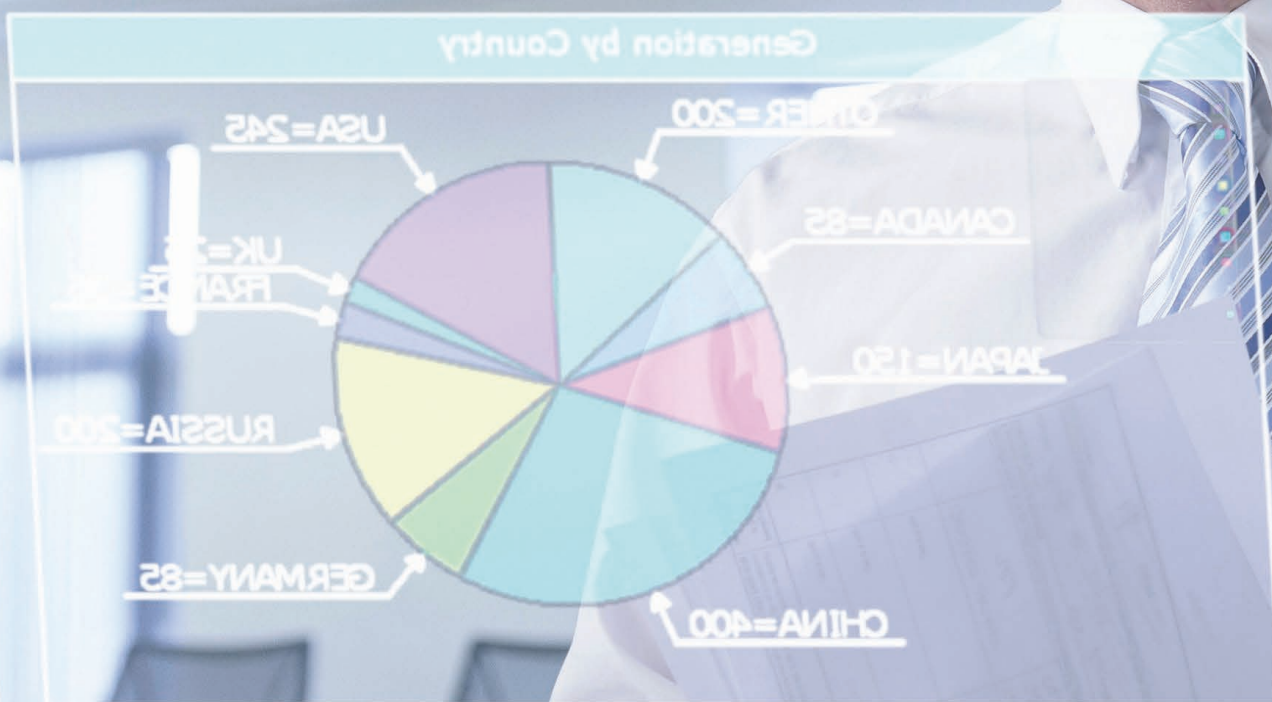




## Analytics aptitude

A survey of internal  
audit analytics maturity  
in financial services



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# Foreword

Through working with data centric organisations who understand the value and potential opportunities with data, we have seen tremendous growth and interest in the use of analytics in Internal Audit. As a result of this interest we have launched the Deloitte Financial Services Industry Internal Audit Analytics survey with the aim of better understanding the maturity of analytics teams, the different vision and approaches to building an analytics capability and some of the key lessons being learnt along the journey.

We aim to address some of the key questions along this journey, such as how are organisations embedding analytics? What is the most appropriate operating model to use? What are the more advanced analytics methods being utilised?

These are just some of the questions that we commonly faced when working with organisations in the industry.

Between April 2015 and June 2015, we interviewed 19 financial services organisations and asked a series of questions covering strategy, vision, and operating model.

To supplement our survey, we interviewed five senior leaders in Internal Audit to draw out further understanding of their vision and the issues on their mind.

All 19 of the Internal Audit teams we interviewed are in large financial services institutions with annual turnover of at least £1 billion. The size of their analytics teams ranged from zero to nineteen.

No two firms interviewed are identical in terms of vision or structure, however interestingly there are some common approaches being utilised to deliver their vision and similar challenges being faced. This paper aims to explore these, and look to the future of analytics in Internal Audit.

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... how are organisations embedding analytics? What is the most appropriate operating model to use? What are the more advanced analytics methods being utilised?

# Executive summary

We surveyed 19 financial services internal audit functions to articulate the range of maturities of their analytics teams, the different visions and approaches to build analytics capability, and the key lessons being learnt in the analytics journey.

