# HM TREASURY

# Review of quality assurance of Government analytical models:

## interim report

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# Contents

# Foreword

On 12 October 2012, Sir Bob Kerslake (Head of the Civil Service), and Sir Jeremy Heywood (Cabinet Secretary) asked me to lead a review of the quality assurance of analytical models that inform policy across Government.

I was asked to lead the review in my capacity as Chair of the Whitehall Heads of Analysis Group. This group – enlarged to provide for external challenge and support – forms the Steering Group for the review, and is supported by a multi-disciplinary team, including economists, actuaries, statisticians and scientists.

Many government departments use analytical models to help make business critical decisions. The review was commissioned to look at the quality assurance framework for these models and to make recommendations on how to strengthen this framework. Full terms of reference are at Annex A, and include:

- asking departments to identify existing government models that are business critical, as well as setting out the existing quality assurance systems, processes and methods in place that apply to those models;

- identifying best practice on model development, operation and quality assurance, both for government analytical models and for non-government analytical models; and

- making recommendations for improvements.

The review will make final recommendations at the end of February 2013, but I also undertook to provide an interim report by the end of November 2012. This is based on the work of the review team to date which has involved:

- an information request to all central government departments, asking for details of all business critical models and quality assurance mechanisms for themselves and their arms length bodies. At this stage, over twenty organisations have submitted returns;

- initial interviews with key departments, to discuss the information provided; and

- desk research, and initial meetings, to form a view of the key principles underpinning good quality assurance.

I am grateful to the Steering Group for their initial views shared at our first meeting on 15 October. I am also extremely grateful to departments for their swift and comprehensive response to the request for information about their business critical models, and the relevant quality assurance frameworks.

This report sets out my initial findings, and focuses on:

- the approach taken by the review, including how departments have sought to identify "business critical" models, and a discussion of what quality assurance should encompass;

- the scope of the review across departments and their arms-length-bodies;

- the key points emerging from the information provided by government departments and arms length bodies about their business critical models, and the existing quality assurance frameworks;

- a summary of the best practice guidance that currently exists; and

- the key issues for the final report to address and to make recommendations on.

The timeframe for the initial phase of the review has been short, reflecting the desire to quickly identify best practice for quality assurance and to make recommendations for the future. This inevitably means my findings are preliminary and subject to further development ahead of the final report. In particular, the review will continue to engage with a wide range of external stakeholders and will undertake a more detailed analysis of the information provided by government departments.

Nick Macpherson

# Executive summary

In October 2012, Sir Bob Kerslake and Sir Jeremy Heywood commissioned a review of the quality assurance (QA) of analytical models that inform policy across government. This interim report sets out the results of the first phase of that work, to map business critical models across Government and the quality assurance processes that apply to them.

The key messages are:

- to date, the review has received information on around **600 models** which departments consider to be business critical. Exact numbers are likely to change over the course of the review, and so this figure is indicative rather than final;

- the **most populous categories of models** are policy simulation, forecasting and financial evaluation categories, with more than half of models returned falling into one of these categories. In general terms the planning and science based models are numerically lower, and there is also a low proportion of returns in the procurement and commercial category. However, this picture is likely to evolve as the review continues to work with departments on the detail of the information provided;

- departments provided details of models which met one or more aspects of the review's definition of **business critical**; that a model is being used to make major financial decisions, is key to delivering core functions, or is critical to an organisation's reputation;

- at the aggregate level, the initial returns also indicate **variation** in the quality assurance (QA) processes that are used. More detailed discussions with departments will be necessary to better understand what drives the approach to QA. In particular whether there are other factors, in addition to business criticality, that determine both the extent and type of QA undertaken; and

- some departments provided the review with **internal guidance documents** relating to QA. Some departments have in place a well-structured approach and there is a lot of good material available which could potentially be distilled and disseminated.

The key focus for the review going forwards will be to:

- **refine and further analyse** the information received to consider whether there are any clear links between different categories of models and the types of QA which are applied to them;

- highlight **models of 'best practice'** in quality assurance, through stakeholder engagement across the public and private sectors and desk research; and

- set out **policy recommendations** on how to ensure best practice extends across government, while ensuring all activity is proportionate and appropriate to different situations and models.

