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in analytical science*

# Introduction to Valid Analytical Measurements



# Outline



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- Reasons for analysis
- The need for valid measurements
- The VAM programme
- Ways to ensure measurements are fit for purpose





measurement of  
veterinary drug residues in  
animal tissues and foods



nutrients and  
contaminants in foods



analysis of soils and water  
samples for organic and  
inorganic contaminants



drugs of abuse and  
alcohol levels in blood

chemical safety of  
consumer products



pesticide residues in foods  
and animal feeds



# Reasons for analysis (1)



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- Comparison with a regulatory limit
  - possible legal action
    - e.g. amount of cadmium released from ceramic ware
- Comparison with manufacturing control limits
  - rejection of unsatisfactory batches
    - e.g. amount of active ingredient in a tablet
- Forensic case
  - conviction
    - e.g. blood alcohol level



# Reasons for analysis (2)



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- Part of a survey
  - to determine if legislation is required to control a problem
    - e.g. plasticizer release from PVC teethingers
- Long term monitoring
  - legislation or changes in practices required
    - e.g. levels of metals in foodstuffs
- Screening test to decide if further analysis is required
  - more sophisticated analysis used to confirm 'positives'
    - e.g. drugs of abuse in urine

# Evidence of problems



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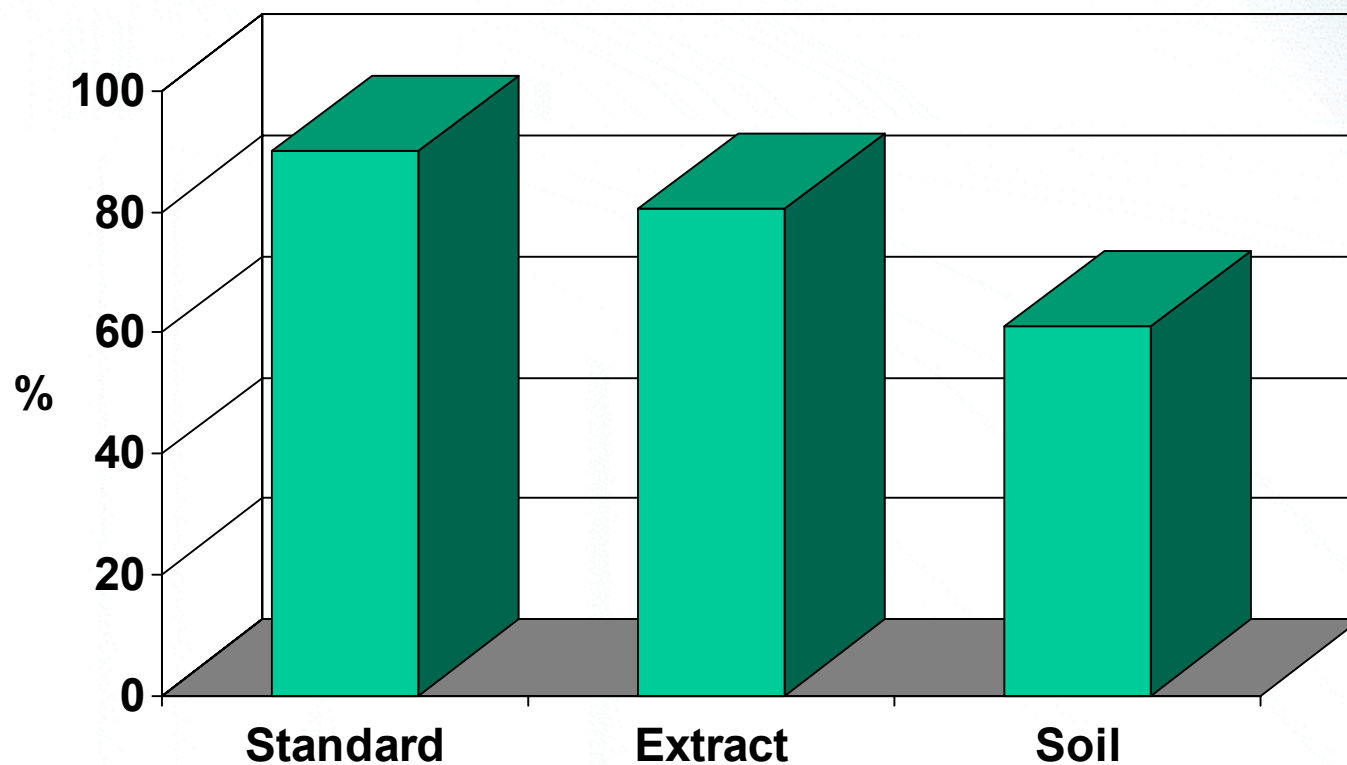
- Evidence suggested a large number of analytical measurements were not 'fit for purpose'
- Poor quality data represent a major cost and risk to business and society
- Requirement for harmonisation of chemical measurements in Europe and worldwide

