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Mr Simon Thomas AM
Chair
Finance Committee
National Assembly for Wales
Cardiff Bay
Cardiff   CF99 1NA

Reference: HVT2758/caf

Date issued: 30 October 2017

Dear Simon

Business Case to develop the use of Data Analytics at the Wales Audit Office

You will see in our Estimate for next year the sum of £260,000 for a Data Analytics (DA) project to support our strategic goal of making more effective use of data and embracing cutting edge technology.

This is a specific and time bound project which will develop essential processes and skills for our staff to meet the increasing demands of a "digital society". Data analytics (DA) is a rapidly developing agenda for many public and private organisations and it refers to using technology to analyse and present data so that conclusions can be drawn about the information it contains. There are some considerable risks to the wider Welsh public sector if we do not invest in DA. Other audit bodies in the UK and elsewhere, together with private audit firms are already investing and there is also growing expectation within the bodies we audit that our work should exploit DA techniques.

Following discussion with your Clerk, we are sharing the Business Case with the Committee, to aid transparency and in order to support your scrutiny of our Estimate next month. We look forward to discussing with you.

HUW VAUGHAN THOMAS
AUDITOR GENERAL FOR WALES

Enc: Data Analytics – Business case

Business Case

Reference: HVT2758ENC

Date issued: 14 September 2017

Key contact: Derwyn Owen and Anthony Barrett

Data analytics

Purpose of this paper

1   This business case seeks the Board's approval to pursue annual funding between 2018-19 and 2020-21 of £260,000 to deliver a three-year data analytics project.

2   The case clearly demonstrates the need for investment in data analytics:

- to catch up with ongoing developments in other audit organisations;
- to avoid falling behind industry standard practice;
- to maintain our reputation as an informed and respected audit authority, and
- to meet growing expectations about improvements in the insight and quality of our audit work.

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Background

3   One of the Wales Audit Office's ('WAO') five strategic themes for the period 2017 to 2020 is to make more effective use of data and embrace cutting edge technology. With this theme in mind, our 2017-18 Estimate included funding for a project to identify priority areas for transforming the way we use data and technology.

4   Using this funding, the Auditor General created the 'Cutting Edge Audit Office' project in September 2016, with the purpose of generating ideas about the ways in which the WAO should exploit technology and make better use of data in future.

5   The Cutting Edge Audit Office project team published its final report, which was considered by the WAO Board on 8 June 2017. The report listed eight recommendations of which, the proposal to launch a three year data analytics project was given highest priority. It was given such a high priority primarily because other private and public organisations are investing in data analytics and the WAO is at risk of falling further behind. The Board endorsed this position and tasked the Management Committee with developing a data analytics implementation plan and securing the additional investment required to deliver it.

6   Data analytics is subject to a rapidly developing agenda within both the public and private sector. The risks arising from not investing in data analytics far outweigh the risks of investment. Data analytics is the future and we need to be prepared to embrace it.

7   The term 'data analytics' refers to innovative ways of using technology to analyse and present data so that conclusions can be drawn about the information it contains. In essence, data analytics is using modern techniques and technologies to make sense of, and make the most of, large quantities of data. Examples of data analytics include the use of coding or programming to automate aspects of data analysis, and the use of data visualisation software to present data in new, insightful ways.

8   This document provides the detailed business case as to why we believe such investment is vital to the future of the WAO in order to facilitate strategic transformation of audit, through improving our use of data and technology.

Business case for data analytics

9   The Auditor General for Wales and the Wales Audit Office set out their strategic priorities in the Annual Plan for 2017-18. Building on the organisation's cultural values, which include innovation and future focus, the plan's five strategic themes for the period 2017 to 2020 include the following:

Make more effective use of data and embrace cutting edge technology

We will challenge our existing use of data and technology, through questioning what we normally take for granted and developing solutions for how we might use new technology to transform our audit and communication processes.

10   This strategic theme is underpinned by a three-year priority action to: facilitate strategic transformation of audit, through improving our use of data and technology, and our methods of communication.

