ADA tool we observed being used effectively through the course of our review was a revenue analytics tool, which became markedly more prevalent through the 2015 year end audits. This technique was developed by the UK firm.

At the other firms we were only able to see ADA tools being used on a small number of audits. Overall, UK firms are at the forefront of their own networks' ADA developments.

2.2 Enhanced audit quality through the use of data analytics

Why is this important?	Thoughtful use of ADA techniques can provide audit evidence that is more focused to the audit risks and provide useful insights to entity's management and the audit committee.
Summary of findings	For complex entities it can take at least two years of investment by the audit team and entity management to deliver full benefits of a data driven audit approach. Effective use of ADA is typically driven by at least one enthusiastic individual audit team member with partner support.
Good practices observed	Audit team knowledge of the entity and their systems is key to good quality ADA, both in design of ADA and in interpretation of results. Running ADA at an interim date improves the prospect of obtaining robust results at year end, particularly in a first year audit.

All audit firms cited increased audit quality as one of the drivers to the increased use of ADA. Observed examples of ADA being used to produce good quality audit evidence include:

- tracing individual revenue transactions to debtors and subsequent cash received
- reproduction of inventory ageing
- reproduction of debtors aging
- valuation of financial instruments
- tracing supplier income to agreements and cash received
- recalculation of fund management fees based on value of assets under management.

Whatever the type of ADA being performed, auditors need to be able to scope the ADA accurately by identifying the appropriate datasets and relevant accounts. Executing the ADA will deepen and extend the audit team's knowledge of the entity.

As auditors work through their first runs of an ADA they may identify sub-populations of interest or an aspect of the application systems of which they were not previously aware. This can enable the relevant parameters or the logic that produce the evidence to be refined to take account of these characteristics. This holds true for both standard and bespoke analytics. We have noted that more reliable results are obtained at year end if an analytic is run at an interim stage first, particularly in the first year of using the ADA. This allows audit teams and data assurance specialists to work together to address any unexpected anomalies and identify whether they are true exceptions or standard transactions of a nature that was not initially considered. For example:

- transactions giving rise to deferred income were highlighted as anomalies in a revenue analytic, but were found to be standard as online sales were made

– a simple matching analytic of orders to shipments produced a large number of apparent exceptions. On investigation these arose in the normal course of business as the entity frequently sent out orders in more than one shipment.

Audit teams need to make an efficiency judgement when such sub-populations are identified as to whether to refine the logic of the ADA or to perform follow up manual testing. It may be that in year one of an ADA a manual sampling approach might be taken to testing a sub-population, whereas the following year the ADA can be refined to automatically match those items to a second independent data set. For the audit of complex entities, therefore, it can take at least two years of investment by the audit team and entity management to deliver the full benefits of a data driven audit approach.

2.3 Supported roll out of standard ADA tools

Why is this important?	Where audit teams' use of ADA tools is successful they are more likely to use them again in subsequent years and on other audits.
Summary of findings	Where audit teams are able to choose from a wide variety of ADA tools, their use on audits is reduced.
Good practices observed	A focused roll out of specific ADA tools to audit teams supported by a central team(s) can increase the level of uptake. Audit teams build experience from using the same ADA tool on a number of audits.

The growth in ADA has been supported by firms rolling out centrally developed standard tools for teams to use on audits. Where firms have focused on a small number of tools we have seen these being used on more of the audits we have looked at. As they are used more often audit teams become more practiced in their use and more adept at evaluating the results, therefore developing confidence in their use.

Uptake of ADA is higher at those firms where the rollout of tools is 'pushed' from the centre rather than relying on a 'pull' from individual teams. Teams may not see a reason for change where they were satisfied with their previous approach and therefore without a central push and, we observe, support they will not change their audit approach.

A focused rollout also allows for more specific support systems to be put in place. Training alone does not equip teams to deploy ADA optimally – in our view support at the point of execution is important as there will be varying considerations running the same ADA in different environments. The deployment of local 'champions' may prove beneficial.

There are some risks associated with a central push, such as the ADA tools being used where inappropriate (see 2.5).