Alongside the final report, the review expects to publish a list of business critical models and their QA framework, subject to any commercial and security sensitivities.

# 1 Modelling across government

## Definition of a model

**1.1** In the broadest sense, a model is a mechanism for analysing or investigating some aspect of the real world. It is usually a quantitative method, system or approach which applies statistical, economic, financial, or mathematical theories, techniques and assumptions to process input data into quantitative estimates. There are typically three parts to a model:

- inputs – in the form of data and assumptions;

- a processing component – often through calculations; and

- outputs.

**1.2** As the returns from government departments illustrate, hundreds of models are being used to help make business critical decisions across government. Models are used in a wide range of situations, from projecting likely demand for key services or driving investment and procurement decisions, to simulating the government's future pension liability.

**1.3** To help structure the returns from departments, and to provide an analytical framework, the review defined seven areas where models are used routinely. These are:

- Policy simulation: to better understand policy options that drive government decisions. Ministers make policy decisions based on assessments of the likely cost and impact of policy choices. For example, the Intra Government Tax Benefit Model is used to analyse the distributional impact of tax and benefit changes;

- Forecasting: to predict the future and inform today's policy choices. For example, demographic projections are essential to understand future cost pressures for education and healthcare. Equally, DECC use the updated Energy and Emissions Model to forecast the energy demand and emissions by fuel and sector under existing firm and funded policies;

- Financial evaluation: to better understand future liabilities or costs. For example, modelling to understand the future cost implications of current pension commitments or the future cost of decommissioning existing nuclear energy plants;

- Procurement and commercial evaluation: for the letting and management of large contracts, and to ensure value for money – for example, where a key service is to be contracted out as in the case of railway franchises or where a major IT upgrades/ new system is being introduced;

- Planning: to make workforce decisions which affect the delivery of future services. For example, these models may be used to assess the number of trainee teachers, doctors and nurses required to deliver education and healthcare into the future;

- Science based: to better understand and simulate the physical environment, in order to evaluate possible solutions or to mitigate potentially devastating impacts – for example, climate change and flood risk; and

- Allocation of funds: to determine how funds allocated to departments are then distributed to, for example: local authorities, schools or across the health service. These models are essential to ensure funds are allocated properly across the country to underpin local service delivery.

1.4 For the purposes of the interim report, models to allocate funds are included within the planning category described above.

1.5 There is also a wide range of modelling techniques which can be employed (e.g. stochastic modelling or micro-simulation modelling), and although the review will not explore these in detail, it is worth noting that the approach to quality assurance may differ depending on the underlying methodology.

1.6 Equally, within each area, there will potentially be a significant range of model complexity. For example, a model may be a relatively simple spreadsheet with a limited number of data inputs from a published data source. Or, at the other end of the spectrum, a highly complex global climate model used to project future climate change scenarios. The complexity of a model may also impact on the approach to quality assurance.

1.7 The table below summarises the categories above, and sets out the possible consequences of making mistakes.

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

| Model type | Purpose | Examples | Possible consequence of error |
|---|---|---|---|
| Policy simulation | Appraisal of policy options, analysis of impact on people, finances, etc | Intra Government Tax Benefit Model | Choose wrong option, costs more than expected |
| Forecasting | Assessing the future, perhaps to provide base information for policy development or financial planning | ONS Population projection | Planning disruption, misdirection of resources |
| Financial evaluation | Assessment of liability or future cost | Pension liabilities, nuclear decommissioning costs | Financial shortfall, misallocation of resources |
| Procurement & commercial | Evaluation of VfM or affordability and award of contracts | Awarding of rail franchises | Incorrect decision, extra cost |
| Planning | Planning current actions based on future forecasts | Teachers, NHS | Service delivery failure, remedial costs, reputation |
| Science-based | Understanding and forecasting natural systems | Climate change | Reputation, wrong policy choice |
| Allocation | To distribute funding across organisations responsible for service delivery | Police allocation formula | Financial shortfall, misallocation of resources. |

## Mapping business critical models – method used

**1.8** A key goal of this review is to identify the business critical models in use across government.

**1.9** To achieve this, the review team asked departments to submit details of all models used by the department and its arms length bodies that they consider to be business critical.