## **Maturity of internal audit analytics**

Internal audit functions are actively using analytics across the majority of clients we interviewed in the survey, with the majority of internal audit analytics teams being in the developing stage. Having set a vision, those teams are now actively implementing the vision whilst supporting audits with analytics in order to demonstrate the art of the possible. There are four internal audit analytics teams using more advanced analytic methods and these teams are close to embedding their analytics capability fully into internal audit practices. Across financial services, the internal audit analytics discipline is still in its early days in terms of maturity, resulting in a relatively low proportion of audits using analytics – currently an average 24% of audits are supported by analytics.

## **Strategy for analytics**

Internal audit are generally striving for two different outcomes from their use of analytics – either to create efficiencies in the audit function through automation, or for analytics driven insights to provide clear and actionable outcomes for the business. The analytics strategy needs to consider the broader objectives of the internal audit function.

## **Continuous auditing and risk assessment**

Almost one third of firms surveyed were providing continuous auditing, however it is a topic that has polarised opinion and a number of survey respondents did not consider it as a service for internal audit to provide. Any decision on continuous auditing will need to take into account the capabilities of first and second lines of defence for conducting their own control monitoring.

A developing area in internal audit analytics is continuous risk assessment, where internal audit assess potential risk in the business on an ongoing basis, and accordingly adjust the audit plan to focus on areas of greatest risk.

## **Big Data is here**

Internal audit functions are beginning to consider how they provide assurance over Big Data practices being developed by the business and how to leverage this for their own analytics. Two internal audit analytics teams we surveyed plan to leverage Big Data from the business to support their audit work.

## **Data is an issue**

Getting access to appropriate quality data in a timely manner remains an issue for internal audit analytics teams. With tight timelines to deliver audits, timely access to good quality data can make a huge difference to the success and quality of analytics delivered. Too often data is received late during fieldwork and it is not to the quality standard required which can impact the benefit of using analytics.

## **Future ambitions**

There are ambitious plans for internal audit analytics in the next three years, with the majority of teams aiming to deliver their strategies and fully embed analytics into internal audit practices. This is going to be a key focus for financial services internal audit functions, and we look forward to repeating this survey in the future to see how the industry has progressed and the innovative ideas being used.

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There are ambitious plans for internal audit analytics in the next three years, with the majority of teams aiming to deliver their strategies and fully embed analytics into internal audit practices.

# Maturity of internal audit analytics

## Is it fully developed or is it still early days?

Internal audit has been using data and analysis techniques since the 1990s when CAATs (Computer Assisted Auditing Techniques) first became a “buzz” acronym. The industry has now progressed from CAATs to analytics – the key difference being that analytics goes beyond control testing to help understand business risk and tell the business something it did not know. We have seen internal audit functions and business stakeholders experience benefits from analytics including:

- increased confidence in testing as manual sample testing is replaced with 100% outcome testing;
- being able to quantify the impact of control failures;
- deep analysis of the root cause of control failures; and
- greater coverage of the risk for similar level of resources.

This survey assessed firms’ internal audit analytics maturity across Strategy, People, Process, Data and Technology. Maturity levels were defined as outlined in the table below.

We found that 74% of survey participants are in the limited and developing stages of building their capability. Four of the nineteen internal audit analytics teams are advanced, using a variety of different analytics techniques, with more advanced skills in the team and processes in place to embed analytics into audit activities.

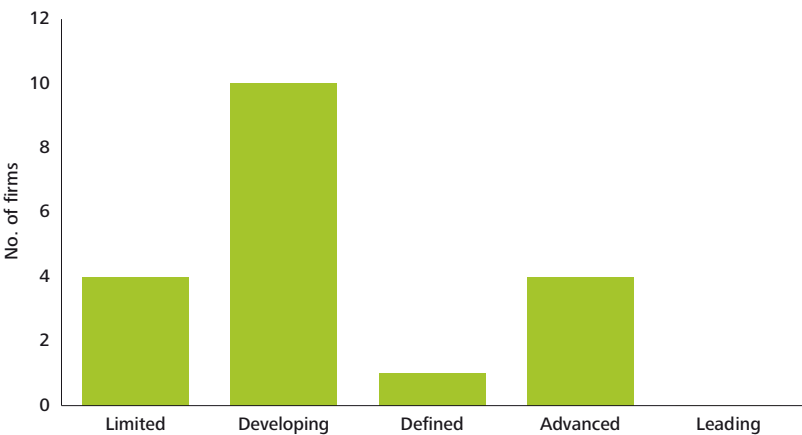
Advanced internal audit analytics teams have been developing their capability for a minimum of three years, whilst developing teams tend to be newer entrants into analytics and are currently investing in building their analytics team.

There are also internal audit analytics teams in the developing maturity level with a longer history of use of analytics, however to date they have not been fully successful in delivering their vision and are beginning to reshape how they approach and use analytics. The types of challenges these analytics teams face include:

- awareness and understanding of analytics by the wider internal audit function;
- data access and quality issues;
- support from internal audit leadership;
- support from the firm’s technology function; and
- not being ambitious enough – or too ambitious – in what they are trying to achieve.

This paper will explore these issues further in the following sections.