11   We need to create a partnership between staff and technology within a secure environment. Data analytics has the potential to be a transformative influence on our financial and performance audit work, in addition to supporting our corporate services.

12   We identify the following as key benefits of investing in data analytics:

Benefits of investing in data analytics
Greater assurance from our work
Data analytics will provide a better, more comprehensive evidence base for our work. We will be able to state our conclusions with greater certainty because we will be able to examine entire populations of data, and/or use statistical sampling rather than basing our conclusions on smaller, judgmental samples of the data.
Greater insight from our work
Data analytics will make it much easier to unearth patterns in data, hidden linkages and trends across sectors. The insight created by data analytics will help us ask questions of the data that we would not previously have thought of. Our current approaches to data analysis tend to have a backward-looking focus, by reflecting on what has already happened within public bodies. Data analytics will help us develop approaches to future modelling and forecasting, thereby helping us move towards audit work that is forward-looking and predictive.

Benefits of investing in data analytics

Greater impact through data visualisations

Data analytics will help us report our audit findings in a much more engaging way. Through data visualisation software and approaches, we will present interactive information that will help our audiences to explore and understand the data, to enable them to ask questions based on this understanding.

Added value to our work in audited bodies

Data analytics will help us deliver added value to our audits. Our new data-led approaches will reveal things about our audited bodies that are so far unknown. The insight we provide will help audited bodies to take ownership and make better use of their own information, thereby strengthening their data capabilities.

Improved efficiency in the way we work

Data analytics will help us complete elements of our work more quickly. It will be quicker to secure data from our audited bodies and we will manage that data more effectively and more securely. Data will be more readily available to auditors, helping us reduce our audit time. Aspects of our data analysis will be automated, thereby freeing up time for our staff to focus on higher-value work. However, whilst financial efficiencies are possible in the long-term, they cannot be secured without time and investment.

Improved business intelligence within the Wales Audit Office

We also intend to apply data analytics to our corporate functions. Improved business intelligence will enhance our ability to plan, carry out and measure our work, leading to more insightful decision making and performance impact.

13   As well as opportunity, the advent of data analytics also brings risk. We have identified a number of risks associated with not investing in data analytics at this stage:

Risks of not investing in data analytics

We are behind other bodies on data analytics and risk falling further behind

The research of the Cutting Edge Audit Office team suggests other audit and inspection bodies are ahead of the Wales Audit Office in investing in data analytics.

The National Audit Office began a data analytics project in 2014 and now has a suite of examples where data analytics approaches have enhanced the insight and/or quality of their work, as well as automating aspects of analysis and securing efficiencies.

The Queensland Audit Office also began a data analytics programme in 2014. Their focus has been on automating aspects of the collection, management and analysis of financial information. Data analytics is now a core part of their financial audit work in

Risks of not investing in data analytics

more than 80 audited bodies. Queensland is heavily involved in a networking approach to spread learning on data analytics in all audit agencies in Australia and New Zealand.

Our research has also highlighted good, progressive development of data analytics within Audit Scotland, the Government Accountability Office in the USA and the US Air Force Audit Agency. Private audit firms are also investing heavily in data analytics.

We risk marginalisation and falling further behind comparable bodies in the UK and further afield should we not invest sufficiently in data analytics in the immediate future.

Financial standards organisations are considering the future implications of data analytics

The bodies that set financial auditing and accounting standards are strongly considering the future implications of data analytics. The Financial Reporting Council has carried out a thematic review of the private audit firms' approaches to data analytics. Similarly, the International Auditing and Assurance Standards Board has set up a Data Analytics Working Group to explore how best to respond to the emerging development in data analytics. The Institute of Chartered Accountants in England and Wales dedicated a considerable section of its November 2016 conference to discussing the potential for data analytics.

With such a focus on data analytics within these organisations, it seems highly likely that data analytics will become a core aspect of audit work in years to come. The Wales Audit Office needs to stay abreast of developments and be able to adapt its audit approach on a timely basis.

