



Chartered Institute of
Internal Auditors



DATA ANALYTICS

Is it time to take the first step?

Foreword



Organisations are seeing increasing digitisation of their operations, resulting in an exponential growth in the generation of data across all business functions. In its proper place, data analytics is a powerful tool freeing up internal audit time to add value to their organisations. Internal auditors must, however, still apply judgement in its application and skill in its interpretation.

Incorporating the use of data analytics into the audit process enhances the ability to do whole population testing and continuous auditing, which in turn can enhance the assurance provided to the board on the management of risk and controls. In this way, some aspects of internal audit practice are likely to change, which will require new skillsets and new thinking.

The case studies which form the core of this report feature three internal audit operations which have successfully established data analytics as a part of their practice. These provide some valuable lessons for considering the potential use of data analytics in internal audit methodologies, and some pointers for introduction and advancing along the maturity path.

For these three organisations, data analytics increased assurance and enabled the internal audit team to focus increasingly on strategic risk, but time and investment was required to up-skill audit staff and embed the methodologies to deliver such significant benefits.

We are very grateful to the heads of internal audit at these organisations and others who have contributed to this project.

Dr Ian Peters MBE
Chief Executive
April 2017

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Executive summary

- The purpose of this report is to enable the head of internal audit (HIA) to have a strategic discussion with their board/audit committee to help determine the value add of introducing data analytics into the function's methodology.
- Most medium and large organisations are generating big data¹ – huge volumes of data ranging from financial transactions to key metrics. Internal auditors, particularly in larger organisations, are making use of data analytics to both guide their audit plan and test controls.
- Data analytics in internal audit is becoming more prevalent as time goes on. For some, it is no longer a question of when to implement it in their methodologies but how.
- The report contains three case studies of internal audit functions ranging from large to small – Coca-Cola Hellenic, Credit Suisse and Dublin Airport Authority – that have incorporated the use of data analytics into their methodologies in order to reap the benefits of data analytics.
- The three case studies (see summaries in the next section) show that the key benefits for the internal audit function are to:
 - Increase efficiency. For example, scripts can be re-used for periodic audits, resulting in efficiency benefits through using analytics vs performing the analysis manually;
 - Increase effectiveness by performing whole-population testing instead of random or judgmental sampling;
 - Improve assurance;
 - Enable a greater focus on strategic risks by moving away from the more routine tasks which can be automated to a greater degree;
 - Provide greater audit coverage; and
 - Realise significant savings, in terms of time and money, over the longer term.

You can see the full case studies in annex A.

Data analytics case study summaries – adding value to internal audit functions

Coca-Cola Hellenic

[Increased assurance using whole-population testing and secondments to the data team to increase the requisite technological skills]

- The internal audit function leverages the organisation's (Enterprise Resource Planning) ERP system.
- The ability to test 100% of the sample in various audits is where the real value lies as internal audit is able to provide much greater assurance.
- Increasing use of data analysis is becoming more common but there is still a need to go out and meet the business to get the intuitive feel that is necessary in an audit.
- The challenge of getting people with a combination of internal audit leadership and data analytics skills will be an increasingly important issue to overcome in the future.
- The HIA seconded members of his team into the data team in order to help up-skill them in the more technological side of data analysis, such as scripting.



¹ "Big data" is the term used to describe the huge portfolio of data that is growing exponentially. It is becoming clear that big data will have a significant impact on operational processes and risk management in organisations. Big data in itself, however, yields limited value until it has been processed and analysed.

Credit Suisse

[Data analytics is used in most audits including non-financial strategic risk areas such as culture]

- Adopting data analytics transformed the function from a traditional judgement-based, sample-driven, manually intensive and reactionary audit process to one that is truly risk based, continuous/real-time and data centric. Buy-in from the function's leadership and every auditor in the team was crucial. Sponsors should also recognise and accept that a period of incubation is necessary before tangible benefits can be delivered. Data analytics is integrated in to all parts of the internal audit cycle. It is, however, mainly used in fieldwork.
- The ideal auditor who uses data analytics as standard in their audit methodology needs a blend of core analytics skillsets, business experience and a solid understanding of risk.
- They go beyond making use of data analytics in financially oriented audits by utilising it in strategic risk areas such as the 'risk and control culture' aspects of their audits.