# CONTEST PT scheme

## Percentage of satisfactory results for zinc analysis



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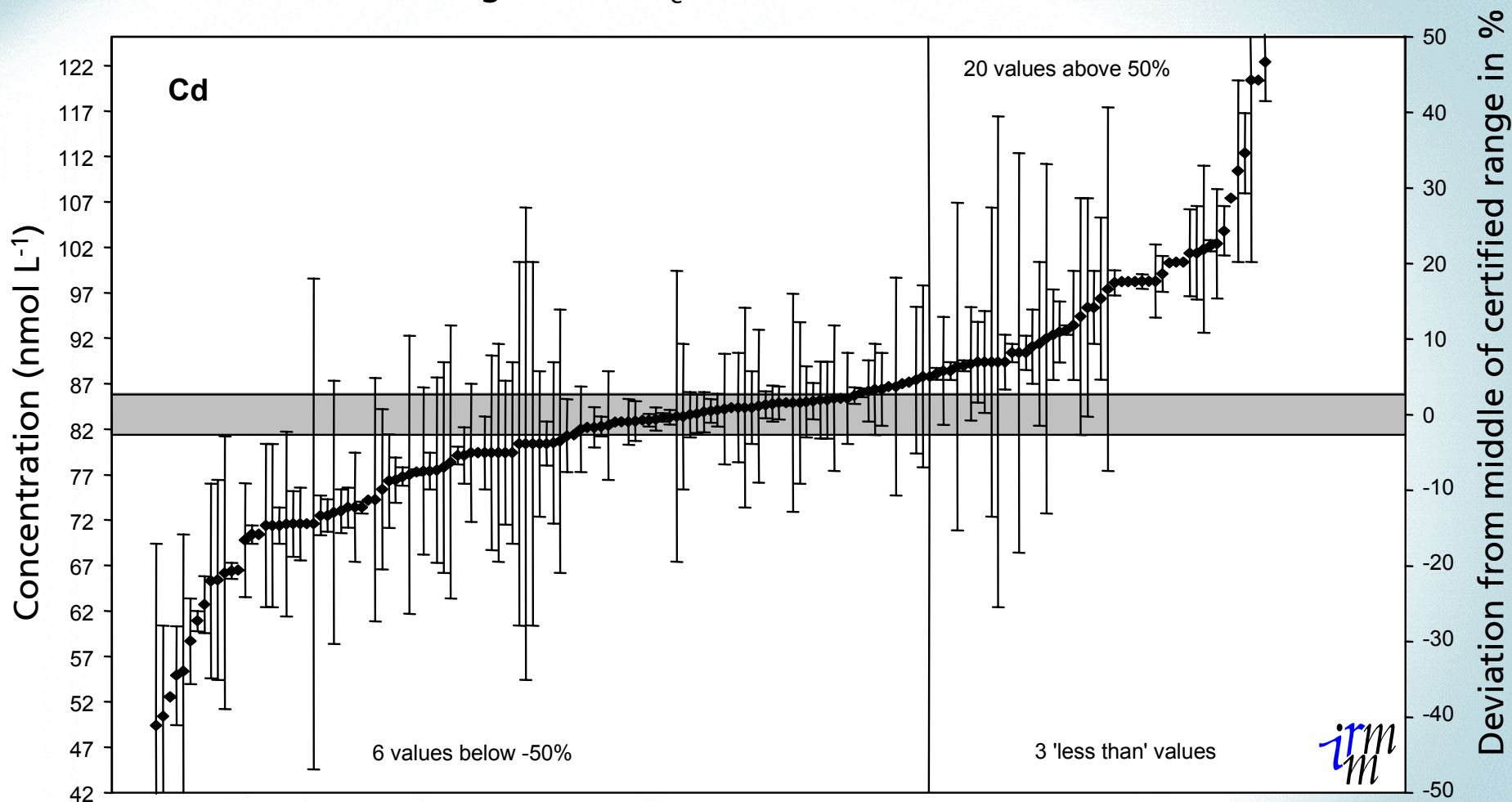
# Cd in river water



IMEP-9: Trace elements in water (1998)

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Certified range ( $\pm U = 2u_c$ ): 81.0 - 85.4 nmol L<sup>-1</sup>



Results from all laboratories



# Need for quality

## Consequences of getting it wrong



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- Forensic science - wrongful conviction
- Trade - substandard goods
- Health - drinking water contamination
- Environment - homes built on contaminated land
- New materials go undiscovered
- Impurities go unnoticed

# Cost of poor quality data



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- Repeat analyses
- Loss of production batches
- Legal disputes/actions
- Public health
- Bad publicity
- Loss of customer confidence



# Aims of the Valid Analytical Measurement (VAM) programme



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At DTI funded programme which aims to:

