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Assessing and Communicating Uncertainty Toolkit

A brief history



GOVERNMENT OPERATIONAL RESEARCH SERVICE

A wide range of analysts have been involved in toolkit development

MoJ

Defra

BEIS

HMRC

DHSC

(and others)

DfE

Home Office

DfT

Statistics

DWP

Operational Research

ONS

Economics

GAD

MoD

DSTL



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The toolkit



Assessing and Communicating Uncertainty Toolkit

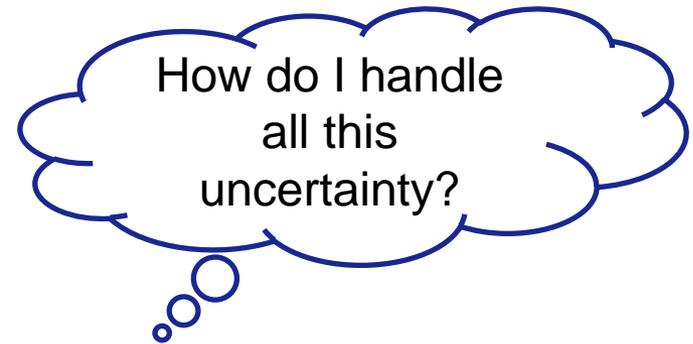
As an analyst working in government:

- Uncertainty is unavoidable.
- We need to conduct analysis in a way that takes uncertainty into account.

We need to communicate results in a way that ensures that the decision maker:

- understands the nature of the uncertainty in the situation;
- understands the nature of the results given this underlying uncertainty.

This will ensure that a properly informed decision can be made.





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Assessing and Communicating Uncertainty Toolkit

Section 1: Jointly agreeing how uncertainty should be used.



Section 2: Defining and identifying uncertainty.



Supporting Documents:

- Case studies
- Further reading
- Summaries

Section 4: Presenting and communicating uncertainty.



Section 3: Measuring and understanding uncertainty.





Section 1: Jointly agreeing how Uncertainty should be used.

Why it is important:

The decision maker and analyst should agree how uncertainty will be handled at the outset.

This helps with:

- Gaining a shared understanding of the factors contributing to uncertainty;
- Designing and building in the appropriate analysis;
- Avoiding giving spuriously accurate results.

What the toolkit offers:

A guide to:

- Understanding the problems posed by uncertainty;
- How uncertainty will affect the decision making process.



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Section 2: Defining and Identifying Uncertainty

Aleatory Uncertainty

e.g. Throwing fair dice

Epistemic Uncertainty

e.g. Throwing dice that are loaded in some unknown way

Ontological Uncertainty

e.g. Someone swapping the fair dice for loaded dice without us knowing this was even a possibility.



Key sources of Uncertainty:

Data – Assumptions – Analysis



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Section 3: Understanding and Measuring Uncertainty.

A range of tools are detailed and their appropriateness for use is considered relative to:

- The nature of the underlying uncertainty
- The role uncertainty will have in decision making

Expert
judgement

Summing
uncorrelated
uncertainties in
quadrature



Monte Carlo
techniques



Section 4: Presenting and Communicating Uncertainty.

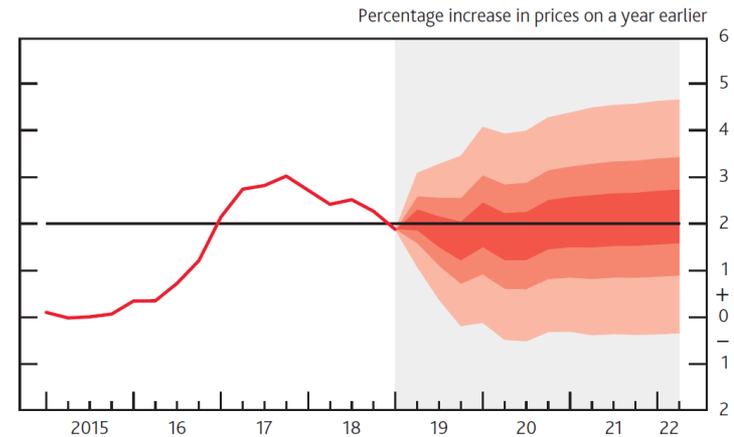
The right words (written or spoken):

The following points are covered in the toolkit:

- Understanding the audience
- Getting the key message across
- What to communicate
- How to communicate

The right visuals:

The guide suggests a wide range of representations of uncertainty.