Dublin Airport Authority

[Enables the team a greater focus on strategic risk]

- Prior to applying data analytics, 90% of the function's time was spent on financial audits. Since incorporating data analytics the focus has shifted, with 50% of audits now concerning non-financial risks. This shift of focus improved the function's overall effectiveness, as the key risks in the organisation are largely non-financial and the overall direction of internal audit is to operate on a more strategic level by looking at strategic risks.
- Data analytics enables continuous auditing on specific business cycles but not necessarily all of them, especially in the case of smaller audit functions. It is important to weigh up the costs and benefits of introducing continuous auditing.
- Data analytics can be applied in all audit functions regardless of size. Sophisticated applications require larger investment, but the basic application of using a desktop function can be incorporated into all internal audit functions with relatively low levels of investment.

Understanding how data analytics can help

Introducing data analytics into the audit function is a journey that HIAs need to embark on only after considering the specifics of their organisation: its size; the industry it operates in; and engagement from the board/audit committee. HIAs need to determine how the use of data analytics will assist them in meeting their strategic needs. They also need to determine which specific areas of the audit population analytics can be used in rather than incorporating it into the audit plan without a clear purpose or strategy.

As with most areas of internal audit, HIAs must ensure their department has the right mix of people, process, technology and structure to realise the greatest benefits from data analytics.

- Without some team members who are conversant in data analytics, internal audit may not know which data sources to secure;
- Without the right process, the data that the department obtains may be incomplete or compromised; and
- Without the right technology, internal audit may lack tools to retrieve data or glean insights.

Audit teams who decide to introduce data analytics into their functions need to do two things first²:

- 1 Define the function's data analytics objectives – The primary goals of data analytics for HIAs are more efficient, enhanced assurance and stronger monitoring capabilities across the business.
- 2 Evaluate what skillsets and technology will be required to achieve those goals and assess where you will be on the data analytics maturity journey (see p.8). Before investing in time and resources, check that the objectives you laid out are realistic based on the team's skills and experience, the organisation's technological capabilities and level of assurance required.

“The ability to uncover trends in large volumes of data enables the internal auditor to provide greater insight. However, this alone is not enough; internal auditors must still use their softer skills such as talking to the business and techniques such as root cause analysis (RCA) to explore what is causing those trends.”

Insight

The ability to uncover trends in large volumes of data enables the internal auditor to provide greater insight³. However, this alone is not enough; internal auditors must still use their softer skills such as talking to the business and techniques such as root cause analysis (RCA) to explore what is causing those trends.

One of the ways which could enable internal auditors to provide more insight could be to incorporate data analytics into their audit methodology.

Identify trends and connections

Audit software and reporting tools enable statistical analysis to reveal issues people may be unaware of. Traditionally this has been used to identify gaps or duplications in records. However, the existence of huge quantities of data (big data) and powerful analytical tools now makes it possible to mine data and assess the results from different angles and perspectives to establish new relationships, patterns and correlations. This is a very technical field but the emergence of big data provides scope for internal auditors to develop specific skills and/or work with IT experts to provide insight.

² First steps in data analytics, CEB Risk and Audit blog, April 2016

³ The term 'insight' is now included in the International Professional Practices Framework (IPPF) Mission Statement that describes the role of internal audit as 'to enhance and protect organisational value by providing risk-based and objective assurance, advice and insight'

Applying data analytics to internal audit

The application of data analytics in internal audit encompasses the use of software to identify significant trends and exceptions in large amounts of data.

Such software can be used for basic data analysis, through to complex data interrogation across billions of transactions, as well as assessing control performance and exception reporting among other applications. Many internal audit teams still rely primarily on spreadsheet-based tools and applications rather than more sophisticated analytics and data mining tools⁴. A recent Deloitte survey⁵ showed that only around one-third of HIAs use data analytics at an intermediate or advanced level. The remaining two-thirds of HIAs use basic, ad hoc analytics (e.g. spreadsheets) or no analytics at all.

It is important to compare the different sets of analytic tools to determine what works best for the internal audit function.

The range of tools includes the following:

- Desktop tools, e.g. Excel. Most organisations have this tool and its use for data analytics within internal audit is widespread;
- Specialised tools, e.g. SPSS, Tableau. These enable a wider range of tasks such as infographics and are compatible with usage in other parts of the organisation;
- Audit specific tools, e.g. ACL, Teammate. These enable advanced analytics but require investment and training.
- Enterprise tools, e.g. SAP, Oracle. These tools can be used by audit functions but users need some data science skills and knowledge e.g. scripting.

Continuous auditing

Continuous auditing means that internal auditors can move from periodic evaluations of risks and controls based on samples of populations, to ongoing evaluations using a larger proportion of transactions⁶.

