



HM Treasury

# **Review of quality assurance of government analytical models:**

**progress report**

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March 2015





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# Review of quality assurance of government analytical models: progress report

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# Foreword

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In October 2012, I was commissioned by Sir Jeremy Heywood and Sir Bob Kerslake to conduct a review of the quality assurance (QA) of analytical models across government. The report set out a number of recommendations for how improvement to the quality assurance process could be made. I published the final report of my review in 2013.<sup>1</sup> The effectiveness of any set of recommendations is dependent on how they are implemented. I therefore suggested an assessment of progress against those recommendations 12 months after publication. This report sets out the findings of that follow up review.

Over the summer of 2014, I asked all government departments to review their quality assurance processes. They were required to fill in a questionnaire that had been drafted by the cross-departmental working group that was set up in response to the review. The questionnaire that was used can be found at Annex A and those that responded can be found at Annex B.

Quality assurance is not the only requirement to make a robust model, but it is key to it. The responses showed organisations making varying degrees of progress against each recommendation, which is to be expected. The work of some departments and their public bodies involves more analysis and modelling than others. But I am satisfied that all organisations have made progress against my recommendations and have an appropriate plan to continue to do so until they are met. The aim of the recommendations was to tackle the variation across departments and encourage a more systematic approach to quality assurance across the board. This is now becoming a reality and will soon become embedded in all organisations as the norm. Ultimate responsibility for models remains with the Accounting Officer in each organisation and so it is my sincere hope that these recommendations help them in the effective running of their departments and bodies.

This work could not have been done without the dedication of the cross-departmental working group on analytical quality assurance. The group has developed a range of tools to promote best practice across government. More information on these can be found in the executive summary and I encourage all organisations to make use of them. In particular, I would draw your attention to the Aqua Book being published alongside this report which outlines a sensible, achievable set of principles for quality assurance. I thank Jason Dewhurst for holding the pen and the many others who contributed. I would also like to extend my thanks to departments and their public bodies for engaging at every stage of this process and for embracing the principle of continual self-improvement. In the spirit of continuous improvement, the group will from now on provide regular reports to the Heads of Analysis meeting that I chair to ensure government continues to review and improve its modelling capability and capacity.

It would be impossible to name everyone who has contributed here, but in particular I would like to thank the working group, in particular John Bates, Andy Jones, Ian Rogers, its secretary Christopher Bull and chair Alec Waterhouse, and Claire Lever for coordinating this review.



Nick Macpherson, Permanent Secretary to the Treasury

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<sup>1</sup> <https://www.gov.uk/government/publications/review-of-quality-assurance-of-government-models>





# Executive summary

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In October 2012, the Cabinet Secretary and the Head of the Civil Service commissioned a review of the quality assurance (QA) of analytical models that inform government policy. An interim report was published in December 2012 and the final report in March 2013. A series of recommendations were made in that final report including that a progress review should be conducted after a year. This report is the outcome of that review.

The previous review found that there were hundreds of models being used as part of policy making and decisions processes. It is therefore imperative that they are fit for this purpose. Quality assurance remains a key to ensuring this, which is why this review focussed on this aspect of modelling processes. While examples of good practices in QA were found, there was too much variation between organisations. A more systematic approach needed to be encouraged.

The recommendations focused on 8 key areas:

- **Recommendation 1:** All business critical models in government should have appropriate quality assurance of their inputs, methodology and outputs in the context of the risks their use represents. If unavoidable time constraints prevent this happening then this should be explicitly acknowledged and reported
- **Recommendation 2:** All business critical models in government should be managed within a framework that ensures appropriately specialist staff are responsible for developing and using the models as well as quality assurance
- **Recommendation 3:** There should be a single Senior Responsible Owner for each model (“model SRO”) through its lifecycle, and clarity from the outset on how QA is to be managed. Key submissions using results from the model should summarise the QA that has been undertaken, including the extent of expert scrutiny and challenge. They should also confirm that the model SRO is content that the QA process is compliant and appropriate, that model risks, limitations and major assumptions are understood by users of the model, and the use of the model outputs is appropriate
- **Recommendation 4:** The Accounting Officer’s governance statement within the annual report should include confirmation that an appropriate QA framework is in place and is used for all business critical models. As part of this process, and to provide effective risk management, the Accounting Officer may wish to confirm that there is an up-to-date list of business critical models and that this is publicly available. This recommendation applies to Accounting Officers for arm’s length bodies, as well as to departments
- **Recommendation 5:** All departments and their arm’s length bodies should have in place, by the end of June 2013, a plan for how they will create the right environment for QA, including how they will address the issues of culture, capacity and capability, and control. These plans will be expected to include consideration of the aspects identified in Box 4.A in Chapter 4 of this report
- **Recommendation 6:** All departments and their arm’s length bodies should have in place, by the end of June 2013, a plan for how they will ensure they have effective processes – including guidance and model documentation – to underpin