2.4 Specialist, dedicated support for data capture for use in ADA tools

Why is this important?	Where audit teams are able to obtain entity data efficiently they are more encouraged to use ADA tools, improving their successful use on audits.
Summary of findings	Audit teams often lack the required IT knowledge to extract data in the required format from entities' systems for use in ADA tools. Difficulties in obtaining entity data efficiently for use in ADA tools can be a barrier to their use by audit teams. Audit testing may be omitted where responsibilities between data analytics specialists and the core audit team are not clearly defined.
Good practices observed	Standard extraction routines (scripts) and extraction tools are used to obtain and prepare the required data from specific/common systems, which improves efficiency and reduces opportunity for error. Use of dedicated staff with specialist data handling skills, in some cases operating from central support teams, to improve the effectiveness and efficiency of the extraction of entity data into ADA tools.

Effective and efficient data capture is key to the successful use of ADA. Teams should ascertain at an early stage whether the quality of the data that the entity's management can provide is sufficient to support the envisaged analytic. Difficulties in obtaining the correct data in the correct format were cited explicitly by two audit firms as one of the main obstacles that hinder ADA deployment.

Firms are increasingly using specialist staff to perform the data capture. Three firms have dedicated centralised support teams to do this. Our observations in performing this thematic review are consistent with the findings of the joint ICAS / FRC report 'Auditor skills in a changing business world' which noted that 'There is no doubt that the firms have individuals and specialists with extensive technology skills'.

All firms are moving towards the use of standard scripts and/or extraction tools to obtain data from common accounting systems for use in standard tools. Three firms are using third party extraction tools to some extent. The deployment of such resources and techniques not only removes the need for core audit teams to get involved in an area that requires specific IT knowledge, it also eases the demands on entities, as requests are more likely to be technically correct and efficient to execute.

Three firms indicated to us that they use offshore staff to assist in data capture and transformation. Therefore the audit team, the data analytics specialists and the data may be in up to three separate geographic locations. Such a model provides challenges to the firm in relation to data governance, security and privacy. These considerations are outside the scope of this thematic review (see section 1.8).

There is a need for clear communication and allocation of responsibilities to ensure that all the required audit procedures are performed. For example, the responsibility for assessing the completeness and integrity of the captured data to be used in the ADA tool should be clearly assigned. On one audit the data assurance staff stated that it was the core audit team's responsibility to perform this assessment, but there was no evidence that this assessment was performed.

2.5 Appropriate use of standard ADA tools in audits

Why is this important?	Audit teams need to have a clear understanding of the purpose of the ADA technique to ensure that they obtain sufficient and appropriate audit evidence.
Summary of findings	The use of ADA techniques by audit teams is higher at firms where the purpose of ADA and the circumstances where it is useful are clearly defined within the firm's audit methodology. A successful ADA may be dependent on evidence obtained from other audit areas, but testing in those areas may not be adequately designed to support the ADA. Tests using standard ADA tools may not be performed properly where an entity's systems and environment are different from those envisaged in the design of the tools. The ADA tools may not be effective to obtain evidence for the whole population and all relevant assertions, including the completeness and accuracy of data used in the ADA.
Good practices observed	Appropriate use is improved where there is clear guidance on the positioning of the ADA technique within the audit approach and on the use of the standard tool. Data used in the ADA tool is fully reconciled to the underlying ledgers and clearly linked to relevant other audit procedures.

ADA techniques are not used in isolation, the output of the technique will form part of a body of audit evidence. There are a number of areas audit teams need to consider at the planning stage in deciding whether to use a standard ADA tool.

- Audit teams should consider whether a tool is a 'good match' for their client entity's specific environment. This is particularly important where there is a central 'push' for audit teams to adopt a specific tool. For example, we observed one audit where a tool designed on the basis that an entity posts granular journals was deployed on an entity that posted large batch journals. This produced a number of anomalies in the output that required significant follow up work.
- Audit teams should ensure that all the relevant assertions are covered for the balance they are testing. We observed one audit where the 'completeness' assertion for revenue was not addressed and one audit where the 'classification' assertion was relevant but was not addressed.

– Audit teams should assess whether testing in other areas needs to be flexed to provide the necessary supporting evidence for the use of ADA. For example, four firms use ADA in various ways to provide assurance over revenue by tracing sales transactions through to debtors and cash. The technique may then rely on testing of debtors and cash to provide substantive evidence for revenue. We have observed one such audit where the cash procedures were inappropriately performed on a sample basis and the bank account used for sales receipts was not included in the sample.