**1.10** Given the difficulty of making objective judgment from the centre, the review team asked departments to determine which models qualified as 'business critical', and asked them to bear in mind the following three factors:

- extent to which model drives essential financial and funding decisions;

- extent to which model is essential to achievement of business plan actions and priorities; and/or

- extent to which errors could engender serious financial, legal, and/or reputational damage or penalties.

**1.11** The team asked departments to exclude models which are used to assign resources and tasks within departments – for example Human Resources and Financial planning tools – unless this is part of a significant strategic review linked to better delivery of key objectives. Where departments used variants of core models, the team asked them to list any additional quality assurance processes relating to these variants.

**1.12** The rest of this section sets out the headlines on where the business critical models are in government, and what they are used for.

## Findings to date – models in use in Government

### Number of business critical models identified across Government

**1.13** To date, the review has received information on around 600 models which departments consider to be business critical.

**1.14** It is important to note that exact numbers are likely to change over the course of the review, and that this figure is indicative rather than final. In addition, some records relate to a class of models, such as procurement and commercial, which might have many models underneath a generic response. For example, the return from DWP includes the detail of their Commercial Operating model, but this covers many procurement decisions. Therefore, the number of models covered by this process is likely to be higher in practice.

**1.15** The review will continue to work with departments to ensure final returns accurately reflect the full number of business critical models, and that departments have defined "business critical" in the way that is most meaningful to their goals and objectives.

### Type of models identified

**1.16** The returns focussed on the seven types of model category as described in Table 1.A above. Over coming weeks, the review will work with departments to confirm the review has an appropriate categorisation.

**1.17** The most populous categories of models were policy simulation, forecasting and financial evaluation, with more than half of models returned falling into one of these categories. In general terms the planning (which currently also includes "financial allocation" models) and science based models are numerically lower. The headline figures also indicate a relatively low

proportion of returns in the procurement and commercial category. But this should be treated with caution, as explained at paragraph 1.14 above.

1.18 Two pie charts are set out below to show a high level indication of the split of models by department and by model type. As expected, the larger departments tend to have the larger number of business critical models. Most departments do have a predominant model type, for example in DEFRA nearly half of their models are science-based and account for nearly a third of the total science models, whereas some departments, HMRC for example, understandably have no science-based business critical models. Some departments and arms-length-bodies with wide-ranging subject areas have a mix of all model types. For example, DWP includes the Health and Safety Executive and so has a wide spread of all types of model, as do DFT, DH and MOD.