appropriate QA across their organisation. These plans will be expected to include consideration of the aspects identified in Box 4.B of Chapter 4 of this report. To support this recommendation, succinct guidance setting out the key, generic issues that drive effective quality assurance will be added to 'Managing Public Money' – which offers guidance on how to handle public funds properly

- **Recommendation 7:** To support the implementation of these recommendations, the review recommends establishing an expert cross-departmental working group to continue to share best practice experience and to help embed this across government
- **Recommendation 8:** Organisations' progress against these recommendations should be assessed 12 months after this review is published. HMT will organise the assessment, possibly with support from another department

This review fulfils recommendation 8. A cross-departmental working group, as proposed in recommendation 7, has supported this review and developed tools to encourage best practice across government.

The group have developed training on 'Understanding Modelling and Modellers – a guide for SROs'. This addresses the recommendation that there should be more support for senior responsible officers to understand their role. Courses are running every 6 months and can be booked through Civil Service Learning. The training is also part of the Major Projects Leadership Academy's (MPLA) 1-day risk masterclass. This session is part of more extensive SRO training given to cohorts of director-level SROs by Deloitte on behalf of the MPLA.

The group have also developed the Aqua Book – guidance which helps to clarify the responsibilities required to ensure that analysis is fit-for-purpose and sets out a framework of roles to address these responsibilities. This is being published alongside this report and can be found on [www.gov.uk](http://www.gov.uk). The group will report to Heads of Analysis to ensure government continues to review and improve its modelling capability and capacity.

The remainder of this report considers the first six recommendations, which were the responsibility of individual departments and their arms-length bodies. Organisations were asked to complete a questionnaire rating themselves against a 5 point red/amber/green (RAG) scale for each recommendation and give more detail about their overall approach. All relevant government departments responded with their returns including their arm's length bodies where appropriate. The responses have shown that all departments have made progress since the recommendations were made. There is a range of ratings and progress, which is to be expected depending on the starting point of the organisations and the amount of modelling for which they are responsible.

Overall there has been satisfactory improvement and the majority had amber/green and green ratings for each recommendation. All departments have developed or are in the process of developing a comprehensive plan on how to improve their QA, which will embed QA into all their process and ensure increased awareness of the importance of QA.

All departments are aware that they need to continue to progress their plans and they have explained how they will do so. Many departments have developed internal review processes (either 6 monthly or annually as appropriate) to ensure progress continues and keep the focus to achieve this.

Recommendation 4 of the previous report explains the annual accounting requirements of departments on QA so there will continue to be open and public information available on QA.

Although it may not be appropriate that all departments publish their full business critical model list, many departments have already done this.



# 1 Introduction

## Definitions and scope of the review

**1.1** This review was conducted to examine the progress made by departments against the recommendations in the final report of review of quality assurance (QA) of government analytical models.

**1.2** As defined in the previous report, a model is a mechanism for analysing or investigating some aspect of the real world. It is usually a quantitative method, system or approach that is applied to data using statistical, economic, financial or mathematical theory, techniques or assumptions, to produce quantitative estimates. There are typically 3 parts to a model:

- inputs – in the form of data and assumptions
- a processing component – often through calculations
- outputs – the key figures as well as the risks and limitations of the models

**1.3** Throughout this report, any use of the term model should be read as encompassing inputs, processing and outputs, and each of these component terms should be taken to include all the items defined above.