Whole population testing

Internal audit analysis techniques include procedures that are designed to determine whether processes contain data errors and/or whether financial reports contain misstatements. Analysis techniques have always been used to test random data sets or target specific data if an internal auditor feels an internal control process is at risk.

The use of data analytics enables auditors to test 100% of populations. Internal auditors use different types of data analytics to undertake a variety of functions. Fraud analysis and continuous auditing are examples of areas where the total population is often tested and then outliers are subjected to more detailed testing.

It is worth noting, however, that whole population testing is not always necessary because:

- Samples selected using judgement give the level of assurance needed in almost all cases;
- The use of samples is the best use of manual audit resources; and
- Testing 100% does not necessarily give 100% assurance because auditors themselves may make mistakes, particularly if the work is tedious.

In internal audit functions where there is currently no or limited use of data analytics internal auditors will test samples of transactions. Only very rarely would they examine every transaction in the period audited, i.e. if fraud or other financial irregularity was suspected then internal audit will test 100% of transactions. For example, every payslip issued, every invoice authorised, every stock item held.

Testing 100% of transactions isn't new but it was previously undertaken manually and only in exceptional circumstances due to resource constraints. Instead, internal auditors often turned to statistical sampling to extrapolate the number of errors in the total population and to determine the accuracy, or otherwise, of transactions. The sample sizes were often large and therefore may have resulted in human errors resulting in false assurance.

⁴ Data analytics – is this the future of internal audit?, BDO, October 2016

⁵ Evolution or irrelevance, internal audit at a crossroads, Deloitte, 2016

⁶ The IIA, GTAG 2: Continuous Auditing: Coordinating Continuous Auditing and Monitoring to Provide Continuous Assurance

Common uses of data analytics by internal audit

Most commonly, auditors use data analytics for fieldwork and engagement planning, and use the results to identify anomalies and test controls. It was asserted in a recent report by Deloitte⁷ that internal audit needs to embed analytics into its approaches, methods, and communications across most of its activities, from planning through to reporting, in order to make the most impact.

For many functions data analytics is used in more financially oriented audits such as:

- General ledger;
- Purchase to pay;
- Payroll;

- Travel and subsistence/entertainment; and
- Order to cash (a set of business processes that involve receiving and fulfilling customer requests for goods or services).

“Most commonly, auditors use data analytics for fieldwork and engagement planning, and use the results to identify anomalies and test controls.”

Internal audit function	Data analytics use examples
Compliance	• Evaluate expense reports and purchase card usage for all transactions. • Perform supplier audits by utilising line-item billing data to identify anomalies and trends to investigate. • Assess regulatory requirements. • Identify poor data quality and integrity around various data systems that are key drivers to non-compliance risks.
Fraud, risk assessment, detection and investigation	• Identify areas at high risk of fraud and assess controls. • Identify ghost employees, potential false suppliers, and related parties or employee-supplier relationships. • Highlight data anomalies that pose the greatest financial and/or reputational risk to the organisation. • Investigate the symptoms of an asset misappropriation scheme to answer the “who, what, when, where” questions.
Operational performance	• Isolate key metrics around spend analysis e.g. payment timing, forgone early-payment discounts and payment efficiency. • Perform duplicate payment analysis and recovery. • Perform revenue-assurance analysis. • Perform slow-moving inventory analysis. • Identify key performance and key risk indicators across industries and business lines.
Internal controls	• Anticipatory e.g. business continuity plan. • Detective and corrective e.g. control account reconciliations. • Directive e.g. code of conduct. • Preventative e.g. passwords, access controls. • Perform segregation of duties analysis. • Perform user access analysis. • Assess control performance. • Exception reporting e.g. identify potential outliers that would indicate control failures or weaknesses.

Source: Based on IIA Research Foundation

⁷ *Evolution or irrelevance, internal audit at a crossroads*, Deloitte, 2016

Benefits of using data analytics

Analytics can enable internal audit to automate the more routine activities of the internal audit process, which then frees up time to do deep dives on the more strategic and complex issues.

Internal audit needs a detailed understanding of the potential benefits of data analytics before implementing it in audit processes.

The key benefits include:

- Increased efficiency. For example, scripts can be re-used for periodic audits resulting in efficiency benefits by avoiding repeated manual analysis;
- Increased effectiveness. Analytics allows for whole-population testing instead of random or judgmental sampling, as well as enabling continuous auditing

- so that internal audit and the business can pick up on emerging trends and themes and be more nimble with their risk monitoring;
- Improved assurance. For example, analytics reduce the margin for human error in the analysis of vast datasets, and allow for greater precision in assessing operational performance;
- A greater focus on strategic risks by moving away from the more routine tasks which can be automated to a greater degree;
- Greater audit coverage; and
- Significant time and money savings over the longer term.