**Chart 1.A: Business critical models by Department**
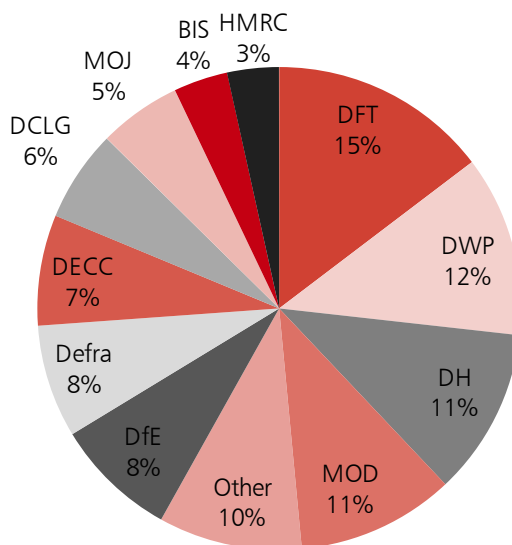


*Source: Departmental returns*

**Chart 1.B: Business critical models by model type**
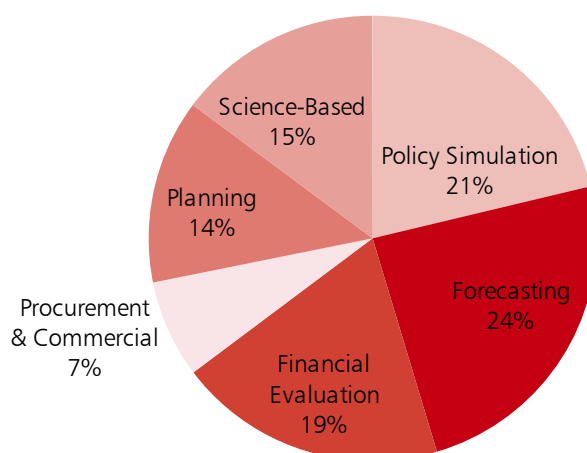


*Source: Departmental returns*

## Significance and scale of models

**1.19** The review asked departments to identify their business critical models, and those of their arms length bodies, using three determining factors (value, i.e. extent to which model drives essential funding and financial decisions, function and reputation).

**1.20** The use of three determining factors meant some models met one of the factors, but not the others. Hence, by monetary value the model range given was in the range of £1 million to £200 billion on an annualised basis and many models had no attributable monetary value.

**1.21** The organisations which had the largest monetary value models were typically either large spending departments, or those raising revenue – for example, taxes (HMRC), benefits (DWP), expenditure on health (DH), education (DfE) and defence (MoD).

**1.22** In addition to monetary value, organisations also included models with an impact on function and reputation. For example:

- one organisation included a resource allocation model that, while allocating about £15 million of annual spend, and being small in comparison with values of other models, went to the heart of the organisation's function; and

- similarly, the climate change model, used by a number of organisations, while having no monetary value attributed to it, underpins a number of key policies and is clearly business critical.

**1.23** There was considerable variation in the interpretation of business critical at the lower end, with some departments classifying models whose impact, or the amount of value influenced, were significantly below the cut-off point used by others. And it is important to recognise that departments may wish to refine their approach ahead of the final report.

**1.24** Overall, the variety of returns confirmed that departments are best placed to make decisions about which of their models are business critical.

## Next steps – mapping business critical models

**1.25** The next steps for the review will be to continue to work with departments to ensure we have:

- a comprehensive snapshot of business critical models across departments and their arms length bodies, which reflects each department's considered view about those models which are critical to their core business and reputation; and

- a sensible categorisation of these models based on their purpose.

**1.26** The review expects to publish this list alongside the final report, and subject to any commercial and security sensitivities.