**1.4** Models are used for a huge variety of purposes in government. The most frequently used types across government were previously defined in Table 1.A of the final report as:

**Table 1.A: Table defining models by their purpose**

Model type	Purpose	Examples
Policy simulation	Appraisal of policy options, analysis of impact on people, finances, etc.	Intra Government Tax Benefit Model
Forecasting	Assessing the future, perhaps to provide base information for policy development or financial planning	State Pension expenditure forecast
Financial evaluation	Assessment of liability or future cost	Pension liabilities, higher education loan repayment model
Procurement and commercial	Evaluation of value for money or affordability and award of contracts	Awarding of rail franchises
Planning	Planning current actions based on future forecasts	Teachers, NHS
Science-based	Understanding and forecasting natural systems	Climate change
Allocation	Distribution of funding across organisations responsible for service delivery	Police allocation formula

**1.5** Quality assurance refers to processes which can help ensure the model's inputs and outputs meet its quality requirements, manage risk of errors and ensure the model is fit-for-purpose. It is a key way to help ensure models are robust. Private organisations as well as the public sector apply a number of QA techniques. These range from review by a peer in the same organisation,

to full external model audits. Key types were set out in Box 1.A of the final report reproduced below. These aspects are not important for their own sake, but because they help ensure sufficiently high quality models, which is their ultimate goal.

#### **Box 1.A: Types of quality assurance**

- **Developer testing** – use of a range of developer tools including parallel build and analytical review or sense check
- **Internal peer review** – obtaining a critical evaluation from a third party independent of the development of the model, but from within the same organisation
- **External peer review** – formal or informal engagement of a third party to conduct critical evaluation, from outside the organisation in which the model is being developed
- **Use of version control** – use of unique identifier for different versions of a model
- **Internal model audit** – formal audit of a model within the organisation, perhaps involving use of internal audit functions
- **Quality assurance guidelines and checklists** – model development refers to department’s guidance or other documented QA processes (e.g. third party publications)
- **External model audit** – formal engagement of external professionals to conduct a critical evaluation of the model, perhaps involving audit professionals
- **Governance** – at least one of planning, design and/or sign-off of model for use is referred to a more senior person. There is a clear line of accountability for the model
- **Transparency** – model is placed in the wider domain for scrutiny, and/or results are published
- **Periodic review** – model is reviewed at intervals to ensure it remains fit for the intended purpose, if used on an ongoing basis

**1.6** The purpose of this report is to provide an overall view of the progress that has been made since the review, to understand the areas where there may still be work to do and check that departments have plans in place to achieve this.

### **Structure of this report**

**1.7** This report is structured as follows: Chapter 2 sets out the findings of the review. Chapter 3 includes the conclusions drawn from the review responses received and sets out the future in this area. There are a series of annexes that give further information.

# 2 Results

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## Introduction

**2.1** All departments were asked to rate themselves, including their arms-length bodies, on a 5 point red/amber/green (RAG) system against the first six recommendations. An overall rating has also been calculated from the returns. All departments responsible for maintaining the key analytical models used across government responded. A list of the organisations that submitted returns can be found at Annex B.

### Box 2.A: RAG ratings and their meanings

The red/amber/green system rates performance against the following 5 levels:

- green – fully delivered and all risks managed
- amber-green – all significant elements delivered and any residual risks and issue are in hand
- amber – delivery is more than 50% complete overall, and the most severe risks and issues are in hand
- red-amber – some key elements delivered and the most severe risks and issues are managed appropriately
- red – many key elements are not delivered or planned, and substantial risks remain

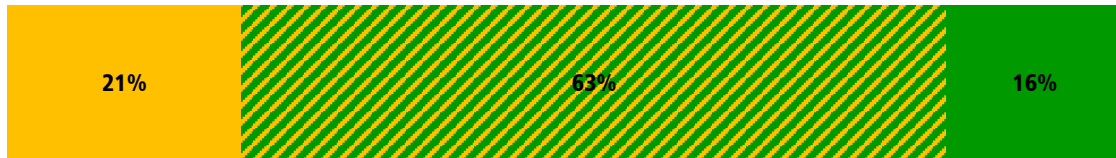
**2.2** The RAG results are summarised in the charts below. Organisations also gave a narrative to explain their rating, so the charts below should not be taken in isolation. Further details are given to explain the ratings. Overall, the results are encouraging, showing the progress that has been achieved since the review was published. However, there is still further work to do. Understandably, not all responses are green or amber-green. However, where organisations identified themselves as red or red/amber, improvement plans in place.