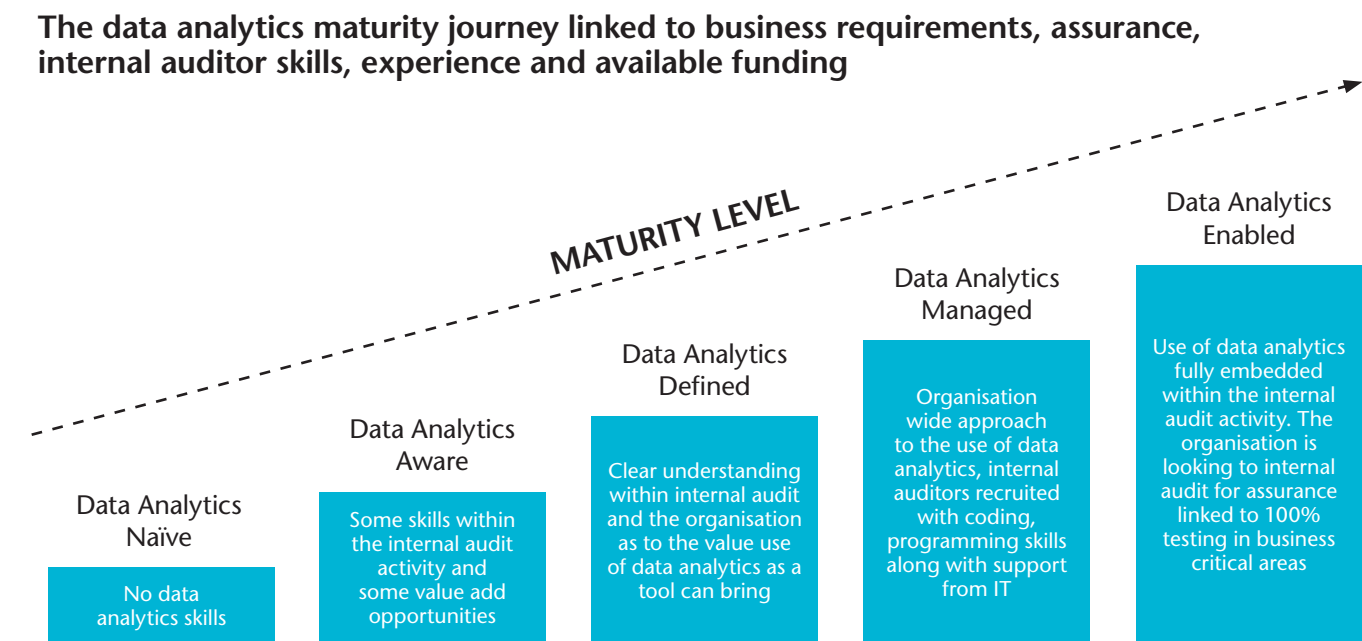
The path to maturity

Internal audit teams who already use data analytics are at various points on the maturity path.

For those functions considering adopting analytics, teams with members who are conversant in analytics skills can start further along the maturity path. It is worth noting that not all team members need to be conversant in the more technical areas such as scripting. If you decide that you would like to

incorporate data analytics into your function’s work at more than a basic level, it is worth bearing in mind that you may need to look for internal auditors with more developed data skills and abilities in the future.

The chart below shows the link between the data analytics maturity path and the internal audit team’s skillset.



Key questions to discuss with your audit committee chair

While it is clear that some organisations benefit greatly from the use of data analytics techniques, we believe that you should address some key questions before considering adopting them for yourself, and determine whether doing so would meet your function's strategic needs and enable you to add value to the organisation.

- Why introduce it? Consider the purpose. Is it to bring about greater assurance or efficiency or both?
- How does use of data analytics relate to your audit plan? Is your plan risk-based? If it is, then using analytics can enable your team to expand audit coverage and increase the focus on risk.
- Use of data analytics and three lines of defence. The risk management function is one of the leading areas in which organisations choose to apply analytics⁸. This provides them with more

information that can be used to make decisions and take action to raise and report those risks in a timelier manner. Senior management is then able to monitor and mitigate these risks promptly, which ultimately improves their decision-making. Is it not management's and the second line's responsibility to 'do' the data analytics work and internal audit's role to assure that the processes are adequate?