The bodies we audit have growing expectations of our use of data analytics

Many of our audited bodies are beginning to develop their own approaches to data analytics through the enhanced functionalities of their financial software packages. If our work is to remain relevant to the Welsh public sector, it is vital that the Wales Audit Office advances alongside these organisations. We will need to develop an audit approach that fully exploits the benefits of data analytics.

By not upskilling in data analytics we risk becoming an unattractive employer

If we decide not to embrace data analytics, we could struggle to attract and retain the best staff and graduate trainees who will seek employment in more progressive and innovative workplaces. Further, we could lose approved employer status should accounting bodies conclude we are not up to date with the latest methods and technologies.

14   The business case for investing in data analytics is further strengthened by the potential benefits of our data analytics approach to the citizens of Wales and Welsh public bodies. The table below summarises these wider benefits:

Benefits to Welsh citizens and public bodes
A more modern audit office will lead to better scrutiny of public spending Data analytics will provide the Wales Audit Office with new skills and approaches that, in future, will contribute significantly to our corporate aim: 'The people of Wales and National Assembly know whether public resources are being spent wisely'. Our data analytics approach will provide greater audit insight thereby improving the support we provide to public services.
Better data visualisations will increase public transparency on public spending By presenting audit data in more visually engaging and interactive formats, we will help to raise public interest and awareness on key issues relating to public spending. This will contribute to greater transparency on the financial and corporate performance of public bodies in Wales.
Public bodies will be able to adopt our approaches to data analytics We will seek to share the learning from our data analytics project to support public services in adopting more modern uses of data and technology. By adopting data analytics approaches, public bodies are likely to derive many of the benefits listed in paragraph 12.
There is potential for efficiencies and increased value for money from our work Data analytics may allow us to deliver our work more efficiently. In the long term, there is potential for overall efficiencies to be secured, leading to greater value for money from the work of the audit office.
Investing now may prevent the need to invest more in future If we do not invest in data analytics now, we run the risk of falling further behind similar audit bodies. The further we fall behind, the more difficult and costly it will be to catch up.

Financial case

15 The strategic and economic cases set out significant risks associated with failing to invest in data analytics, as well as clear benefits that data analytics can bring to the Wales Audit Office and the wider public sector in Wales. This business case therefore argues for funding to allow the development of our data analytics approach.

16 From 2018-19 onwards, we will require additional resource to progress to implementation of a three-year data analytics project, including the embedding and expansion of our pilot projects so that data analytics begins to become a core part of our business. The table below presents further detail on the finance required:

	Details	Annual Investment required[1]
Director oversight	The project requires specific, director-level leadership to oversee and drive implementation.	£10,800
Project management	We will have joint project managers from financial and performance audit, to ensure data analytics develops across our two main business areas.	£62,000
Internal advisors	We will use the expertise of our IT Manager and the manager of our IT Audit Function to optimise our approach and collaborate with other audit agencies.	£54,000
Embedding and expansion of our pilots	The core analytics team, together with delivery staff from our financial, performance and IT audit functions, will work to ensure successful pilots are adopted across our business, and implement a rolling programme of further pilot projects. Purchase of relevant software licences.	£157,200
Reference group	Project governance will be through an internal reference group, chaired by the Assistant Auditor General.	£8,500
Total		**£292,500**
	Removal of committed costs (ie non-fee earning corporate enabler staff)[2]	£32,500
	Revised annual investment required	**£260,000**

[1] per published hourly rates in the WAO fee scheme

[2] The work of corporate enabler staff can be reprioritised without any loss of income and therefore without the need for additional cost or backfill.