**2.3** One of the main aims of the recommendations was to ensure a more systematic approach across government and encourage sharing of best practice. The responses show that organisations have added a range of new processes to sit alongside existing structures. It may be helpful to share these so other organisations can consider if they could be appropriately used in their own plans, although they may not all be appropriate for every organisation.

## Recommendation 1

**2.4** All business critical models in government should have appropriate quality assurance of their inputs, methodology and outputs in the context of the risks their use represents. If unavoidable time constraints prevent this happening then this should be explicitly acknowledged and reported.

**Chart 2.A: RAG rating of organisations for recommendation 1**



**2.5** The responses showed 79% of organisations at green or amber-green. There are still improvements to be made in some areas of this recommendation most notably around risks and acknowledging time constraints. Assessing and admitting that models have risks or weaknesses both in their internal methodology and when applied may be difficult, but it is vital to enable the robust decision making that the model is designed for, allowing civil servants and ministers to see the full picture and make risk based decisions.

**2.6** Some organisations have chosen to meet this recommendation by introducing:

- an internal risk scoring system for the models
- log books to record pertinent issues of each model over time
- model summary templates and risk registers

**2.7** A standardised risk scoring system and a log for each model which includes a risk or issues section, is a formalised process that ensures that such issues are considered and captured appropriately. Such processes becoming routine should help ensure that a model's limitations are known and are fed into the policy they are informing.

**Box 2.B: Case study: Quality assurance scoring system**

The Department of Energy and Climate Change has developed a quality assurance scoring system for models. It reflects the extent to which the quality assurance (QA) process has been adhered to, and the quality present within this process. The score is calculated automatically through completion of a QA log.<sup>1</sup>

The log covers 5 sections: documentation, structure & clarity, verification, validation and data & assumptions. The assurer assigns a rating from 1 to 5 to each task within the sections, reflecting the performance of the model in that area. These ratings are then combined to produce an overall model score from 0% to 100%. Introducing a target score has also proved an effective means to incentivise and monitor improvement in processes and quality assurance.

<sup>1</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/384598/model\\_quality\\_assurance\\_full\\_log\\_temp.xlsx](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/384598/model_quality_assurance_full_log_temp.xlsx)



## Recommendation 2

**2.8** All business critical models in government should be managed within a framework that ensures appropriately specialist staff are responsible for developing and using the models as well as for quality assurance.

**Chart 2.B: RAG rating of organisations for recommendation 2**



**2.9** The responses revealed 76% of organisations at green or amber-green. Some responses showed that progress in this area was restricted by staffing, both in terms of identifying the roles needed and recruiting people into them, which can be lengthy processes. Some organisations recognised that their frameworks may need further adjustment. It may be appropriate that plans be considered as 'organic' documents as models may change over their life cycle. They may also need to reflect that an organisation's responsibilities and priorities change. Flexible plans that are regularly assessed are crucial to achieving appropriate QA.

**2.10** Organisations have demonstrated a range of ways of ensuring they have specialist staff including:

- coaching of new staff who use the model
- continuity planning for when staff move on
- having a Senior Analyst as well as SRO
- creating technical leads to support the SROs
- identifying Chief Analysts for each model
- implementing oversight committee
- appointing modelling champions
- using a centralised team to assist other teams who utilise them
- utilising a model development division

**2.11** All of the above can help create a strong framework and the right culture towards QA in organisations, whether they are based on single individuals to support the model SRO or a team to provide wider guidance, or even a combination of both.

**2.12** Those organisations which scored red/amber for this recommendation have clear plans in place to improve their performance which were in the early stages of being implemented at the time of the questionnaire. The organisations explained that the plans had taken some time to

put in place because of the need to consult across the organisation to avoid duplication of work and the wasting of resources. These returns also indicate that more work with their arm's length bodies may be required to ensure that similar standards extend across their whole organisation.