- Ask yourself why you need 100% coverage. Whole-population testing is not always the preferred option. Testing 100% of the population is not necessarily the fail-safe option to provide full assurance as poor data interpretation may still lead to the risk of false assurance.
- What kind of tool is it in the armoury of governance, risk and control?

Conclusions

Data analytics offers numerous benefits, but you must first assess whether it would fit with your function's overarching goals and desired activities. You can then build a business case to present to your audit committee chair, but there are some important questions to address before doing so, as outlined in the previous section.

Most who are using data analytics are using it to bring about greater efficiency and to provide greater assurance in their audits and particularly financial audits. We are, however, seeing examples in larger organisations and those in Financial Services, which tend to be further along the maturity path, of analytics being applied to more strategic risk areas such as culture.

Many relevant controls in relation to key business risks have not been automated yet. Internal audit's

approach in relation to assurance around these key risks has, therefore, not fundamentally changed at this point in time. This of course is likely to change as time goes on, so it is imperative to have discussions with the audit committee chair sooner rather than later about how, why and when the internal audit function will need to consider using data analytics to reap the potential benefits.

Internal audit's strength lies in its ability to adapt to an ever-changing landscape, and the use of data analytics should be no different. Internal auditors' skillset will change but they will continue to support their organisations to achieve their goals and objectives through the provision of assurance in relation to risk, control and governance.



⁸ Adding insight to audit, Deloitte.

Annex A – full case studies

Annex A1

Richard Brasher (Corporate Audit Director) – Coca-Cola Hellenic

Coca-Cola Hellenic is a leading bottler of the brands of The Coca-Cola Company with sales of more than 2 billion unit cases, or 50 billion servings, annually. They have operations in 28 countries spanning three continents, reaching 594 million people.

It has one Enterprise Resource Planning (ERP) system with a huge quantity of data going through its operations. The data also accumulates over time resulting in many terabytes of data.

The audit function introduced the use of data analytics a few years ago as they wanted to benefit fully from making use of data generated from the ERP system. They now have an independent data analytics team led by a data analytics expert designing and developing a broad range of ACL scripts and working with the business to understand their key strategic concerns, and if possible design tools to help them.

Coca-Cola Hellenic uses SAP Business Warehouse (BW) to produce standardised reports based on predefined criteria and these provide necessary information for operational and oversight purposes. Although well designed for the first and second lines of defence, these reports encounter performance issues and involve intense manual effort if executed at a large scale. Therefore, on top of the BW, the internal audit organisation uses data mining tools (e.g. ACL) to build and automate various queries over the available sets of data which are good for identifying business process exceptions, highlighting macro level patterns or risks. That said, the development is quite a manual process and requires a unique combination of relevant business and technical knowledge on top of the understanding of writing scripts that underpin the data mining tools.

Practice and methodology

The team follow a standard audit process and when they are auditing a business unit or topic the audit team asks the data analytics team for all the outputs they have from relevant ACL scripts.

Data analytics are incorporated into the whole audit process from planning onwards. The design also incorporates risk-based internal auditing into the process. Each audit contains up to 300 standard working papers and there are certain things that are always tested. Approximately forty per cent of working papers have a data analytics tool built in. They use

- data analytics particularly heavily in the fieldwork stage where, if no scripts are available, they ask the data analytics team to develop them.

In addition to the support provided to Corporate Auditors, the data analytics team provides test results to the Internal Controls Framework (ICF) team on a continuous basis. These tests are developed in cooperation with the Group ICF manager and assist the testing of internal controls. Due to the increasing demand from operational management to have access to the ACL tool results, a Self-Service Portal was developed to share the available data analytics tests with business users as well as the corporate auditors. This has been very well received by the business.

Skills

Internal auditors need to learn to use data analytics effectively. In order to help auditors build their technical skills they can spend six months on secondment with the data analytics team where they are given the opportunity to write their own scripts and learn how the data systems work from a technical perspective.

Continuous auditing

Continuous auditing would enable auditors to spot anomalies in large quantities of data but continuous auditing is at an early stage. They have started to run some scripts continuously, but have found that they need to define the parameters very accurately otherwise simply too much data is generated.

Advantages of using data analytics in the audit function

The use of data analytics helps external auditors to rely on the work already done by internal audit and hence reduces duplication of time and effort. For example, the internal team wrote a script for recalculating depreciation. They shared this with their external auditors who, after testing it thoroughly, were satisfied with it and as a result felt that they could rely on the results of this script to a certain extent for their own audit work.

Another advantage is that it frees up time particularly during the fieldwork stage but they try to use this extra time to make better use of the data in order to deliver a better quality, more focussed, audit. The ability to test 100% of the sample is where the real value lies as the level of assurance is much stronger.