17   The investment detailed above will provide sufficient funding to carry out our data analytics implementation plan. The plan will cover the items set out in the table below:

Details of how we will use the investment
Leadership and governance
For data analytics to succeed in the Wales Audit Office, we will need buy in from the Management Committee, Senior Leadership Team, and the Board. The Director assigned with responsibility for data analytics will empower the data analytics team to solve problems itself, in an environment of experimentation and well-managed risk taking.
An internal reference group with representation from across the WAO will provide advice when required and will scrutinise progress with the project's work plan.
Core data analytics team
We need a dedicated resource from across the organisation to ensure we can establish data analytics as a core part of our audit work in future. The team will initially consist of:
- Two project managers: One from financial audit, one from performance audit, to ensure data analytics is developed by managers from both of our main business areas, who are directly involved in operational audit work and are therefore au fait with the potential applications of data analytics. Each manager will spend one day a week on this role.   - IT audit manager and IT manager: These managers will provide specialist expertise and advice to the project. Key aspects of their work will be in ensuring our data environment is safe and secure, ongoing liaison with other audit agencies, involvement in pilot projects and advising on software solutions.   - A performance audit specialist, a financial audit trainee and data analyst on secondment from another public sector body, or as part of an internship.
The core team will likely be expanded and/or the skills mix altered as we progress through our three-year project plan. The core team will be supported by operational teams during the delivery of pilots.
Development of a detailed work plan
The data analytics team will develop a detailed work plan covering the three-year project. The work plan will be agreed with, and reviewed on a quarterly basis by, the internal reference group. The work plan will cover a rolling three-year period but should provide additional detail in relation to the tasks planned for the coming year..

Details of how we will use the investment

Staff engagement

We will communicate with our staff in a clear, honest and regular manner, to ease potential concerns, wherever possible, and to involve and engage staff to help develop our data analytics approach.

The project team will work with our Communications Team to consider an engagement strategy and branding for the project. We will proactively share with staff news of our successes, through lunchtime sessions, articles on our intranet, and we will attend team meetings. We will demonstrate what we have done and how it works.

The project team will engage with staff from all areas to find the priority, real-life problems that we will seek to solve through data analytics.

Once the project team has identified pilots, we will actively involve members of staff from outside the project team in developing the approach. This will serve to spread our impacts wider than the project team itself.

Ongoing collaboration with key partners

We will continue to understand best emerging practice in data analytics, through research and engagement with other audit agencies. We will actively promote, publicise and share the work we are doing on data analytics.

The Director will assign a member of staff to be a key point of contact with other key bodies, including the other four audit organisations in the UK and Ireland, Queensland Audit Office and the Office for National Statistics.

We will establish six-monthly meetings with these bodies to share news of the progress we have been making, and the issues we have encountered along the way.

We will also explore the possibility of developing a shared work plan with our partner audit bodies to ensure we do not duplicate our efforts.

Engagement with our audited bodies

We will communicate to audited bodies our vision for data analytics, to obtain buy-in to data analytics and sharing of data. We will need to invest time and effort in developing our relationships with audited bodies, to ensure we get access to the data we need.

This may require us to educate and inform them about the long-term benefits of data analytics. This work will start by identifying 'sympathetic' and innovative client bodies who are most likely to support us in our approach to data analytics. Once we have secured successes within the initial bodies we will spread the learning, to publicise the benefits of the approach and secure wider buy-in from other bodies.

Pilot projects

Before mainstreaming data analytics within our everyday work, we will trial specific data analytics interventions through a range of pilot projects.

To gain traction in the organisation, and to make impact quickly, the team should begin work on small-scale, deliverable interventions. These interventions should be relevant to a mix of sectors and teams within the Wales Audit Office, to ensure engagement and spread across the organisation.

The early focus will be skewed towards Financial Audit. This is where the work is most repeatable and where, based on our scoping, we feel most impact can be secured

Details of how we will use the investment

through data analytics in the medium term. This focus may lead to benefits for delivering the early closure of Local Government accounts.

The team will carry out further research on how to turn pilot projects into 'business as usual', learning from examples such as the DOING programme within the Netherlands Court of Audit.

Library of techniques

We will compile a library of proven data analytics techniques and interventions that our staff can be confident in. As the team's work progresses, it will compile a library/repository of data analytics techniques for use in common analytical procedures. This can then become a source for all auditors to pick from and use.

The team should work with other audit bodies in compiling the library, sharing approaches as much as possible and avoiding unnecessary duplication.