**Chart 1. Maturity assessment of internal audit analytics capabilities**  
Number of firms surveyed classified by maturity stage

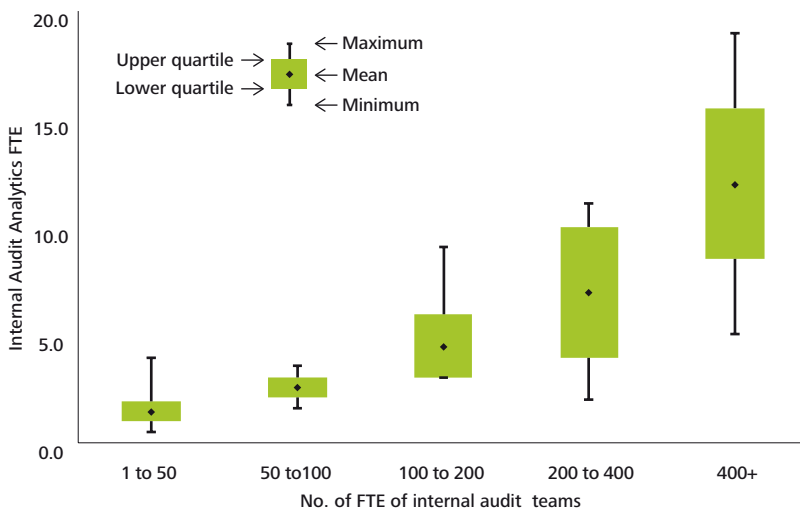


Limited	Developing	Defined	Advanced	Leading
<ul style="list-style-type: none"><li>• No or limited capabilities</li><li>• Ad-hoc activities resulting in unpredictable performance</li><li>• Success is based on individual competence and not on repeatable processes</li></ul>	<ul style="list-style-type: none"><li>• A basic set of capabilities</li><li>• Processes are rudimentary and unstructured</li><li>• Success is repeatable with similar application and scope, but not consistent across organisation</li></ul>	<ul style="list-style-type: none"><li>• Capabilities are developed and adopted consistently</li><li>• Capabilities are used to drive some audit activities</li><li>• Management defines goals and objectives for standardised processes and confirms they are communicated</li></ul>	<ul style="list-style-type: none"><li>• Capabilities are well developed and practised with appropriate governance</li><li>• Processes are used to drive audit activities</li><li>• Processes and practices are routinely analysed for effectiveness and efficiency</li></ul>	<ul style="list-style-type: none"><li>• Capabilities are well defined and institutionalised</li><li>• The department is differentiated based on its capabilities</li><li>• Continuous improvement methodologies are used to adopt to future changes</li></ul>

### Does the size of the analytics team matter?

There is a close correlation of the size of the analytics team to the size of the internal audit function. Larger functions require more analytics resource to support a higher volume of audits and in a wider range of geographic locations. Internal audit functions with over 400 plus full time employees (FTE), had analytics teams ranging from 5 to 19 FTE, with teams at the lower end of the range in the initial stages of developing their analytics capability. The analytics teams are on average 4% of the headcount of the internal audit function.

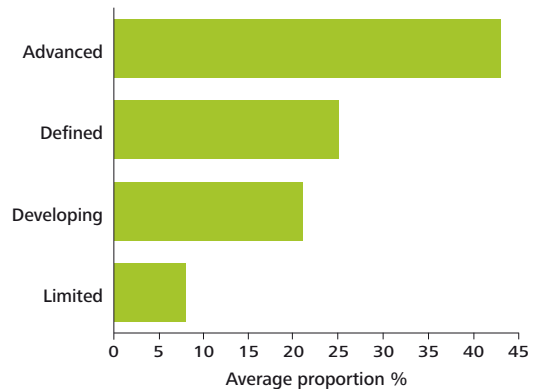
**Chart 2. Size of internal audit analytics teams**  
Range and distribution of analytics teams compared to size of internal audit teams



Advanced analytics teams have on average 12 FTE fully focused on analytics, whilst the developing teams have 2.4 FTE on average. Advanced teams have more resources available as a result of leadership support, buy-in to the vision and the benefits of analytics being demonstrated.

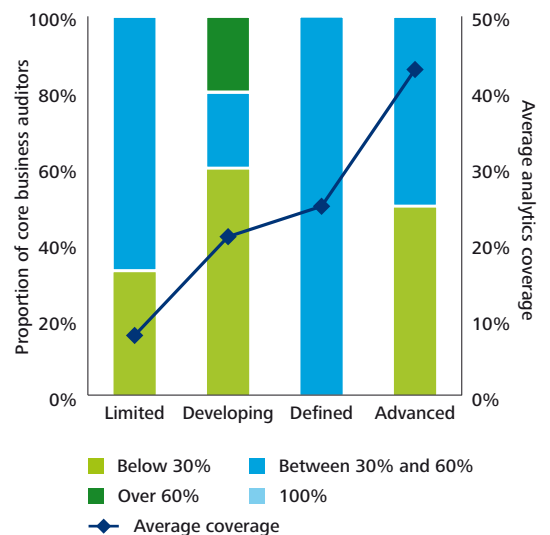
Not surprisingly the advanced teams tend to have a wider coverage of analytics supporting the audit plan, with an average of 43% of audits using analytics in the test approach (highest coverage by any analytics function included in the survey is 50% of audits using analytics in the test approach).