Common challenges

- The need to educate the audit committee of the possibilities presented by the use of data analytics in the audit function.
- Huge quantities of data are now being generated – the need to get the data in the right form to perform the analytics is critical.
- Skillsets and hiring the right people – the skills and experience of auditors needs to be continuously enhanced.
- Data quality and availability – disintegrated system environment sometimes makes availability of suitable data for good analysis a challenge.
- Lack of focus – i.e. trying to do everything at once!

The future

- They are seeing the increasing use of data analysis in relation to audits but there is still a need to go out and see operations in person. Spending about 50% of time on each is probably about right in the long-term. Meeting the business still tells you most of the intuitive feeling you need in an audit.
- There will be continuing challenges around getting the people with a mix of the right skills combining leadership and data skills.
- It is critical that standard business processes are implemented across the company, the master data is uniform and that there is one ERP system working right across the data.

Annex A2

Mark Starbuck (Chief Auditor, Regulatory and People Risks) and Stephen Magora (Director of Data Analytics) – Credit Suisse

Background

Credit Suisse is a leading global private bank and wealth manager with distinctive investment banking capabilities. It has operations in over 50 countries and more than 48,000 employees worldwide.

Data analytics was introduced into the organisation partly through natural evolution – as a result of technological innovation – and has transformed the fundamental way in which businesses operate. The internal audit function is quite advanced in terms of the data analytics maturity path.

Data analytics enables the internal audit function to do more with less data while increasing the quality of its output. In other words, it helps to enhance the function's efficiency and effectiveness. The overall objective is to transform the function from a traditional, judgement-based, sample-driven, time-intensive and reactionary audit process to one that is risk-based, continuous and wholly data-centric and is carried out in real time. Today, data analytics is helping the organisation to identify business areas with high-control risks due to anomalous, non-conforming events, and is facilitating the continuous monitoring of the risks.

The bank's data analytics director and leadership team developed a vision and strategy clearly articulating how data analytics will support and, in some cases, transform internal audit. With a solid vision and understanding of the benefits of data analytics, the internal audit department outlined an operating model and roadmap for how it would move forward. Each phase in the roadmap included clearly defined goals and metrics to determine when those goals have been met, as well as the people, processes and technology capabilities and investments that will be needed. The department also evaluated its current (or starting) capability using interlocking and dependent components – people, processes and technology. They started with simple tools, as the key was to avoid making it too complicated at first, so that the department would find data analytics straightforward to integrate into their plans.

Sponsorship and buy-in

The internal audit department's culture plays a central part in securing the team's support. The institutionalisation of analytics and the best outcomes are achieved when the sponsorship comes from the function's leadership. Credit Suisse's internal audit leadership team has been a strong advocate of the use of analytics from the start; recognising and accepting that a period of incubation is to be expected before tangible benefits can be delivered, and that the road towards maturity is an ongoing, often costly multi-year initiative.

As the organisation took steps to fully embed analytics in its methodology and introduced a self-service platform, it was imperative to devise and execute an appropriate training and awareness programme to improve the auditors' understanding of analytics and its applications. The internal audit team are finding these programmes to be very helpful, empowering them to be independent and having the skills needed to readily access data, analysis and dashboards. Another important mechanism to ensure the buy-in of the team is to include performance objectives relating to data analytics in each individual's appraisals. This is in addition to the implementation of a department balanced scorecard metric that measures the use and value of analytics.

Practice and methodology

Data analytics are used in the entire internal audit cycle but mostly as part of fieldwork. An example is management oversight of cross-border risk where analytics was used to test the hypothesis that policy breaches have occurred and are undetected. This year, the team plans to use data analytics much more as part of continuous risk monitoring. The use in the entire lifecycle is as follows:

- Risk assessment – can analytics help with ongoing risk assessment, either via ad-hoc testing or in the context of continuous risk monitoring processes?
- Planning – can analytics help to drive more targeted auditing by helping auditors focus on areas or population segments with the highest risks?
- Fieldwork – can analytics be used to provide a higher degree of assurance by testing up to 100% of the population, or perform testing more efficiently?
- Reporting – can we provide more insightful findings and actionable outcomes through analytics by helping to quantify risk, or identify root causes?

Auditing culture and the link to data analytics

Given the large number of audits conducted every year across the organisation, the bank's internal audit department felt that it ought to be able to inform objectively senior management and the audit committee of the risk and control culture observed 'on the ground'. An audit rating methodology was developed to apply to each audit that looks for 'clues' concerning key aspects of risk and control culture. Around 35 different data sources were identified that relate, for example, to compliance, risk assessment and supervision. These are extracted and assessed for each audit.

