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Embedding Quality through the Model Cycle

Jonathan Tecwyn, DECC Modelling Integrity Team,
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“Essentially, all models are wrong, but some are useful.”

George E. P. Box

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Key takeaways from today

1. Ensuring model quality is an ongoing and collaborative process which should be embedded throughout the model cycle(s).
2. Being transparent through the use of proportionate and clear documentation will ease the process greatly.
3. Appetite for model use may depend on policy timelines, business criticality and risk appetite, amongst other issues – but regardless of this it is important to communicate how fit for purpose the model results are.

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Overview

- Introduction (5 mins)
- Model and quality assurance management: key areas (10 mins)
  - Documentation
  - Scope & Specification
  - Design & Build
  - Data & assumptions
  - Model testing (including Regression testing) & clearance
  - Model use
  - Model review
- Q&A with Neil Strachan and open discussion (15 mins)

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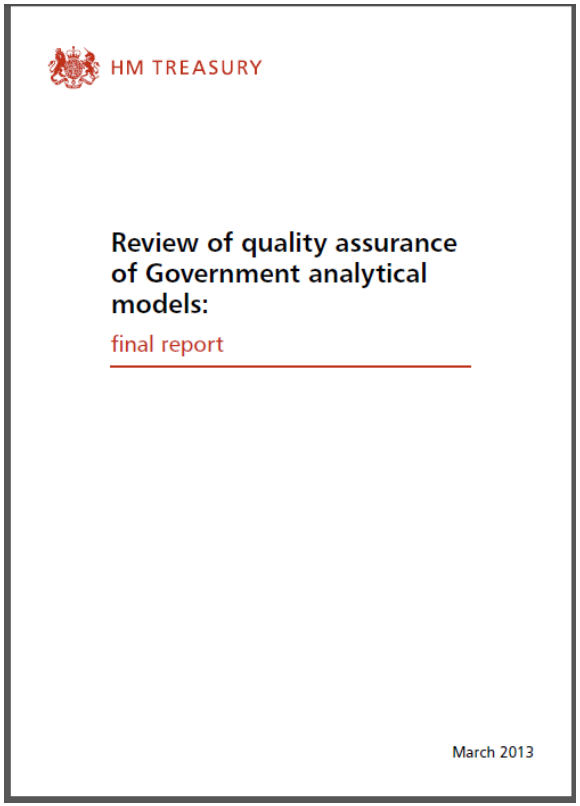
Quality assurance - context



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DECC's Modelling Integrity Team

Jonathan Tecwyn
OR

Thomas Webb
Engineer

Emma Frost
OR

Alessandro Arbib
OR

Katie Walker
Engineer

Responsible for:

- Formal Review of key DECC Models
- Ongoing DECC Model Support
- Developing and embedding best practice, guidance and tools

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Embedding Quality throughout the Model Cycle

- In reality – less structured
- Speed of cycle varies by project

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Documentation – Why?

- **Transfer of knowledge** from developers to users, e.g.:
  - helping a **non-analyst use** the model to get outputs
  - helping a new **analyst** pick up the model from scratch with a view to **developing it**
  - Allowing the model to be **rebuilt** from scratch
- **Mitigate the risk** that analysis or model results are used or adopted for a new problem inappropriately
- **Provide evidence** to auditors and aid external scrutiny

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Scope & Specify – key points

Scope

- Model objectives.
- Model boundaries.
- Should be as simple as possible (but no simpler).

Specify

- What it will do, and how.
- Level of detail.
- Bubble diagrams help structure.
- QA standard required.