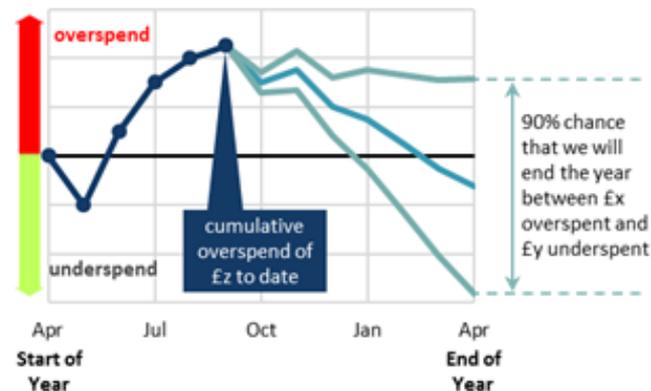
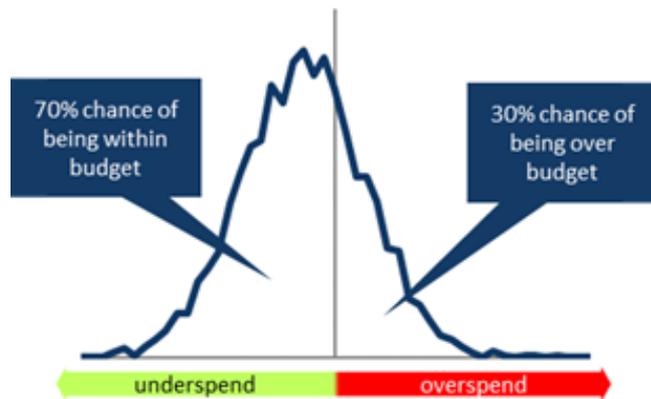
Case Studies

Seeing the toolkit in action:

Four practical examples guide the reader through the four step process.

1. Estimating the impact of evidence volumes in Legal Aid spend.
2. Estimating uncertainty in prison population projections.
3. Estimating changes to staff travel times following an office relocation.
4. Predicting staff pay costs.

Key issues, decisions and considerations are discussed along the way.



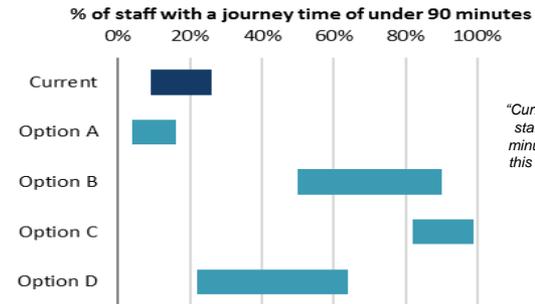
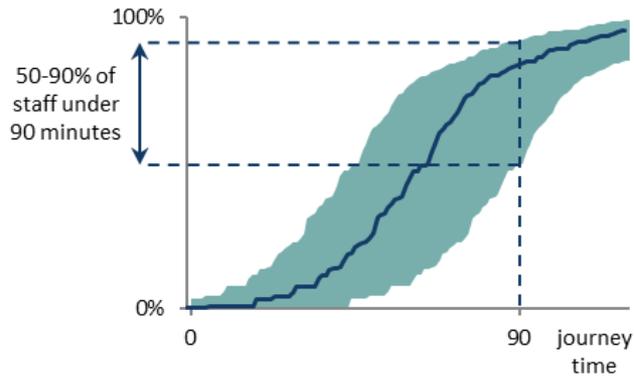
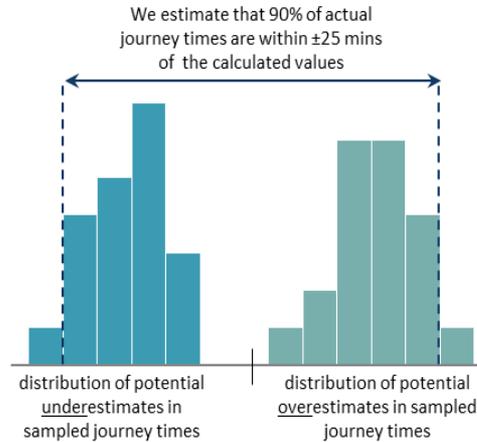
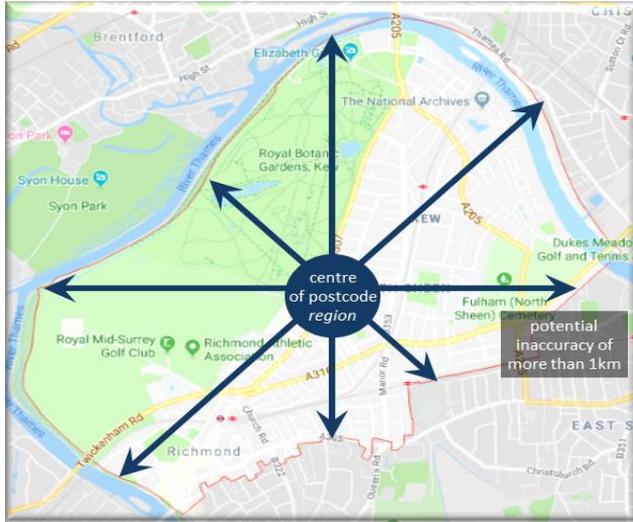