Audit teams are therefore more confident in adopting ADA where the purpose of ADA and the circumstances where it is useful are clearly defined in line with the firm's audit methodology. Centrally provided guidance for specific tools can help avoid 'gaps' in audit testing. For example, two firms using standard ADA tools in the audit of revenue have issued specific guidance, one in the form of a standard work program incorporating the use of ADA, the other by describing that nature of procedures that are required to complete the revenue audit in addition to execution of the ADA.

We are starting to see methodologies evolve to encourage the use of ADA in certain circumstances with one firm now strongly encouraging the use of ADA for risk assessment, although we have not yet seen the impact of these developments in the field.

Some of the data analytic tools and techniques were originally developed by firms for the advisory market. These can be difficult to apply for use in audits and therefore require careful adaptation and positioning. We have seen better uptake with tools that originated within the audit practice rather those adapted from advisory usage.

2.6 Evidencing of ADA

Why is this important?	An experienced auditor should be able to understand the nature, timing and extent of the audit procedures performed, including where data analytics have been used.
Summary of findings	ADA tools are often run separately from the audit file. The audit team determines what inputs and outputs to evidence on the audit file. Insufficient or inappropriate audit evidence was retained where: • factors and criteria input to ADA tools were not recorded • screenshots of interactive ADA omitted important information relating to the test parameters • evidence produced by ADA specialists was omitted • firms' archiving tools were not able to archive relevant ADA evidence • it may not be technically, practically or legally possible for either the audited entity or the audit firm to keep data in a format that allows reperformance of ADA throughout the six year audit file retention period required by auditing standards.
Good practices observed	Some excellent examples of evidence with clear audit trails accompanying meaningful visualisations.[3] Good use of flowcharts on audits to demonstrate the audit team's understanding of how the ADA tools have been used in a complex transaction stream.

We note that the IAASB DAWG has raised the challenges in meeting ISA documentation requirements when applying data analytics as an area that may affect standard setting. As we have performed our review, we have noted a number of areas as discussed below where the evidence was insufficient for us to fully understand the procedures performed.

Audit teams must consider the data analytics specialists, including those that assist in capturing the data, as part of the audit team. The auditing standards considerations in relation to evidence, documentation and archiving therefore cover the data analytics specialists' work as they do any other audit work. We identified three audits (at three separate firms) where we required information produced by data analytics specialists in order to gain an adequate understanding of the nature and extent of the work performed, but the information was not held on the archived audit file. We also have some concerns regarding how audit firms demonstrate the integrity of the operation of standard tools (as discussed at section 2.7 below).

One audit firm has designed templates and standard documentation sets to assist with this. We observed them to be used effectively on one audit, but on another audit they were either not used or not retained on the archived audit file.

3 Data visualisation communicates information clearly and efficiently via statistical graphs, plots and information graphics.

Where we have seen good examples of documentation, these are characterised by fewer words and clear diagrams and flowcharts. Where we saw examples of documentation using lengthy narratives, these did not adequately reflect the procedures performed. We observed one audit where a good flowchart that aided understanding of the bespoke ADA used was not rolled forward onto the current year file, although the ADA was run again.

One of the benefits of current data analytic tools is the ability to produce visualisations. Such techniques can help audit teams identify trends and outliers in populations. For some tools audit work may be iterative in nature, with audit teams able to flex the parameters that produce the visualisations to produce the output that appears most useful for their purposes. We have seen numerous instances of visualisations being used to assist auditors in understanding the populations they are auditing. Care needs to be taken to ensure that retained evidence is clear and concise. We have observed the following:

– one audit where there was no clear numeric audit trail through the retained evidence to enable the work to be reconciled to the ledgers
– one audit where the screenshots retained as evidence contained incomplete keys, meaning that the visualisation could not be understood.

At present we are not aware of firms routinely retaining captured datasets throughout the file retention period. Data is typically either deleted on completion of the analytic, or retained for a year to enable comparatives to be made. There are open questions regarding the retention of large datasets, as noted by the IAASB DAWG.