The data is not used in a 'black box' type of approach to extrapolate to a rating. Instead, Internal Audit engages with the business, using the data as a catalyst to confirm how it perceives, manages and controls risk, and to identify good risk and control behaviours that will serve to reinforce or sustain the control environment, such as the use of lessons learned or root cause analysis.

Internal audit assigns two ratings to each audit – a control environment rating and a risk and control culture rating. The latter is derived from the above process, supplemented by the consideration of other insights available from the audit process. While the control environment rating reflects the current design and operating effectiveness, the risk and control culture rating is important in the organisation's assessment of the potential future path of that environment. The two ratings are not necessarily aligned.

The internal audit function is now developing ways to aggregate the culture rating results by broader business area, joining the dots to identify where themes (positive or negative) are apparent. One form of this type of output is a heat map by culture driver. Work is continuing to refine the methodology, and they are looking to see if there are other data sources in the bank not yet considered that may provide supplementary insight at a more macro level.

Skills

The ideal data analytics auditor has a blend of core analytics skillsets, business functional experience, and a good understanding of risk. They are expected to understand the linkages between business processes, risks and data. Ideally, there needs to be some cross-fertilisation of skills between the internal audit function and the analytics function. They are increasing the internal auditors' knowledge levels, so that they are able to do some basic data analytics themselves to interpret what the data is saying. But it is equally important for the data analytics team to understand the internal audit function.

A question remains about where the processes are data rich, e.g. Know Your Customer/Anti-Money Laundering, can data analysts crunch the data to trigger areas for investigation? The internal audit department is exploring whether these processes and associated audits could be data-analytics led, with auto triggers for auditors to perform focused investigations when heightened risks are identified. If this becomes the baseline approach, then a key requirement is that the data has to be trusted and of high quality and integrity. The bank's internal data team has also positioned itself to be able to give some comfort around quality and completeness of data sets.

Kevin Goulding (Group Head of Internal Audit – daa (Dublin Airport Authority))

The Group Head of Internal Audit joined the organisation in 2012 and had used data analytics in his last job so was fully persuaded of the benefits of its use.

Initially it was introduced as a desktop function enabling data analytical work to be used on the work around financial risk. The use of data analytics brought immediate benefits, for example, through being able to identify potential duplicate transactions. These immediate benefits and taking a step by step approach using the desktop application helped overcome some of the other business units' initial scepticism or uncertainty about introducing data analytics. These attitudes have evolved over the last five years and now it is seen as the accepted norm in the audit function. Once staff had experienced one cycle of being audited using data analytics they were a lot more accepting of it.

The internal audit function then introduced a server version to connect to the Enterprise Resources Planning (ERP) system without compromising the organisation's overall system performance or security. Furthermore, they have a very compact function – fewer than six internal auditors, so the HIA didn't really have the luxury of being able to tie up one person's time administering a system or spending a significant chunk of their time on an ongoing basis doing that.

The move to the server-based system enabled the IA function to ramp up the level of testing they were doing and freed up time to do deep dives in non-financial areas. Being able to focus on non-financial areas was very important in the context of the evolution of the function's overall effectiveness as the key risks in the daa are largely non-financial. They do still have to focus on financial risks but, for example, significant risks that would shut the airport down temporarily would likely be non-financial. If they had a significant security issue or a significant health and safety issue it could result in significant fines and more likely to have an immediate impact on the airport operations.

- Before they used data analytics in the function their focus would mainly be on financial audits (around 90% of their time spent on this). With the implementation of data analytics they were able to shift their focus so that they are now able to spend about 50% of the time on non-financial risks and 50% of the time on financial risks.

Data analytics is mainly used in the fieldwork stage of audits but they do sometimes use it in the planning stages as part of the risk assessment process or, for example, when trying to gauge the volume of transactions. They are now able to test 100% of populations and more accurately identify areas of non-compliance and control in certain areas. Data analytics is not used in all areas and some areas lend themselves better to its use than others. Examples of audits they use it in include the procure-to-pay cycle and the time and attendance system. As time goes on, data analytics can be used in more and more areas of the audit universe.

The use of data analytics does enable continuous auditing on specific business cycles but not necessarily all of them, especially in the case of smaller audit functions. Within business cycles there will be specific areas that continuous auditing works well with but it is important to weigh up the costs and benefits of introducing continuous auditing.