Each example in the library should include a fully documented description of what we have done. Our research highlighted good practice around storing and sharing the full experimental process. This helps repeatability but can also help with buy in and prevent fears of inaccuracies.

Tools and software

We will test and select a range of tools to help our data analytics work, to create a toolkit for auditors to pick from depending on the task in hand.

We should make the most of the existing tools we have, such as Microsoft Excel and IDEA. In time, we will also consider investing in some new tools, such as Tableau and Power BI. Our investment will be small scale and iterative, providing the tools to only a small number of staff before considering expansion and further investment.

Through collaboration with other audit bodies, we should try to learn about other tools and share our experiences of the tools we use.

Our general approach to procurement will be through cloud-based rental of software, rather than one-off purchases. This should help prevent over-reliance on single tools and should provide flexibility should we want to change our approach.

Data management model

We need to develop a clear, written framework that governs our data analytics techniques with a clear standardised process for understanding, gathering, storing, cleansing, transporting, sharing and finally erasing data. This model needs to be compliant with relevant legislation, specifically the General Data Protection Regulations which come into force in May 2018.

The first step of our data management model will involve understanding, very broadly, what data exists in our client's accounting systems and identifying how we need to deal with it to support our library of techniques. This will require considerable work to map the systems and data. Once we understand what data are available, we will design a set of standard processes for extracting information efficiently and transporting it into the Wales Audit Office environment.

Details of how we will use the investment

Training and skills

We will increase our skill levels to develop our data analytics approach. We will make use of our existing skills as well as developing and bringing in new skills.

Through our collaboration activities, we should seek opportunities to learn skills from our partner audit bodies. This may take the form of shadowing, secondments, shared training delivery, shared training resources, a joint competency framework for data analytics.

We are also considering becoming involved in a data analytics apprenticeship scheme developed in partnership with the Office for National Statistics and the Welsh Government. The team will then lead the development of an internal training plan for data analytics. We have also developed working links with the ONS and have agreed, for example, that some WAO staff can attend the ONS in-house training on coding and data visualisation.

Developing new outputs from our work

We will produce a range of authoritative, up-to-date outputs to promote our approach to data analytics and to spread the insight generated through our data analytics work.

Our work on data analytics should seek as an intended outcome to produce data visualisations that are engaging, interactive representations of the data we have acquired. The visualisations should publicise the data to staff, promoting its effective use and providing additional insight to audit teams. These visualisations may include standard dashboards, collating financial audit data, for audit teams to interrogate.

Wherever appropriate, we should try to make our outputs open to our audited bodies and the public. We should adopt an 'open by default' policy to promote the benefits of an open data culture.

In future, we will seek to trial approaches to reporting in 'real-time' on the progress of our work. This will provide immediate insight and feedback to our clients, allowing them to make rapid changes and improvements

18   As stated above, the data analytics team will develop a detailed work plan covering the three-year project. The work plan will cover a rolling three-year period but will provide additional detail in relation to the tasks planned for the coming year that should seek to ensure data analytics grows at a safe rate within the organisation. The table below describes the key phases of our project:

Key phases of the project

Year 1 (2018-19):
- Research and development.
- Detailed project design and project planning.
- Establish leadership and governance arrangements.
- Form a data analytics team.
- Second an industry expert into the core team.
- Develop a communications strategy and specific branding.
- Formalise/cultivate existing relationships with other audit bodies.
- Depending on positive evaluation, implement the initial two pilots into business as usual.
- Consult with staff to identify further pilot projects.
- Test out the possibilities of analytics software, including Tableau, Power BI and others, sharing lessons with other audit bodies
- Begin to develop our data management model (framework for data acquisition, cleansing, storing, transporting and sharing data).
- Work with other audit bodies to identify training needs.
- Research and plan for providing interactive user interface (dashboards) for audits.