# 2 Quality assurance of models
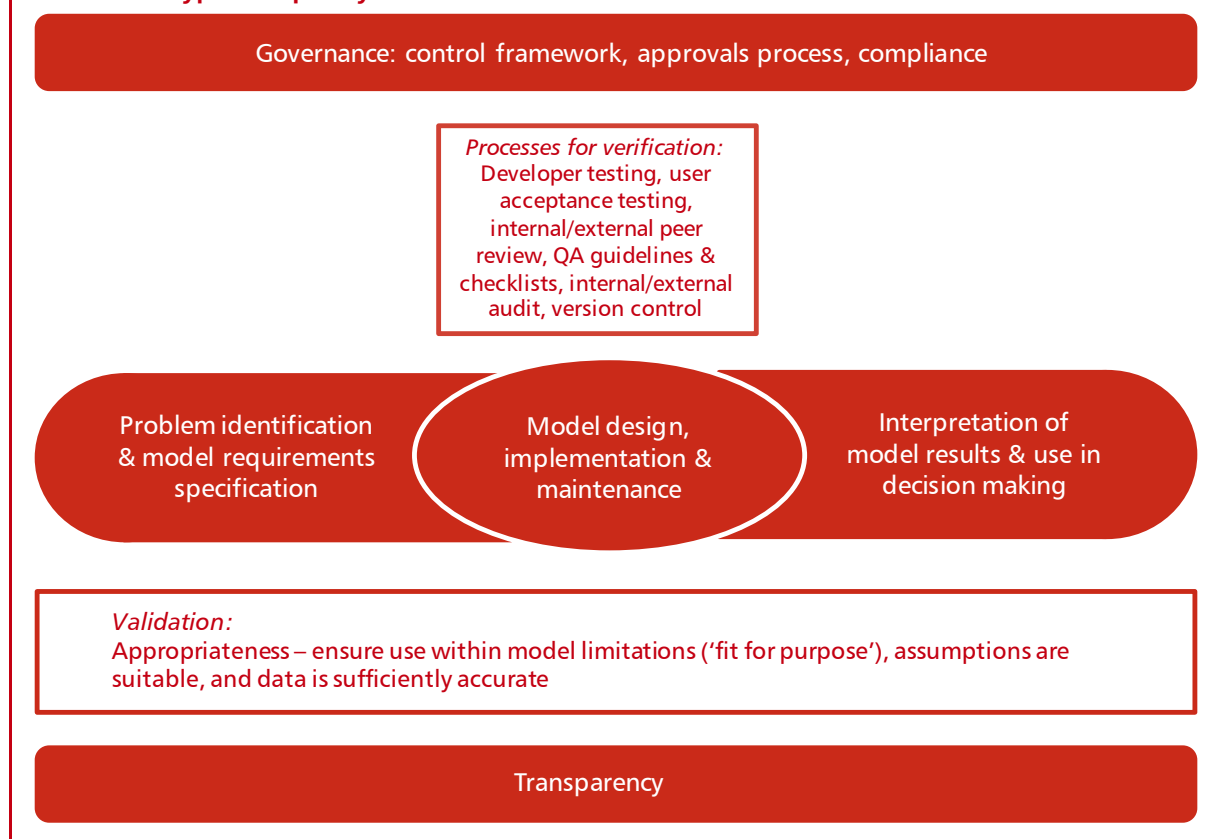
## Definition of quality assurance

2.1 Models are a representation of the real world or possible future, and will never be perfect. They therefore need a degree of quality assurance (QA) to ensure the methodology and outputs are accurate and relevant.

2.2 Equally a wide range of factors will contribute to the overall quality of models. These include the skill and expertise of the model developers and users, the quality of the data and assumptions, the communication of the outputs and the understanding of the limitations and simplifications to the decision makers. All these factors play an important role in developing good quality models, and using them appropriately.

2.3 Quality assurance can then confirm that a model is fit for purpose. This review has defined quality assurance broadly as: "those processes and systems which are applied to ensure the model's outputs meet its quality requirements, manage risk of errors and ensure the model is fit for purpose".

2.4 The diagram below helps to illustrate this wider context and the subsequent text box explains some of these basic QA concepts in more detail.

**Chart 2.A: Types of quality assurance**

Governance: control framework, approvals process, compliance

*Processes for verification:*
Developer testing, user acceptance testing, internal/external peer review, QA guidelines & checklists, internal/external audit, version control

Problem identification & model requirements specification

Model design, implementation & maintenance

Interpretation of model results & use in decision making

*Validation:*
Appropriateness – ensure use within model limitations ('fit for purpose'), assumptions are suitable, and data is sufficiently accurate

Transparency

2.5 Chart 2.A sets out the key stages in a model's development and use, together with the elements of quality assurance that might apply to the different stages. The central element of this chart is focussed on the quality assurance of analytical models themselves. However, as the chart shows, this is only one element of an overall approach which underlines the importance of understanding:

- the purpose for which the model is developed;

- the quality of any data inputs, and any assumptions that drive the model, including the estimation of parameters;

- the use of the model's outputs; and

- the degree of risk and uncertainty in the model and it's outputs (it is important that final decisions take this into account).

2.6 Equally, some aspects of quality assurance are about more than the model development process. A governance framework should identify clear lines of responsibility and accountability, and transparency can help to ensure a business critical model benefits from external scrutiny. Effective governance and transparency can be particularly important where a model is highly complex, and a level of expertise is required to understand the model and the risks associated with its complexity. An organisation's culture can also play a role in ensuring that appropriate QA is highly valued and seen as fundamental to model development and use. These issues are discussed in more detail in the box below.