Skills

The skillset (on use of data analytics) of any internal audit team can be a limiting factor. One of the HIA's team members acquired a level of expertise in the use of software for auditing methodology, though he did not have this on joining the team. He now can train the rest of the team so that all of the team can run reports and some basic scripts but anything more sophisticated is the preserve of two team members who have greater technical expertise on data analytics.

Challenges

One of the initial key challenges was getting buy-in from the organisation's IT department as they were concerned about the potential impact on the ERP system's performance.

Access to the raw data at the start of using data analytics poses some issues and accessing specific tables and reformatting them so that they are user-friendly can be a little tricky but with the right training and repeated use over time these issues become less problematic.

Reasons for introducing data analytics into your audit methodology

- It is part of the future anyway. There are expectations from senior management teams that data analytics will become integral to the methods you use in internal audit.
- External audit are making much more use of data analytics so internal audit needs to keep up and remain relevant.
- The overall direction of internal audit is to move towards operating at a strategic level through focusing on strategic risks. The use of data analytics frees up time to do this by moving away from the transactional, low-value tasks.
- Many outsourced audit functions use data analytics so in house functions will need to become conversant with its use in order to compete.

Benefits

The overall benefits are that they are carrying out a significant amount of extra work that they weren't doing a couple of years ago. They have also saved significantly on headcount—so are doing more work with fewer bodies, and achieving much deeper audit penetration and the work is much more insightful.

Using audit software and reporting tools enables statistical analysis and the ability to consider many interrelated fields and transactions over time. This then gives auditors greater scope to provide greater insight into what is happening across the organisation.

Data analytics has the potential to be used in all audit functions regardless of size. To use it in a more sophisticated way, a larger investment is needed but the basic application using a desktop function can be incorporated into all internal audit functions with relatively low levels of investment. Scripting may be beyond the reach of some audit functions but a lot can be done without it such as point in time analytics.

A great advantage of using data analytics, the team has found, is that it frees up time to look more in-depth at strategic areas e.g. around capital projects and management. It also allows them to apply analytics when auditing these and other strategic areas.

Annex B

Data analytics in the NHS

The NHS is full of data-rich organisations. Sir Ian Kennedy, former head of the Care Quality Commission, commented back in 2001 that one hospital was awash with data from one source or another⁹. He said:

“Bristol was awash with data. There was enough information from the late 1980s onwards to cause questions about mortality rates to be raised both in Bristol and elsewhere had the mind-set to do so existed.”

Following Sir Ian's comments, one might wonder whether the internal audit function was abreast of the issues and had made good use of data analytics. In most NHS providers, clinical auditors, rather than internal auditors, use data analytics in their work around quality assurance to the board¹⁰. This is because it is rare for NHS internal audit providers to have access to specialist clinical knowledge.

Clinical audit is the review of clinical performance against agreed standards, which results in the refinement of clinical practice. Clinical audit is an established, systematic review process with quality improvement at its core. Clinical audit provides a mechanism for boards to measure quality in the

NHS. It is one of the key compliance tools at a board's disposal and has an important role within the assurance framework. Internal audit reviews clinical audit to provide an assessment of the effectiveness of the clinical audit arrangements in place but do not bring in any particular data analytics expertise.

Clinical audit and internal audit are complementary but different processes in the provision of assurance to NHS boards. Internal audit is, in fact, one of a number of related processes which also have a role in measuring and improving quality – these include confidential or significant event enquiries, patient surveys, research and peer review. None of these replace clinical audit and systematic clinical audit is the main way of assessing compliance of ongoing clinical care against evidence-based standards, and is also a requirement of the Healthcare regulator, the Care Quality Commission.

⁹ *The Report of the Public Inquiry into children's heart surgery at the Bristol Royal Infirmary 1984–1995*, July 2001

¹⁰ *Clinical audit – a simple guide for NHS boards and partners*, Healthcare Quality Improvement Partnership, 2010

About the Chartered Institute of Internal Auditors

First established in 1948, the Chartered Institute of Internal Auditors (Chartered IIA) obtained its Royal Charter in 2010. It is the only professional body dedicated exclusively to training, supporting and representing internal auditors in the UK and Ireland. It has over 9,000 members in all sectors of the economy including private companies, government departments, utilities, voluntary sector organisations, local authorities and public service organisations such as the National Health Service.

Over 2,000 members of the institute are Chartered Internal Auditors and have earned the designation CMIIA. Over 800 of our members hold the position of head of internal audit and the majority of FTSE 100 companies are represented amongst the institute's membership.

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