2.7 Audit regulators' approach to standard ADA tools

Why is this important?	Audit regulators need to consider how they assess the integrity of standard ADA tools used by audit teams and in particular whether they are functioning as intended.
Summary of findings	Audit teams use standard ADA tools based on the firms' assurances as to their reliability and effectiveness to function as intended. The audit firm's scripts driving the functioning of the ADA tool are often designed to be held separately from the audit file and hence are not available to the regulator to review. Regulators should consider how to evaluate ADA tools developed or executed in another jurisdiction.
Good practices observed	Standard audit documentation for some standard ADA tools includes details of the underlying scripts and the parameters chosen. However, this is not technically possible with all ADA tools.

Standard ADA tools are typically populated with the entity's data by data assurance specialists. Audit teams are then able to analyse or interrogate the data through a user friendly interface, entering or amending relevant parameters to obtain the required output. Where audit teams use such tools, the actual programming logic that performs the analysis and, where relevant, identifies the exceptions, is embedded in the ADA tool and may not be visible. Hence it is not archived on the audit file and neither is it visible to regulators performing audit quality inspections.

Where standard ADA tools are used, firms have varying approaches to ensuring that the ADA tools are functioning as intended and endorsing their use. One firm, with a wider choice of tools and techniques than most, formally accredits tools for audit use. Third party visualisation software may be deployed, however these are often badged with the firm's proprietary tool name and it is not evident which logic is coded by the firm and which is standard code in the third party software.

The IAASB paper acknowledges that one of the challenges that impacts the use of data analytics in a financial statement audit is 'how regulators and audit oversight authorities maintain oversight'. The FRC recognises that we need to adopt a standard approach to satisfying ourselves as to the integrity of these tools. However, as tools are global in nature, and in some circumstances may operate outside our geographic jurisdiction, we believe that this approach should be arrived at collaboratively with other independent audit regulators.

We would note that, in our inspection work, we have not identified evidence that would indicate that a centrally assured ADA tool does not function as intended when used as intended.

2.8 Globalisation of ADA tools

Why is this important?	Consistent use of ADA by group and component audit teams promotes a consistent audit approach across global groups.
Summary of findings	ADA tools developed in one territory of a global firm are being rolled out globally.
Good practices observed	Group audit teams instructed component audit teams to use specific ADA tools encouraging consistent global adoption. Where entities have global accounting systems, the group audit team has used ADA across multiple components to extract populations and samples for testing.

Where global clients run global accounting systems, group teams can instruct components to use the output of centrally run ADA. This provides advantages in terms of efficiency, standardisation of approach and ability of the group team to provide oversight and direction to component teams.

We have seen limited examples of group teams deploying this approach to date. While we have not had access to the component files, we are interested as to how the documentation challenges referred to in 2.5 above are addressed where components are evidencing their work for local statutory purposes.

3 Appendix 1 – Our approach to the review

Our approach to this thematic review can be summarised as follows:

- We asked each firm to complete a questionnaire in February 2016 regarding their current use of ADA, focusing on audits with 2015 year ends.
- We held meetings with and attended presentations made by the firms regarding the use of ADA on audits over the past eighteen months.
- As far as possible the different responses were compared across the firms. We were unable to obtain reliable comparable data from the firms regarding the extent of use of ADA to obtain audit evidence. Areas of good practice were identified and outliers were identified and followed up.
- During our 2016 inspection cycle we focused on the use of ADA in the audits reviewed and we reviewed specific audits identified by individual firms as demonstrating a particular ADA tool or technique. The findings from these reviews were collated, identifying areas of good practice and areas where improvement was required.
- We reviewed the following publications issued by professional bodies, audit regulators and standard setters:
  - 'Data Analytics for External Auditors' – ICAEW, 2016
  - 'Audit Analytics and Continuous Audit: Looking Toward the Future' – AICPA, 2015
  - 'Exploring the growing use of technology in the audit, with a focus on data analytics' – IAASB Data Analytics Working Group, Request for Input, September 2016
  - 'Auditor Skills in a Changing Business World' – ICAS and FRC, September 2016
  - 'Audit data analytics alert: Keeping up with the pace of change' – CPA, June 2016.
- We held discussions with standard setters, professional bodies and other international regulators to discuss the use of ADA by audit firms in other jurisdictions.
- The results of our review were presented to, and discussed with, each of the firms.

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