### **Box 2.C: Case study: Knowledge, analysis and intelligence**

The Direct Business Taxes team in HMRC's Knowledge, Analysis and Intelligence Directorate maintains a wide range of models supporting simulation of tax policy reforms, forecasting and provision of statistics across direct company taxes including corporation tax and North Sea revenues. The quality of these models is critical in reducing significant risks to the public finances from inaccurate forecasts or assessments of the cost or impacts of policy changes. Model outputs are subject to various quality assurance processes, including quality checklists and external scrutiny. However, the team recognised a need for improved internal review of the models themselves, creating a temporary posting in 2014 for a modelling specialist to lead this work.

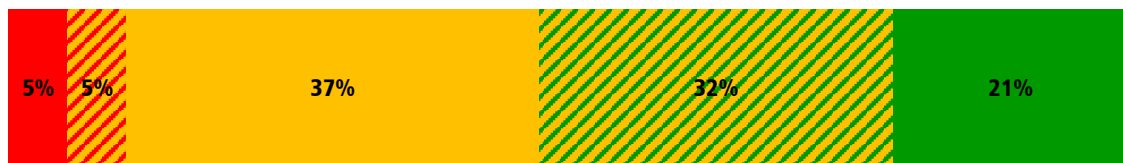
A rolling programme of basic model reviews has been initiated, supported by a new quality checklist examining model use and requirements, inputs including key data and assumptions, methods and design, and team knowledge. Model users are encouraged to provide honest and critical assessments of model shortfalls or limitations, forming an issues log to guide and prioritise future model developments. These are followed as necessary by the specialist's in-depth reviews and recommendations for specific models, and their support in implementing improvements. As examples, one key policy simulation model was re-written to correct errors identified in data use and re-designed to address its previously high potential for user error, slow service and ineffective quality assurance; another review exposed the limitations and large error margins of an econometrics forecasting model, and the need for a new approach incorporating alternative evidence.

The team's model review initiative cannot solve all model quality issues immediately, but has helped to signal that model improvement and quality assurance is valued and prioritised within the team. Knowledge of the state of the team's models is improving, and provision of dedicated specialist resource has helped to address the capability and capacity issues that can crowd out model improvement in a fast-paced policy environment.

## **Recommendation 3**

**2.13** There should be a single Senior Responsible Owner for each model ("model SRO") through its lifecycle, and clarity from the outset on how QA is to be managed. Key submissions using results from the model should summarise the QA that has been undertaken, including the extent of expert scrutiny and challenge. They should also confirm that the model SRO is content that the QA process is compliant and appropriate, model risks, limitations and major assumptions are understood by users of the model and the use of the model outputs are appropriate.

**Chart 2.C: RAG rating of organisations for recommendation 3**



**2.14** With 53% of organisations scoring green or amber-green, this is the lowest percentage of all the recommendations.

**2.15** While virtually all organisations have SROs in place for their business critical models, not all model SROs were content that all QA processes were compliant or appropriate, with model risks, limitations and major assumptions understood. Some organisations have added a section in their ministerial submission template to include a summary of QA, while others have not done this yet, but plan to. Introducing a section on QA in the ministerial submission template may be one way to help organisations meet this part of the recommendation relatively quickly and easily.

**2.16** The returns indicated that more progress was needed before SROs would find themselves fully content with the QA on each model they were responsible for. Progress so far had concentrated on putting the SROs in place and developing departmental processes. The next stage of progress is to ensure the SROs are satisfied appropriate QA is being applied.

**2.17** Departments have implemented various processes or created documents to support the SRO role:

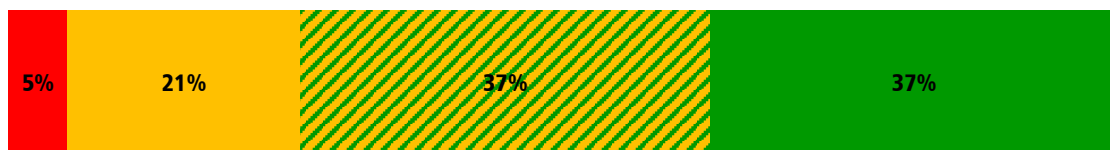
- central list of SROs (including for ALBs)
- appointment letters for SROs setting out their responsibilities
- teach ins for SROs
- a SRO community established
- a standardised reporting template to help SROs

**2.18** The organisations that declared themselves red or red-amber for this recommendation reported that moving to the system of SROs, instead of their previous authorising roles, was taking some time. Many of these organisations, while having high performing areas, need to work towards full consistency of best practice, especially when it comes to submissions. Progress has been made in utilising the SRO training developed by the cross government working group. Some organisations have also set up internal training and challenge sessions for their SROs. There are clear improvement plans in place within less well performing organisations with mechanisms to monitor and gauge compliance.