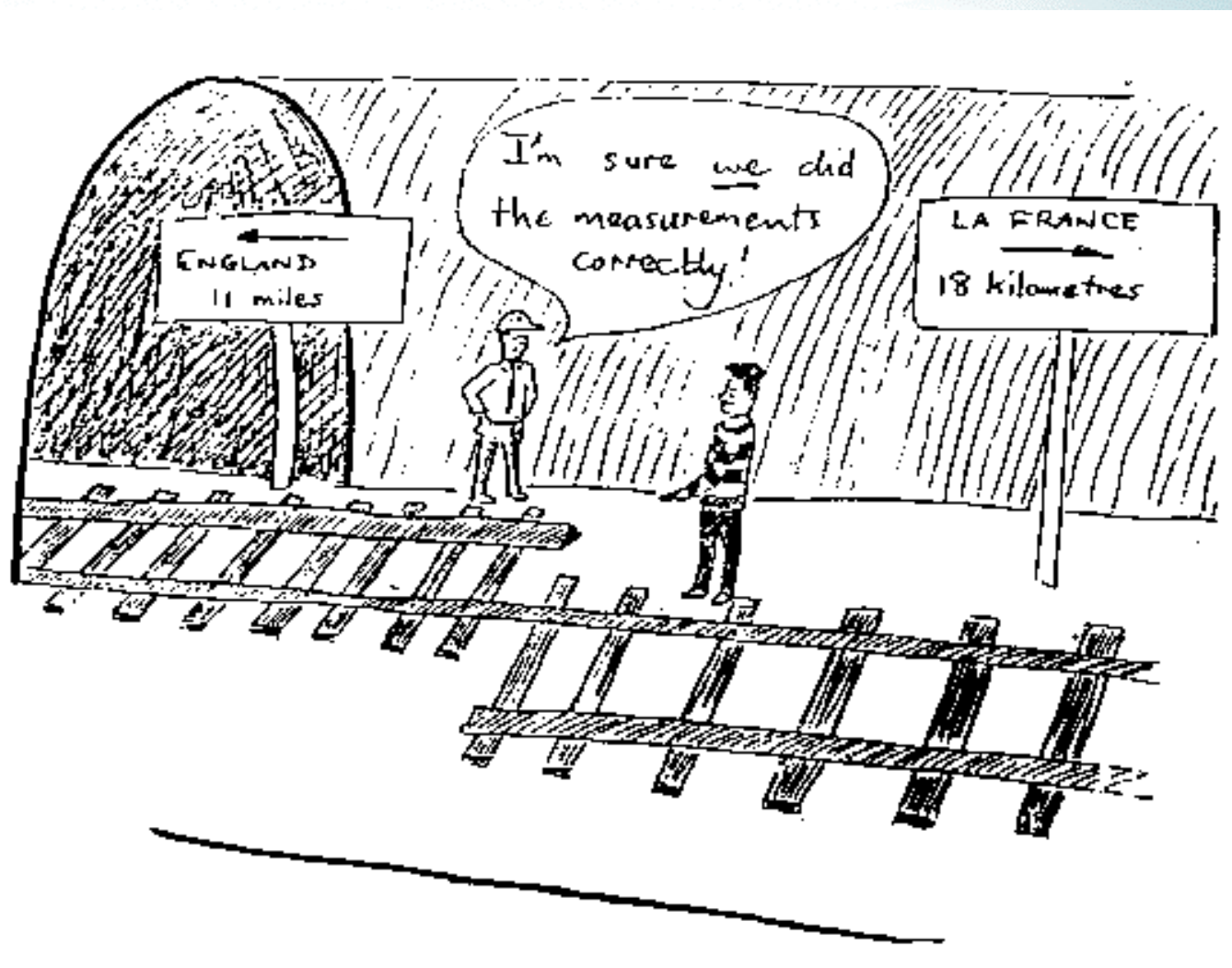
- Improve the quality of analytical measurements made in the UK
- Facilitate mutual recognition of analytical data across international boundaries
- Develop a robust and transparent infrastructure aimed at achieving international **comparability** and **traceability** of chemical and biochemical measurements

*Measured anywhere accepted everywhere*

# Measurements: Essential and easy?



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# The VAM principles

- Analytical measurements should be made to satisfy an **agreed requirement**
- Analytical measurements should be made using **methods and equipment** which have been tested to ensure they are **fit for purpose**
- **Staff** making analytical measurements should be both qualified and competent to undertake the task
- There should be a **regular and independent assessment** of the technical performance of a laboratory
- Analytical measurements **made in one location** should be consistent with those made **elsewhere**
- Organisations making analytical measurements should have **well defined QC and QA procedures**

# Workshop 1



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- A potential client has come to you with a request for analysis that involves examining a field for contamination by diesel oil
- Consider the issues you would discuss with the client before agreeing to take on the work in your laboratory



# Acknowledgement



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- This lecture material was produced by LGC under contract with the Department of Trade and Industry as part of the National Measurement System Valid Analytical Measurement (VAM) programme
- For further information on the VAM programme visit [www.vam.org.uk](http://www.vam.org.uk)