**Chart 3. Internal audits supported by analytics**  
Average proportion of audits supported by analytics by firm maturity



The analytics teams with the largest analytics coverage also have the highest understanding of the 'art of the possible of analytics' by the core business auditor population. Core business auditors play an important role in planning and scoping audits, therefore the more they understand analytics the more capable they are of identifying opportunities to apply analytics. In our experience, time spent building awareness, training on analytics and presenting case studies to the core business auditors is repaid by the increases in successful deployment of analytic techniques in the internal audit plan.

**Chart 4. Understanding the art of the possible with analytics**  
Proportion of core business auditors understanding of analytics, by maturity, compared with average % of analytics coverage of internal audit plans





### What technology is being used by internal audit analytics functions?

Only 33% of internal audit analytics teams surveyed are utilising visualisation as a part of their analytics testing. Visualisation technologies like Qlikview, Tableau and Spotfire can be deployed quickly as a powerful method for internal audit to communicate the results of analytics, allowing core business auditors and the business to interrogate the data. They can also help support agreement of analytic findings with the business.

Advanced analytics is being conducted using SAS, SPSS and R tools that enable statistical analysis, unstructured data mining and predictive modelling. Some examples of how these are being applied include:

- clustering on trade activity to identify transactions that are outliers and more likely to be a potential risk for the business;
- testing of payment screening systems using relevant sanctions lists and dummy transaction datasets to test exact name and fuzzy matches; and
- assessing the accuracy of operational risk ratings using regression analysis to show the relationship between recorded risk impact and the actual loss incurred.

When it comes to applying analytics it is important for the internal audit function to have imagination and vision to get the best use from the data available. The use of open data, which is data that is freely available for everyone to use, is increasingly being used to overlay market factors and demographic information onto internal data. With such open data now readily accessible, there are even greater opportunities to deliver new insight.

### How much time should be invested in training and development for the analytics team?

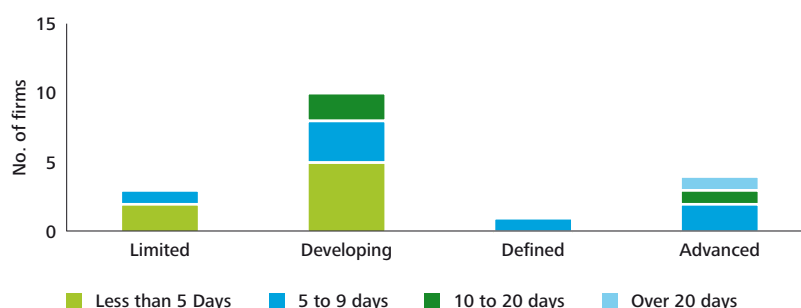
Most internal audit analytics teams surveyed target over five days of training a year, with one advanced team targeting over 20 days training per year, per person. In an innovative discipline such as analytics, allowing teams the time to further develop their skills can result in more efficient and effective practices being utilised, including different analytics techniques.

Training, along with allowing your analytics team time to try different ideas and be innovative within audits will give your team an opportunity to develop themselves, and will assist with the retention of talent.

### What are the costs of running an internal audit analytics team?

The cost of the internal audit analytics teams surveyed ranged from 3% to 15% of the internal audit function cost. The key driver of the higher expenditure was appetite from senior stakeholders to accelerate the process of embedding analytics into their function. There was no correlation between levels of investment and financial services sector.

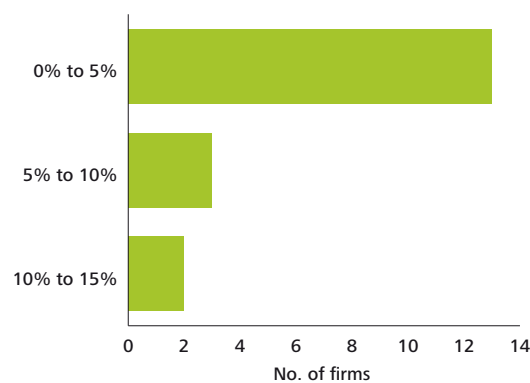
**Chart 5. Targeted training days**  
Number of firms by training day ranges, grouped by maturity assessment



Be innovative and bold with analytic ideas. The most advanced internal audit analytics functions are those which developed concepts jointly across the team and pushed their capabilities to the limit without fear of failure.