## Recommendation 4

2.19 The Accounting Officer's governance statement within the annual report should include confirmation that an appropriate QA framework is in place and is used for all business critical models. As part of this process, and to provide effective risk management, the Accounting Officer may wish to confirm that there is an up-to-date list of business critical models and that this is publicly available. This recommendation applies to Accounting Officers for arm's length bodies, as well as to departments.

Chart 2.D: RAG rating of organisations for recommendation 4



2.20 The results show 74% at green or amber-green. Many departments have published a list of their business critical models on gov.uk.

2.21 Some departments showed progress against the recommendation by introducing:

- independent audit/assessments both internally and/or externally as appropriate
- quarterly senior steering meetings

2.22 The red score for this recommendation reflects where a list of business critical models existed but needed updating. This work is in hand.

## Recommendation 5

2.23 All departments and their arm's length bodies should have in place, by the end of June 2013, a plan for how they will create the right environment for QA, including how they will address the issues of culture, capacity and capability, and control.

**Chart 2.E: RAG rating of organisations for recommendation 5**



**2.24** The responses show 63% of the organisations scoring green or amber-green. This is quite a broad recommendation and some organisations have indicated that they are tackling the issues (culture, capacity and capability, and control) in different ways to ensure that they are successful. Some areas like culture may take longer to change. The resourcing issues previously highlighted also have an impact on some of these areas, like capacity and capability. All organisations showed they have comprehensive plans in place, although at different stages of progress.

**2.25** The responses showed some innovative ways that departments have helped to create the right environment in their organisation, for example:

- a confidential mail box for help with QA
- QA objectives included in appraisals
- internal awards for good QA practices
- use of intranet to promote QA in general and policies and tools
- training of non-analytical and policy based staff, so they have an understanding of basic QA, in some cases all staff in the organisation receive basic training
- regular discussions at team meetings
- regular QA workshops/forums

**2.26** The organisations rated red or red-amber have chosen to prioritise the more analytically focused areas of their business in their returns to this exercise. However, they now plan on expanding their implementation of these recommendations to other areas of their organisations.

### Box 2.D: Case study: modeller and analyst forums

The Department of Energy and Climate Change runs monthly forums to enable modellers and other analysts across the department to meet regularly and discuss modelling issues. The purpose of the forum is to:

- enable the sharing of knowledge and best practice across the DECC modelling community
- peer review the analytical capability of DECC models, where requested by model owners
- allow senior leaders to present their view of analysis from a policy perspective
- have guest speakers from outside the department, and outside the civil service, to present on work they do

The forums cover a wide variety of topics, including Excel tips and tricks, dealing with uncertainty, a policy perspective on modelling, and quality assurance of the Global Calculator.<sup>2</sup> A full range of analytical professions attend the forum, and feedback is positive. The impact of this forum is to foster a strong cross-cutting community of analysts, providing a focal point for collaboration. This is particularly critical for DECC as many of the analysts are embedded within policy or economic teams.

## Recommendation 6

**2.27** All departments and their arm's length bodies should have in place, by the end of June 2013, a plan for how they will ensure they have effective processes – including guidance and model documentation – to underpin appropriate QA across their organisation.