Year 2 (2019-20):
- Refresh the 3-year rolling plan for data analytics.
- Continue staff engagement and expand attempts to involve staff in DA from outside the dedicated team.
- Agree a shared work plan with other audit bodies.
- Depending on positive evaluation, implement the ongoing pilots into business as usual.
- Begin to compile a library of techniques to centralise commonly used data analytics interventions.
- Share our learning with all audited bodies to show what is possible and to secure wider engagement in our approach.
- Review our data analytics tools/software and consider expansion/investment.
- Finalise and embed our data management model.
- Continue to build WAO data analytics capability, including select training in data analytics.
- Pilot interactive dashboards for audit teams.

Key phases of the project

Year 3 (2020-21):
- A significant number of pilots should by now be part of our core business.
- Expand the number of WAO staff involved in developing and performing data analytics, and update our core competencies to include data analytics.
- Extend data extraction and validation across a greater number of audited bodies.
- Expand the number and coverage of our pilots and include in our library of techniques.
- Carry out quality review of data analytics processes and data management model.
- Begin to increase our focus on performance audit, as opposed to financial audit.
- Begin to develop approaches to using data to predict, monitor and identify areas for audit.

19   It is important to note investment in data analytics is required over the medium to long term. Data analytics is the future. Our research to date indicates it will take more than three years to roll out a data analytics capability. However, as our capability develops, and as data analytics becomes more embedded in the organisation, we intend that data analytics will become supported through our established fee regime and not through additional funding.

20   The table below sets out the high-level risks relating to the delivery of our data analytics project, as well as the counter measures we intend to take.

Risks	Counter measures
Data security and information risks associated with storage of data within the Wales Audit Office environment, or through the use of cloud based systems.	Use cloud services and software independently accredited to latest data security standards. Establish data governance function within WAO Follow requirements of General Data Protection Regulation.
Lack of staff and stakeholder confidence in our data analytics approaches due to lack of understanding or suspicion of inaccuracies in our automated approaches.	Project leaders will promote data analytics within WAO, stressing the principles we are using to guide our approach, including: engagement, communication, collaboration,

Risks	Counter measures
	innovation, fast-moving, selflessness and empowerment.
	Engagement with our Communications Team.
	Training and development of all staff in data analytics.
	Independent/peer scrutiny of our data analytics outputs (as we do with our current written outputs).
Delays in securing sufficient data from our audited bodies	Whilst the Auditor General has a lawful right of access to any data, early communication with audited bodies about our data analytics approach, and positive engagement by senior WAO leaders will help to address any delays.
Risk of competing demands on staff preventing sufficient focus on data analytics	Clear agreed priorities for delivery – close involvement of workforce planning team and practice business units.
Failure to recruit/retain sufficient staff with necessary skill set	Establish clear competencies for data analytics that are pursued in all recruitment processes. Consider developing a career pathway for data analysis professionals. Consider secondments with other public bodies.
Insufficient resourcing or prioritisation leading to slippage in achieving identified benefits	Sufficient funding being available. Review project plan in line with available funding.

Commercial case

21   Procurement is not significant in the delivery of the project. The data analytics team will test and select a range of existing (such as Microsoft Excel and IDEA) and new tools and software products (such as Tableau and Power BI) to develop our approach. Our investment will be small-scale and iterative, providing the tools to only a small number of staff before considering expansion and further investment. Our general approach to procuring such tools will be through cloud-based rental of software, rather than one-off purchases. This should help prevent over-reliance on single tools and should provide flexibility should we want to change our approach.

Conclusion

22   In conclusion, we need to invest in the development of data analytics to:

- Explore how data analytics can be used to focus and streamline our audit process for both accounts work and studies/reviews

- Provide stronger and more consistent audit evidence thereby enhancing audit quality

- Provide greater insight into the organisations we audit and the data we examine

- Ensure we improve access to audit information through better visualisation of data and audit findings

- Maintain a respected, strong and relevant presence in the audit profession particularly as we continue to attract the very best graduates onto our trainee scheme

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Recommendation

23   We recommend that the Board approves the pursuit of annual funding between 2018-19 and 2020-21 of £260,000, to deliver a three-year data analytics project.