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**Box 2.A: Basic quality assurance concepts**

**Governance:** the structure and systems in place to ensure accountability for modelling and ultimate responsibility for quality assurance. The governance process around the development and use of models is critical to ensuring quality and underpins assurance. This includes the framework around who does what, what approvals are required and the control environment. This should make clear who is accountable for the model's use and how compliance with agreed processes is monitored.

**Processes:** the basic tools of model quality assurance incorporate a range of stages including: developer testing, internal peer review, external peer review, use of version control, internal audit, quality assurance guidelines and checklists, and external audit. These processes should be in place from the outset of a project or piece of modelling work to ensure that quality assurance is not an afterthought. Documentation of the processes can help to maintain knowledge management and retain institutional information. Compliance with the processes should be monitored so that quality assurance is achieved and not just assumed to take place because the processes are in place.

**Transparency:** where models and/or results are placed in the public domain, the resulting additional scrutiny can generally be relied upon to increase confidence in the modelling. The more open and transparent modelling is, the more open to challenge and critique it will be. This can help with peer and external review as well as aiding the internal quality assurance by highlighting the importance of quality assurance and the risks of getting it wrong.

**Appropriateness:** any model can be fully quality assured and 'a correct model' in terms of the inputs, calculations, assumptions and outputs but the model could still be used inappropriately. Inappropriate use can come from poor communication, and/or a model being used for a purpose other than that originally intended. Good communication of outputs and a developed understanding of a model's accuracy, robustness and stability are important to avoid confusion and incorrect use of the model. Where a model is being assessed separately from a particular application, the QA process should record the main limitations on the expected validity of the model. These can then be checked for each actual application and any resulting risks disclosed to decision-makers.

**Verification:** the process through which a model is reviewed to ensure it is error-free and satisfies its specification.

**Validation:** a wider review to ensure a model is appropriate i.e. fit for the purpose for which it is being used.

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**2.7** With all these techniques and processes, it is of crucial importance that quality assurance is proportionate to risk. Clearly, all QA requires a level of resource input. It is therefore important that the level and type of assurance sought relates to the significance of the model, and the likelihood of error. This is vital to avoid imposing undue burdens, maximise value for money, and ensure resources are directed where they are most needed.

## What the review team asked of departments

**2.8** In order to map the business critical models in use across government, the review team asked departments to provide details of the quality assurance processes that applied for each business critical model. The team asked departments to provide these details both for themselves and for their arms-length-bodies.

2.9 To assist departments in completing their return, the team provided a list of elements of quality assurance. These included: developer testing, internal peer review, external peer review, use of version control, internal audit, quality assurance guidelines and checklists, external audit, governance, transparency, and model development over its lifetime/fitness for purpose. The team highlighted that this list was not exhaustive, and asked departments to add their own categories if they felt this appropriate.

# Findings to date – the nature and extent of model quality assurance in government

## Types of quality assurance in use

2.10 The types of QA process described in the returns broadly fell into the categories suggested by the review team (see paragraph 2.9). Within these broad categories, some processes were also used including user acceptance testing or user sign-off for models supplied externally, model walk-through with relevant staff, checking outputs against independently-produced results, benchmarking or reconciliation against other models, comparison or regression testing against previous models or previous model versions, and comparing previous projections from the model with actual data ("back-testing").

## Degree of variation in quality assurance

2.11 At the aggregate level, the initial returns indicate some variance in terms of the QA processes that are used both within and across departments.

2.12 The returns illustrate that all business critical models are subject to QA, but – as would be expected – there is variation in the extent and type of QA depending on the model in question. In some instances a full external audit is undertaken. In other cases verification and validation is undertaken internally.

2.13 Examples of models with extensive QA include large-scale scientific models subject to full external audit and where the resulting model is placed in the public domain and hence subject to ongoing academic scrutiny. Conversely, there are examples of models which are relatively straightforward or small in size where it has only been considered necessary to get the model reviewed by a (normally more senior) colleague of the original modeller. This is more likely to be the case where a model involves relatively minor changes to an earlier version.