In developing an analytics capability, considerable investment of time is required in exploring and creating analytics tests to support audits. This requires close working with the core business auditors to design analytic tests for subject areas that are relevant to the risk profile of the business. It is also important to invest time with IT to understand the technology options available, seek buy-in from stakeholders for the desired environment and technology implementation, understand of the data landscape and gain access to appropriate quality data.

**Chart 6. Proportion of internal audit budget spent on analytics**  
Proportion of spend by number of firms



#### How mature is internal audit analytics in financial services?

In our opinion the financial services industry overall is still in the early stages of maturity of internal audit analytics capability. Teams are leading the way by conducting more advanced analytics, demonstrating business value and embedding their analytics process and practices within the internal audit team. However they are yet to fully embed the analytics into the internal audit processes and mindset. The majority of financial services internal audit functions are investing in developing their analytics capabilities. We expect the market to mature significantly in the next few years.

In developing an analytics capability, considerable investment of time is required in exploring and creating analytic tests to support audits.



# Key themes

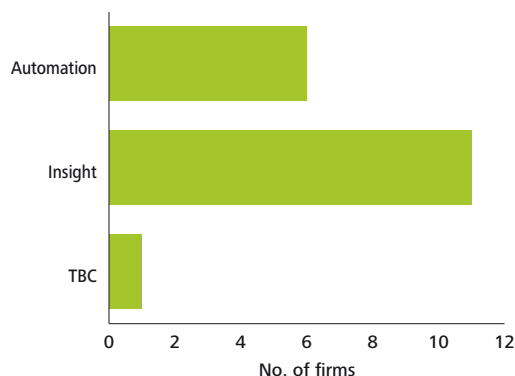
Four key themes emerged from discussions and analysis of results, and these topics were the most frequently encountered items and issues. We have explored each of these in more detail.

## Strategy for analytics

When survey respondents were asked what kind of analytics is used in their team, the majority of respondents were grouped into two categories, one that strives for automation to deliver their analytics strategy whilst the other aims for insight driven analytics.

Embedding analytics through automation is a technique that has been widely used across the internal audit community for years and is discussed in detail in the “Continuous auditing” section of this paper. This is

**Chart 7. Internal audit analytics ambitions – automation v. insight**  
Number of firms



where repeatable tests are identified, built, catalogued and embedded into audit processes. There is also an added benefit of empowering core business auditors to be part of the analytics process rather than relying on a separate analytics team. The main benefits that this approach offers are efficiency and coverage. Typical tools used in these instances by internal audit are ACL AX, IDEA, and SQL Server.

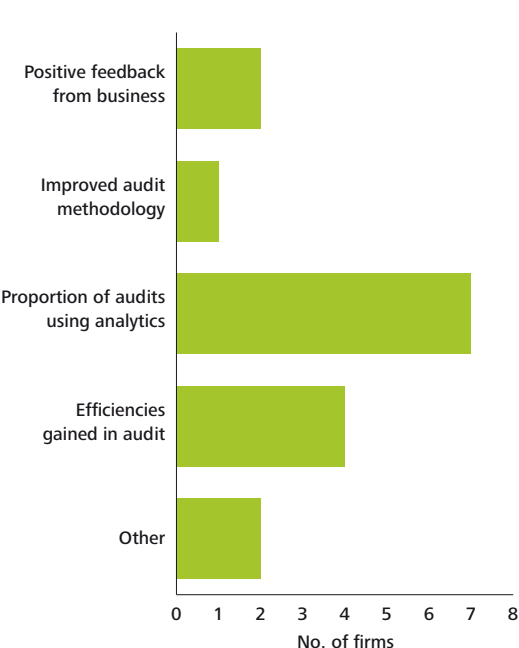
Alternatively, insight driven analytics is supported by a more bespoke and exploratory approach. The analytics team work with the core business audit team to form an analytics driven testing approach to test the risk and the appropriateness of the controls that are inherent in the process.

The main benefit of this approach is that it can go beyond testing control exceptions and identify new risks that previous approaches may not have identified. It can use more advanced analytic tools and techniques to explore the data, understand business behaviours and can inform the core business audit team on previously unidentified potential exposures.

For those organisations embedding analytics using automation it is appropriate to measure success based on time and cost spent in audits on the principle that once developed, the automated tests can be used again and again assuming there are no significant changes to the organisation’s control environment.

An effective insight driven analytics audit approach will enable internal audit functions to focus their work in the areas that matter most. While this will not necessarily impact time and cost per audit, it does mean that the audit effort is being directed more effectively. In these circumstances it is more appropriate for internal audit functions to measure success in terms of audit effectiveness; an assessment of the output from audits compared to audit effort. For example the proportion of audit reports using analytics in audit findings.

**Chart 8. Success measures of internal audit analytics**  
Number of firms



An effective insight driven analytics audit approach will enable internal audit functions to focus their work in the areas that matter most.

If used wisely, continuous auditing can give senior business stakeholders good visibility of the key risk areas for the business.