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Case studies



Estimating changes to staff travel times following an office relocation.

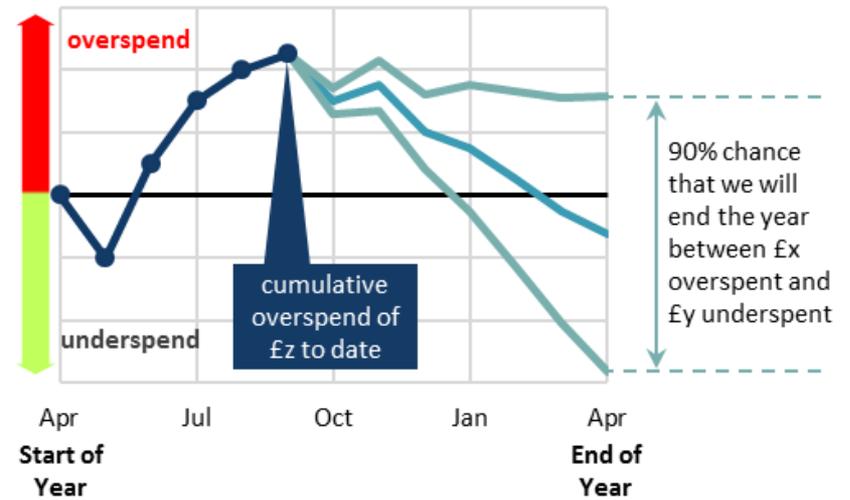
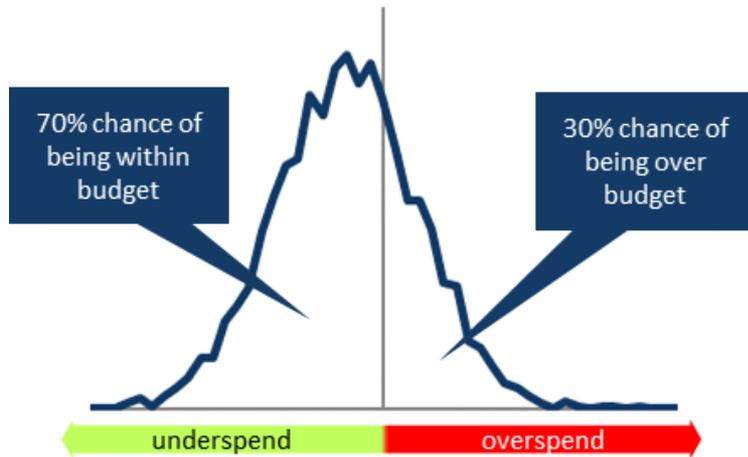


"Currently, between 10% and 25% of staff have journey times of over 90 minutes. If we relocated to Option B, this would increase to between 50% and 90% of staff."