2.14 It is clear that there is an important distinction between consistent QA (applying the same QA processes to all models) and appropriate QA (for example QA varying by model depending on risk, complexity or other factors). In practice, different organisations are likely to have different model mixes and the risk/complexity of their individual models may necessitate different levels of QA.

# Departments' internal guidance

2.15 Some departments provided the review with guidance material covering their quality assurance processes. This section describes our initial findings from a review of this guidance.

2.16 There is a wide variation in the scope of these documents. Sometimes they apply only to models used in particular parts of the organisation, such as the operational research team, or to models used when carrying out certain activities, such as impact assessments. The format of the guidance differs between organisations, ranging from detailed prescriptive processes and specific checklists, to more generic lists of ideas which should be considered.

2.17 Some of the documents provide useful criteria to help decide on the extent of QA that should be undertaken. Almost all of the organisations highlight the value of using someone independent from the project team to review the model and provide effective challenge.

2.18 In terms of content, several of the documents make the distinction between verification (the process through which the model is reviewed to ensure it is error free and satisfies its specification) and validation (a wider review to ensure that the model is fit for the purpose it is being used for). Just over half the documents describe approaches to verification, while all discuss validation. Some documents also refer to wider areas of model use, including the effective communication of results and good model governance.

2.19 The documents outline a range of verification processes. At the most detailed these include, for example, a full logic review by an external team to review every cell of a spreadsheet. With the help of software, a 'map' is produced showing how formulae change across the sheet, and each unique formula is then reviewed to ensure that it is correct. Other ways described of trying to ensure the calculations are correct include:

- replicating parts of the model independently;

- the inclusion of cross-checks within the model;

- checking that the response to changes in inputs is as expected;

- checking the model using simplified dummy data; and

- seeing how the model reacts to extreme values, zeros and critical limits.

2.20 With the aim of ensuring fitness for purpose, many of the processes include references to considering the aim of the modelling, the integrity of the data, the uncertainty in the assumptions and the simplifications adopted in the modelling. These are described as considerations for both those undertaking the analysis and those involved in the review process. Validation processes described include:

- 'sense' checks of the model;

- comparison to other models;

- comparison to real events (for example pilots, training exercises or historical data);

- sensitivity/scenario testing to assess the impact of uncertainty in inputs; and

- stress testing to understand the robustness of results under extreme conditions.

2.21 Almost all the processes require a formal review of the model by someone who has not been directly involved with its development. This can bring a new perspective and uncover issues which may have been overlooked by the model developers. The extent of this external scrutiny is difficult to compare from process documents alone and is likely to vary depending on the significance of the modelling work. Some organisations have set up separate teams to carry out such reviews for particular types of models. Due to the range of models being used, the person carrying out such a review varies, but the list includes economists, scientists and technical experts as well as peers (sometimes of a specified seniority) within the organisation.

2.22 Documentation, version control and good modelling practice (for example, clearly identifying inputs/outputs and assumptions) are also mentioned in many of the documents. These are aimed at reducing errors and aiding the verification and validation processes (although they may not in themselves form quality assurance processes). They also aim to ensure the limitations and uncertainties of the models are captured.

**2.23** The framework for the governance of models is not always fully detailed in the process documents provided, and so it is difficult to draw any initial and general conclusions about the governance frameworks that are in place.

**2.24** Where the responsibility for obtaining verification and validation remains with the project team, the audit of documentation is often used to ensure that quality assurance processes are being completed.

**2.25** Overall it is clear that, while there is a degree of variation in the quality assurance guidance, there is a lot of good material available. Hence it should be possible to distil best practice and seek to extend this as widely as possible.

## Next steps – best practice in model quality assurance

**2.26** In working towards the final report, the review team will analyse the returns in more detail to consider whether there are any clear links between different categories of models and the types of QA which are applied to them. For example, are external peer review and/or model publication more likely to be considered appropriate for particular types of model?

**2.27** The team will hold more detailed discussions with departments to better understand what factors drive the distinction between the types and extent of QA which apply to different models – for example, the extent to which the complexity of the model and the degree of risk and uncertainty are factors. Discussions with developers and users of models outside government will also explore this theme in more detail.