## Continuous auditing and risk assessment

Continuous auditing can act as a catalyst in the first and second lines of defence to enhance the efficiency and effectiveness of internal controls, yet reduce the cost of operations. Continuous auditing uses technology to automate manual monitoring of controls through:

- extracting data from business systems and processes on a regular basis;
- querying the data against the business rules to identify control breaks; and
- notifying the responsible people through workflow where there has been a break in a control and to remediate the cause.

Continuous auditing can be an impactful way for internal audit to demonstrate added value for the business through the ability to identify control breaks and potential risks for the business at more regular intervals than typically expected from the third line of defence. If used wisely, continuous auditing can give senior business stakeholders good visibility of the key risk areas for the business.

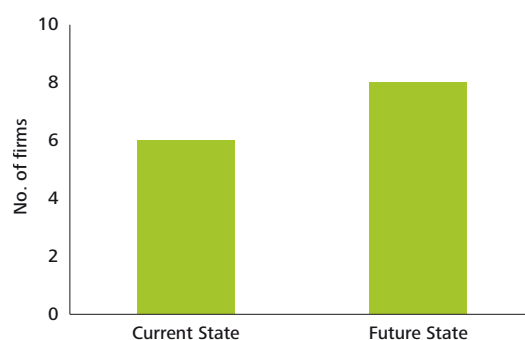
A key challenge with continuous auditing is to regularly review and assess the tests being conducted to make sure they remain focused on the key risk areas highlighted in the risk universe, which can be a time consuming activity in an ever evolving risk landscape. Other challenges include ensuring that control exceptions are appropriately dealt with, and that the continuous auditing processes are kept up to date with constantly moving technology and data landscapes.

### Is continuous auditing the responsibility of internal audit?

Our survey showed that six internal audit functions are delivering continuous auditing to the business to some degree. Three of these functions are in the advanced level of maturity in their analytics capability. The question is should internal audit be dedicating their resources on delivering this capability to their business stakeholders, or should this responsibility reside with the first and second lines of defence?

The answer lies within the internal audit function's vision for its analytics capability. If the vision is to automate and create efficiencies across internal audit and the business, then the function should consider delivering this service. However, if the vision is to provide insight on thematic risks to the business, the function should consider focusing its resources on delivering thematic audits and let the first and second lines of defence monitor their controls.

**Chart 9: Internal audit functions with continuous auditing in place**



### Continuous risk assessment

An emerging area for internal audit analytics is continuous risk assessment – proactively identifying areas of potential risk, regularly monitoring and measuring emerging trends in the risk profile of the business, and subsequently influencing the direction of the audit plan. For example: monitoring the risk of front office activities through regular reporting and analysis of the volume of different products being sold to customers over time – where volumes exceed a defined risk profile limit, this metric would be flagged for potential coverage in the audit plan.

Continuous risk assessment enables a rapid response to risk profile changes, an audit plan continually aligned to current risks, and efficient use of resources. Visualisation and dashboards can be developed to engage stakeholders, and for the results to be clear and indisputable.

# Big Data is here

## What is Big Data?

The topic of Big Data was not a question in the survey – but it was a topic that emerged as survey respondents talked about their ambition for the near future. Big Data insight is commonly characterised along three dimensions – volume, the velocity at which insight can be captured, and the complexity of the data source.

## Why is it important for organisations and what are they doing?

Organisations are using data to derive more insight for their business, as new tools and techniques allow analysis of structured and unstructured data across the organisation. Big Data solutions provide advanced technologies, approaches and methodologies to capture greater value from data.

## Is internal audit leveraging Big Data?

There were two very distinct Big Data responses from survey respondents; the first group focused on the application of Big Data techniques and technology to benefit the internal audit function. The second group of responses focused on how internal audit functions should respond to the challenges and risks for organisations that embrace Big Data.

Only two internal audit analytics teams surveyed are planning to leverage Big Data solutions in the near term. In both cases, internal audit are leveraging existing capability in the business by embedding an additional layer of risk and controls monitoring. A proactive approach is required to work collaboratively across the three lines of defence on the proposed Big Data platform so that it meets the analytics requirements for all parties involved.

Examples of where we have seen Big Data used in oversight functions are:

- A Tier-1 bank built an analytics model based on a behavioural analytics platform that will provide insights from the behaviour patterns of communications and actions observable when individuals use electronic communications – including emails, instant messages etc.
- A Tier-1 bank built a platform to provide a single view of fraud and financial crime risk globally. The information was then leveraged by first, second and third line teams for analysis.
- An Operational Risk function at a capital markets firm used unstructured data analytics and classification algorithms to group operational risk event data into similar categories in order to identify common root cause. The analysis was conducted on a large volume of data in a variety of different formats such as Microsoft PowerPoint, Microsoft Word, Microsoft Excel and email.