Chart 2.F: RAG rating of organisations for recommendation 6



**2.28** This recommendation showed the highest percentage of organisations at green or amber-green, at 84%.

**2.29** Examples of documentation that organisations have put in place to address this recommendation include:

- user guides for the model
- handover checklists

<sup>2</sup> [www.globalcalculator.org](http://www.globalcalculator.org)

- induction packs
- defined handover process between SROs

#### Box 2.E: Case study: Cost Assurance and Analysis Service Approvals Team

Defence Equipment and Support (DE&S), a trading body of the Ministry of Defence, set up the Cost Assurance and Analysis Service Approvals Team (CAT), a dedicated branch that carries out detailed scrutiny of the cost side of business critical (and also delegated) businesses cases. They would look to ensure that the existing DE&S cost modelling QA procedure can be demonstrated to have been adhered to, and they would also take a view on the robustness of modelled outcomes themselves. This then forms a section for 'estimating assurance' in part of a formal report. The report is a mandatory part of approval.

## Overall scores

2.30 The overall scores have been averaged out from the 6 scores per recommendation and rounded to the nearest whole number.

Chart 2.G: Departmental average RAG rating



2.31 There were 74% of the organisations at green or amber-green, which shows encouraging progress. However, even in these departments there is typically still more progress that could be made.

2.32 In a minority of departments, progress has been slower. However, comprehensive plans are now in place to make the necessary improvements in their QA. It is essential that these plans are delivered.





# 3 Conclusions

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**3.1** Overall there have been satisfactory developments with how departments have embraced the recommendations and made progress embedding QA into their modelling processes. However, further progress can be achieved. In some cases, departments had made changes not just to business critical models, but to all models. In one case, the new QA procedures were being used across all analytical work, not just business critical models, demonstrating a wider benefit to this process.

**3.2** One department had implemented a QA framework despite not currently having any business critical models, in anticipation of their being used in future, which really highlights and reinforces the importance of QA being recognised by this organisation.

**3.3** Other departments have prioritised review of the QA processes of new and current models against those not being used at present. In the context of this report it is considered that is a wise use of resources, and this is part of a satisfactory plan to ensure that all models are covered in time.

**3.4** There are significant variations in departmental QA positions, often a result of the number and type of models and the available resources the department has. Some organisations have had an easier journey by virtue of their more experienced starting position. This should not discourage those organisations who have scored less well. They have had a longer journey and are to be commended for engagement. All organisations that submitted returns demonstrated improvement and have plans in place to address the recommendations.

**3.5** Since publication of the final report, the Government Internal Audit Agency (GIAA) has been established bringing together internal audit staff from all departments into a single, central body. As many organisations already use internal audit to help assess their systems and drive improvement, this development can only strengthen the work. The Government Actuary's Department (GAD) also provides external review of models where this can help make systems more robust.

**3.6** In addition, the SRO training and the Aqua Book developed by the cross-departmental working group should provide further resources for continuous improvement. Some departments plan to develop additional guidance of their own to complement the Aqua Book. Making this available across government, where possible, would help to spread best practice and would be particularly helpful for smaller departments which may not have the resources to develop all their guidance in-house.

**3.7** Most organisations have implemented an internal annual or even six monthly review, which means that the QA of models will continue to receive the focus it requires.

**3.8** The Accounting Officer for each department is ultimately responsible for the models within their department and organisations attached to them. The Accounting Officer's findings on QA will be publically available in departmental annual reports. Therefore regular review of QA will continue at a departmental level, which will ensure that the plans each department has identified will continue to be reviewed. This should drive progress until all the recommendations are met.



# A

## Copy of questionnaire

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### Section 1: Narrative on the broad approach your department has taken

Please describe the broad approach you have taken to addressing the Macpherson recommendations. In particular you may wish to identify how you have ensured sufficient senior buy-in, how you have co-ordinated the work across your department, what documentation you have commissioned or produced, and how you have involved any arm's length bodies in the process.

## Section 2: Confirming compliance

In this section, you are asked to assess delivery of the Macpherson recommendations using a red/amber/green rating system.