**2.28** The review will seek to identify best practice in quality assurance, and in particular to establish guidelines to assist in the choice of appropriate QA.

# 3 Conclusion and next steps

**3.1** Initial returns to the review have illustrated the volume of business critical models used by government, and the variety of approaches to quality assurance.

**3.2** The next stage will be to understand this variety in more depth, and determine how to preserve necessary distinctions between the type and degree of quality assurance applied to different models, while ensuring appropriate robustness across the board.

**3.3** The next steps for the review will be to:

- refine and further analyse the information received to consider whether there are any clear links between different categories of models and the types of QA which are applied to them. For example, are external peer review and/or model publication more likely to be considered appropriate for particular types of model?

- highlight models of 'best practice' in quality assurance, through stakeholder engagement across the public and private sectors and desk research; and

- set out policy recommendations on how to ensure best practice extends across Government, while ensuring all activity is proportionate and appropriate to different situations and model types.

**3.4** Alongside the final report, the review expects to publish a list of business critical models and their QA framework, subject to any commercial and security sensitivities.

# A Terms of reference

## Background

A.1 In light of the experience on the InterCity West Coast franchise competition, and given the Civil Service's commitment to better policy making, the Cabinet Secretary and the Head of the Civil Service have commissioned a review of the quality assurance of analytical models that are used to inform policy decisions.

## Purpose

A.2 Government departments are responsible for the analytical models they use to inform decision-making in the policy areas on which they lead. This review will consider the quality assurance mechanisms that central government departments have in place to scrutinise the robustness of analytical models and will make recommendations for improvement.

A.3 In doing so, the review will:

- ask departments to identify existing Government models that are business critical, as well as identifying and justifying the existing quality assurance systems, processes and methods in place that apply to those models;

- identify best practice on model development, operation and quality assurance both within Government analytical models and in non-Government analytical models; and

- make recommendations for improvements.

## Governance

A.4 The review will be led by Sir Nick Macpherson, Permanent Secretary to the Treasury and chair of the Whitehall Heads of Analysis Group. The review will be supported by a multi-disciplinary team, including economists, actuaries, statisticians and scientists. The Whitehall Heads of Analysis Group, enlarged to provide for external challenge and support, will act as Steering Group for the review.

## Evidence

A.5 The review will gather evidence from a wide range of stakeholders, including government departments, the private sector, public policy organisations in the UK and overseas; as well as the academic community.

## Reporting

A.6 The review will provide an interim report by end November 2012 which will identify the business critical models identified across Government and map the quality assurance mechanisms that apply to those models, and a final report to the Cabinet Secretary and Head of the Civil Service by end January 2013 setting out lessons from best practice and recommendations for improvement.

**Contact**

A.7 For more information, please contact HM Treasury public enquiries at public.enquiries@hm-treasury.gov.uk.

**Notes for editors**

A.8 The Steering Group will be as follows:

- Sir Nick Macpherson (Chair)

- Tera Allas – Deputy Head of the Government Economic Service

- Richard Bartholomew – Joint Head of Government Social Research

- Sir John Beddington – Chief Scientific Adviser

- Ian Davis – Non Executive Director, Cabinet Office

- Jenny Dibden – Joint Head of Government Social Research

- Trevor Llanwarne – Government Actuary

- Jil Matheson – National Statistician

- Tony O'Connor – Head of Government Operational Research Service

- Dave Ramsden – Chief Economic Adviser

- Chris Wormald – Head of Government's policy profession

- Richard Douglas – Head of the Government Finance Profession

A.9 Richard Brown, former Chief Executive Officer of Eurostar International Ltd is also leading a related review into the InterCity West Coast franchise competition.

**HM Treasury contacts**

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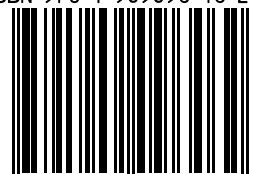website: http://www.hm-treasury.gov.uk

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