Internal audit functions that see their role as providing assurance over the governance and management of Big Data by the business will need to be aware of the potential risks faced. Typical risks include:

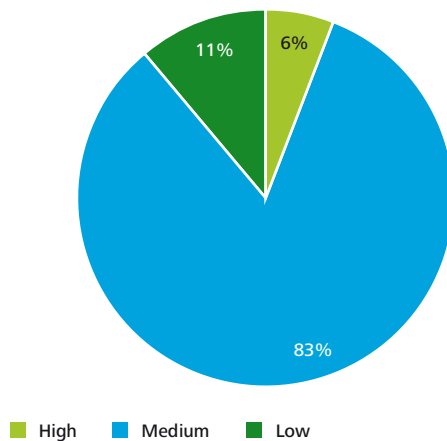
- data relevance;
- data quality;
- data privacy;
- increased complexity;
- redundant data; and
- multiple versions of data.

Big Data presents organisations with new and innovative ways to develop their strategy. Organisations using Big Data will face changing risk profiles in how data is collated, managed and used. Internal audit functions should understand how their organisations are using Big Data and ensure they are equipped to provide assurance over these changing risks in a rapidly developing environment. Internal audit should also consider whether they can take advantage of the opportunities arising from Big Data to enhance their analytics approach.

## Data is an issue

Access to quality data is a critical factor in the impact analytics can have in business operations or in internal audit. 94% of the surveyed internal audit analytics teams rated the data in their business as being of medium or low quality, indicating that this is still an issue for many organisations.

**Chart 10. The level of data quality available for analytics**  
Proportion of firm's classification of data quality available



### Access to data by internal audit

As firms move along the internal audit analytics maturity journey, data access issues are rarely fully eliminated and a number of pain points can remain:

- policy and legal restrictions can inhibit cross-border transfer of data. This can be at least partially mitigated with the use of federated models or with internal audit analytics hubs in regions with data transfer issues;
- data held by third parties can impose cost and time delays. Engaging and educating IT and procurement teams who negotiate the terms and conditions with third party service providers on internal audits requirements for access to data can significantly ease this issue; and
- data ownership and governance is still an issue, with the business at times struggling with sudden requirements for comprehensive data access. It is critical that these stakeholders are brought into the internal audit analytics process and methodology well before an audit is due.

Not addressing these issues can limit the scope an audit plan can cover, and restrict the ability of analytics to address high risk issues.

### Data Quality

#### Regulatory considerations explicitly driving internal audit

The modern financial services regulatory landscape increases the onus on internal audit functions to be more aware of data quality and governance requirements, and to provide assurance that their firm is adhering to relevant regulations, e.g. Solvency II and BCBS 239.

#### Data quality as part of the internal audit analytics methodology

50% of internal audit functions surveyed do not strictly apply a data quality assessment as part of the analytics process, despite known issues with data quality in the business. Data quality is sometimes considered as a secondary concern by internal audit as it is not always easy to see the direct value provided by work in this area. This will need to change as organisations are driven externally by regulators to have better control of their data and internally by the demand for robust analytics within internal audit.

# Future ambitions

## Where would you like to be in 3 years?

The use of analytics is enabling internal audit to do something different, tell the business something they did not know and cover wider-ranging business risks more efficiently. Factors leading to the growing future use of analytics include:

- firms looking for more efficient and effective practices;
- firms becoming more data aware;
- the development of technologies to enable analytics, such as visualisation;
- growing interest from regulators in firms' data; and
- firms looking for different ways to assess and monitor the effectiveness of their control environment.

The majority of internal audit functions surveyed have ambitions to reach advanced or leading maturity levels in the next three years, with clear direction on how they are going to achieve this. Other internal audit analytics teams are looking to reinvigorate their strategy and set a new direction as their existing approach has not yet delivered the expected results. Three of the 19 internal audit functions are yet to decide on their future for analytics, either waiting for new leadership to set the direction or building a business case for senior internal audit leadership support.

## What are the ambitions of the internal audit analytics teams aspiring to get to a leading capability in the next three years?

Key themes include:

- analytics is to be an integral part of the internal audit function, driving the plan through continuous risk assessment, working alongside the core business auditors to plan and scope audits;
- targets for analytics to be a component of at least 70% of audits. This will require the analytics capabilities to evolve to support more audit themes that have not traditionally lent themselves to CAATs or analytics techniques; and
- the use of Big Data, conducting pure data driven internal audits and creating research and development analytics teams.

One advanced internal audit analytics team is looking to train every core business auditor to have a minimum level of analytic skills. This will enable the core business auditors to be able to do basic analysis, but more importantly for all of the core business auditors to be aware of the 'art of the possible' of analytics and identify opportunities where analytics will drive benefit to the audit. In addition, this will help the analytics team to focus on the advanced work requiring their specialism, and could be an effective way to develop and retain talent within the audit team.

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The majority of internal audit functions surveyed have ambitions to reach the advanced or leading maturity levels in the next three years.