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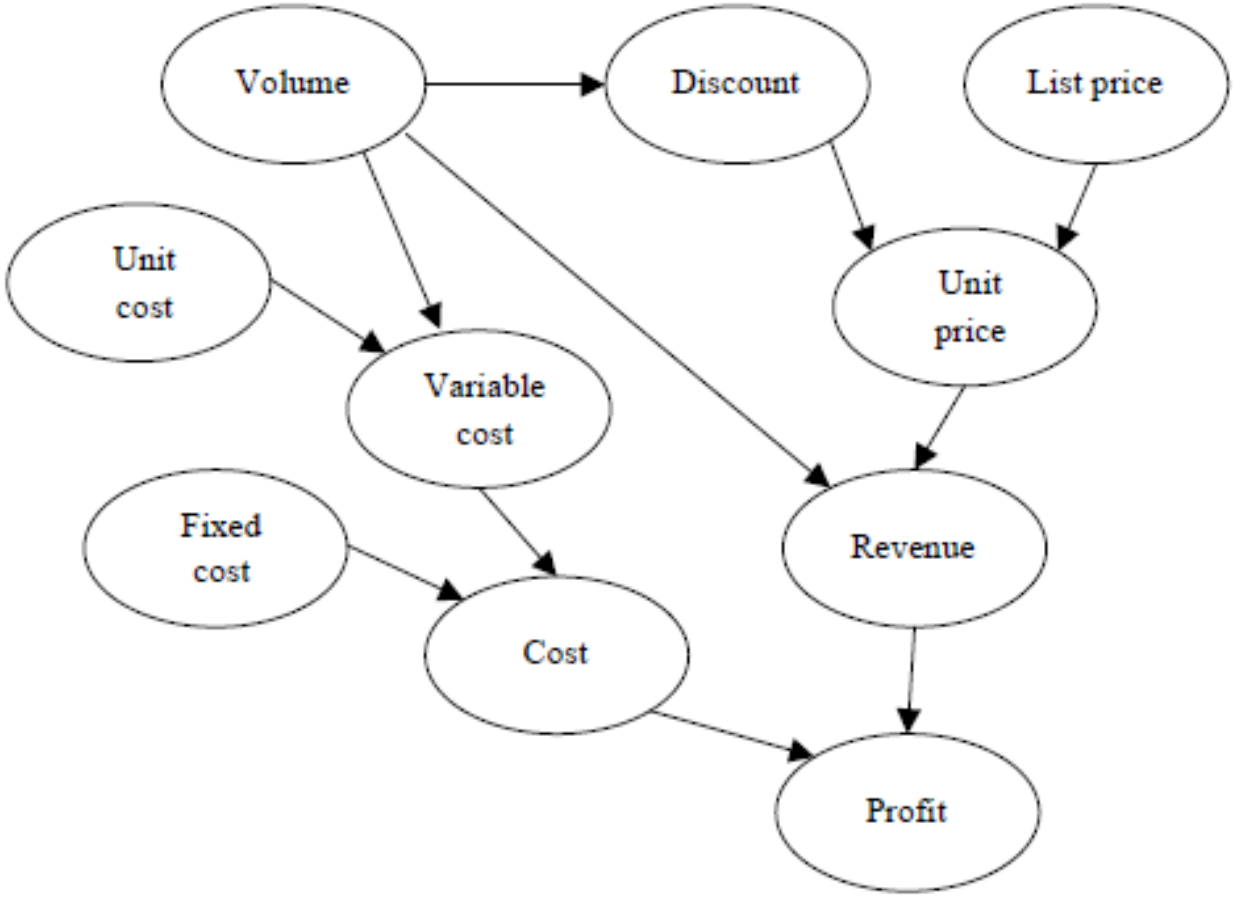
Example of a bubble diagram



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Design & Build – key points

- Formulae/code as simple, transparent and easy to read as possible.
- Model organised in a clear way.
- Clear naming system convention for tables, variables and constants.
- Proportionate level of documentation within or external to the model.
- Easy to validate and verify:
  - Include error traps
  - QA plan

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Populate – key points

- Transparency.
- Use names.
- Include units.
- Use a data log.

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Test & sign off – key points

Model testing

- Reduce risk of error, build credibility and influence of final model.
- Verification **and** validation.
- Done by someone other than developer.
- Sign off through relevant channels.

Regression testing

- Checking that changes to the model made during the development cycle have not introduced unintended consequences.

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Use – key points

- User guide.
- Is intended use appropriate?
- Wider risk consideration? (e.g. policy landscape etc)
- Think about the customer – what information will help them understand and make the right decisions?
- Standard form of words to be included with any output so that the ultimate decision maker(s) are aware of the model's limitations.

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Review – key points

- Version control: date stamp the model.
- How to ensure model stays fit for purpose?
- Correct modelling tool?
- Are there known model deficiencies?
- Trigger points for model update?

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Discussion points

- How can we make documenting as painless as possible?
- How well followed are the steps that have been outlined?
- Pros and cons of publishing models, data and methodologies.
- How to ensure we are asking the right QA questions?
- Any other top tips for model assurance?

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Any further questions?

Contact DECC's Modelling Integrity team:

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DECC Model QA Guidance:

Google search: "DECC Procurement" – look for "analytical modelling" section.