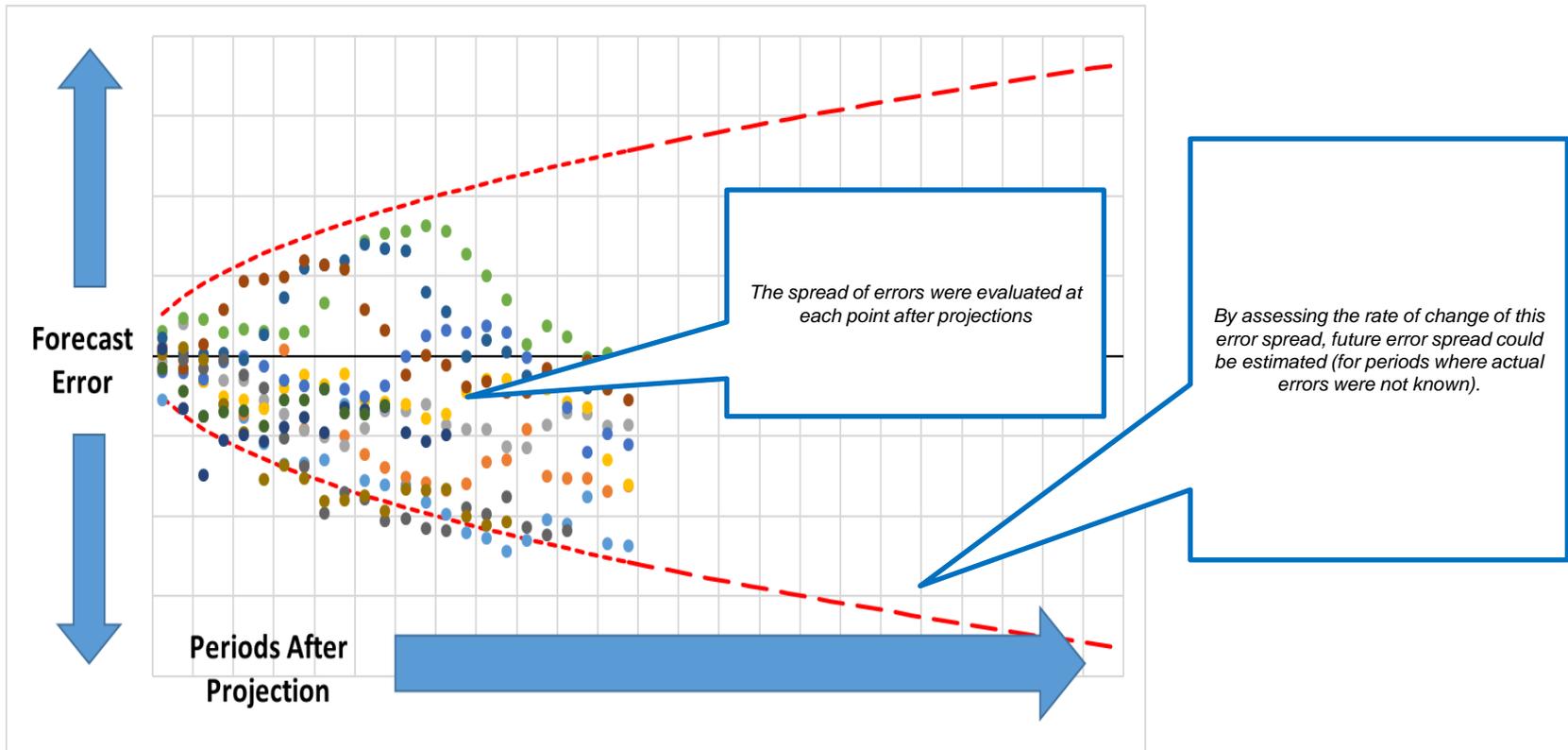
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Predicting staff pay costs.





Estimating Uncertainty in Prison Population Projections





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Estimating the impact of evidence volumes in Legal Aid spend





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Next Steps



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Next Steps

The toolkit is online <https://analystsuncertaintytoolkit.github.io/UncertaintyWeb/index.html>

Linked from Aqua Book resources on gov.uk <https://www.gov.uk/government/collections/aqua-book-resources>

We are now working on the next phase of the toolkit, acting on feedback from government analysts and linking with academics and external stakeholders to develop the toolkit in line with latest thinking. Areas of development include: creating more practical tools, increasing the number of case studies, improving the decision makers section, adding missing techniques, and bringing in wider perspectives on uncertainty.

You can ask questions and provide feedback via AnalystsUncertaintyToolkit@homeoffice.gov.uk



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