# Conclusion

## What are advanced companies doing well?

Of the internal audit analytics teams surveyed there are common characteristics across the advanced teams that are worth bearing in mind:

- buy in from senior internal audit leadership and the Audit Committee is crucial for the success of analytics capabilities. There should be on-going support and direction, and the analytics team should take responsibility for making sure key stakeholders are effectively engaged;
- the analytics team must be integrated into the internal audit function. They cannot work isolated in the corner of the office, but must regularly engage and work alongside the core business auditors, driving the direction of the audits and advocating and demonstrating the use and value of analytics;
- investment in the skills of the analytics team – targeting at least one week per year of training. Leading companies are also requiring the analytics team to spend time to proactively hypothesise and explore different techniques and ideas;
- advanced internal audit analytics teams find solutions to data issues and do not let this restrict what can be achieved and the value provided by analytics. An example is getting access to business platforms and data warehouses, rather than being reliant on the business to provide data; and
- finally, leveraging analytics capabilities across the business for new analytics techniques, learning new skills and approaches, investing together in the technology solutions and gaining a greater understanding of the data landscape.





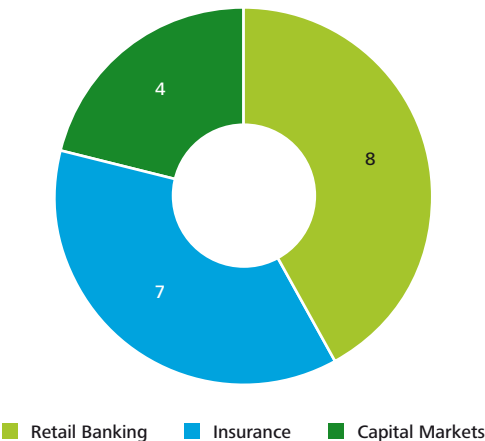
# Profile of the benchmarking participants

## Methodology

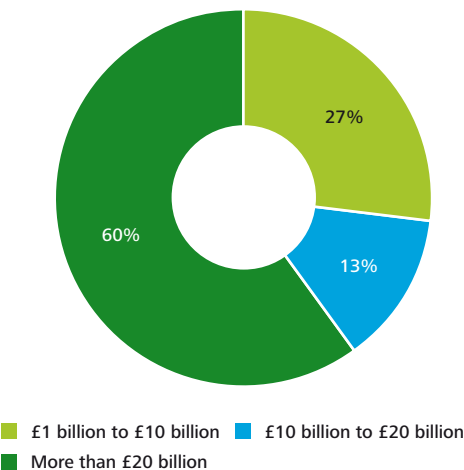
All 19 of the Internal Audit teams we interviewed are in large financial services institutions with annual turnover of at least £1 billion. The size of their analytic teams ranged from zero to nineteen.

The survey consisted of 44 questions across strategy & vision, people, process, and technology. Responses were scored and from these scores an overall maturity level derived for each participant.

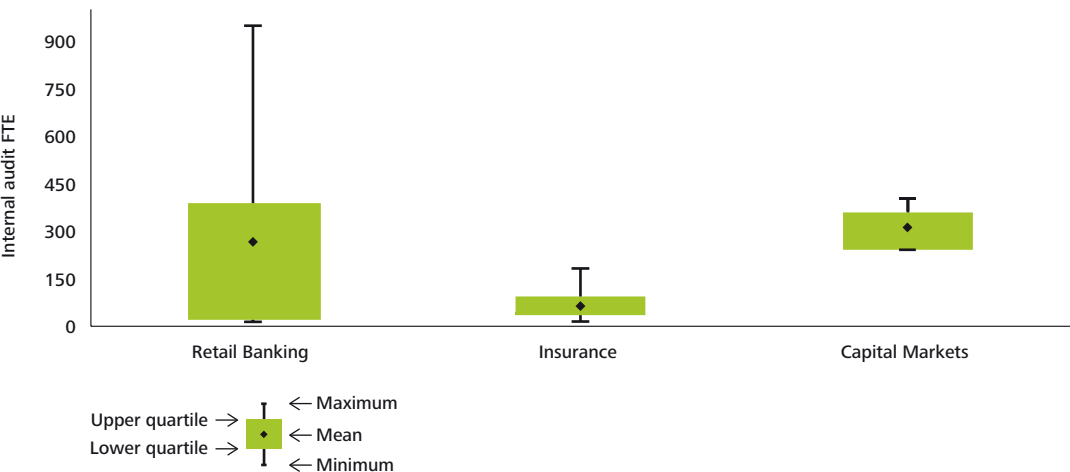
**Chart 11: Participants by Financial Services sector**  
Number of respondents by sector



**Chart 12: Participants by turnover**  
Percentage of survey respondents by turnover



**Chart 13: Size of internal audit functions**  
Range and distribution of internal audit functions



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# Notes

# Notes



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