To aid consistency, the following is a suggested interpretation of ratings:

- green – fully delivered and all risks managed
- amber/green – all significant elements delivered and any residual risks and issues are in hand
- amber – delivery is more than 50% complete overall, and the most severe risks and issues are in hand. However some risks and issues are outstanding
- amber/red – some key elements delivered and the most severe risks and issues are managed appropriately, but some work outstanding or risks not fully handled
- red – many key elements are not delivered or planned, and substantial risks remain

Recommendation	RAG rating	Narrative: how did you deliver requirements for this recommendation?
<p><b>Recommendation 1:</b> All business critical models in government should have appropriate quality assurance of their inputs, methodology and outputs in the context of the risks their use represents. If unavoidable time constraints prevent this happening then this should be explicitly acknowledged and reported.</p>		
<p><b>Recommendation 2:</b> All business critical models in government should be managed within a framework that ensures appropriately specialist staff are responsible for developing and using the models as well as quality assurance.</p>		
<p><b>Recommendation 3:</b> There should be a single Senior Responsible Owner for each model (“model SRO”) through its lifecycle, and clarity from the outset on how QA is to be managed. Key submissions using results from the model should summarise the QA that has been undertaken, including the extent of expert scrutiny and challenge. They should also</p>		

<p>confirm that the model SRO is content that the QA process is compliant and appropriate, model risks, limitations and major assumptions are understood by users of the model and the use of the model outputs are appropriate.</p>		
<p><b>Recommendation 4:</b> The Accounting Officer's governance statement within the annual report should include confirmation that an appropriate QA framework is in place and is used for all business critical models. As part of this process, and to provide effective risk management, the Accounting Officer may wish to confirm that there is an up-to-date list of business critical models and that this is publicly available. This recommendation applies to Accounting Officers for arm's length bodies, as well as to departments.</p>		
<p><b>Recommendation 5:</b> All departments and their arm's length bodies should have in place, by the end of June 2013, a plan for how they will create the right environment for QA, including how they will address the issues of culture, capacity and capability, and control.</p>		
<p><b>Recommendation 6:</b> All departments and their arm's length bodies should have in place, by the end of June 2013, a plan for how they will ensure they have effective processes – including guidance and model documentation – to underpin appropriate QA across their organisation.</p>		

### Section 3: Detailed checklist

In this section, we have identified specific aspects of the Macpherson recommendations where compliance appears particularly challenging and/or contentious. There is some overlap with section 2. Please provide a brief narrative on each point to explain what considerations you have applied to this issue, and whether you feel your plans and processes have fully addressed it. How confident are you that this element has been delivered?

Have you quality assured, to an appropriate level, the inputs, methodology and outputs of all your business critical models?	
Have you ensured that any limitations of QA, or risks in use of outputs, are explicitly acknowledged and reported?	
Do you have procedures in place to ensure that appropriate staff are responsible for developing and using models?	
Have all model SROs been made aware of their responsibilities?	
Have you ensured that submissions or other communications with ministers reflect the degree of QA that has taken place?	
Have you established mechanisms to ensure that risks, limitations and assumptions are understood by users of models?	

<p>Is there a procedure to confirm to the AO that an up to date list of BC models is available (and, where appropriate, published)?</p>	
<p>Have you taken steps to ensure that ALBs have appropriate QA frameworks in place?</p>	
<p>Are ALB accounting officers appropriately sighted on their responsibilities to ensure proper QA?</p>	
<p>Do you have a departmental plan to identify how to create the right environment, culture, capacity and control?</p>	
<p>Do you have a departmental plan to ensure effective processes to underpin QA across the organisation?</p>	
<p>As part of the cross-government response to these recommendations, a cross-Whitehall group was established. Is there anything else you would like this group to do to support you implementation of the Macpherson recommendations?</p>	





# B Responses received

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**B.1** This section lists the organisations who supplied a response and are included in this report. Unlike the last report this review did not require the organisations to declare their list of business critical models. Many organisations have published their lists of business critical models in line with these recommendations. They can be found on the organisation's site through the gov.uk site.

- Cabinet Office
- Department for Business, Innovation and Skills
- Department for Communities and Local Government
- Department for Culture, Media and Sport
- Department for Environment, Farming and Rural Affairs
- Department for Education
- Department for Transport
- Department for Work and Pensions
- Department of Energy and Climate Change (including the Committee on Climate Change who reported separately in the last review)
- Department of Health
- Foreign and Commonwealth Office
- Food Standards Agency
- Government Actuary's Department
- HM Revenue and Customs
- HM Treasury
- Home Office
- Ministry of Defence
- Ministry of Justice
- UK Export Finance





## **HM Treasury contacts**

This document can be downloaded from  
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