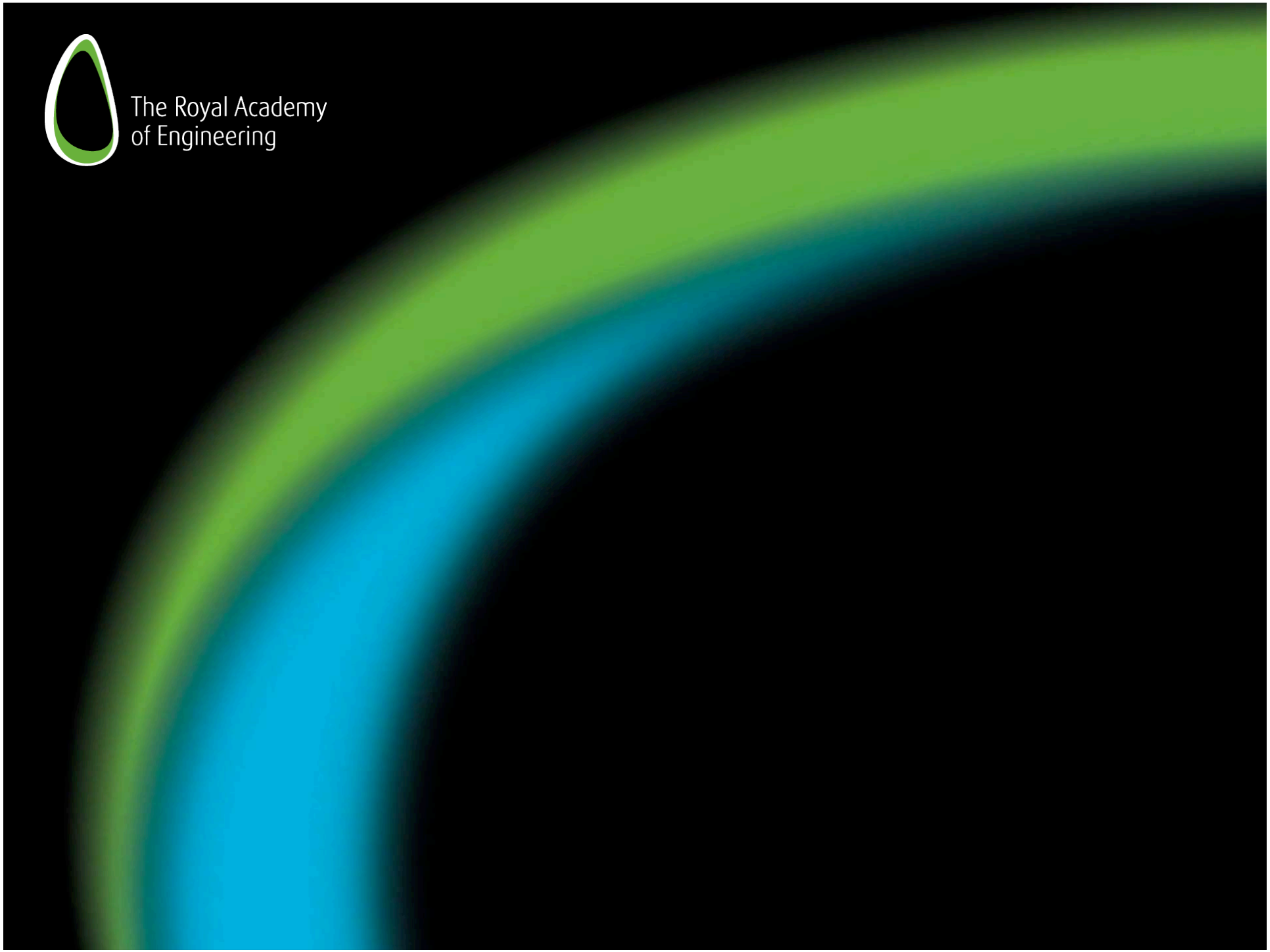
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Assessment of Research Quality in Engineering

Mr P C Ruffles CBE, FREng, FRS
R A Eng Working Group Chairman

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Assessment of Research Quality in Engineering

Personal Background

- Rolls-Royce University Technology Centres
- R A Eng Report Measuring Excellence in Engineering Research Jan 2000
- HEFCE Review of Research Assessment May 2003
- R A Eng Report on The Assessment of Research Quality in Engineering Disciplines Jan 2005

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Fellows' Working Group

Chairman

Mr P C Ruffles CBE FREng FRS

Members

Dr S Bold FREng

Professor D Clarke FREng FRS

Dr R Dolby OBE FREng

Professor R Eatock Taylor FREng

Professor R Kitney OBE FREng

Professor J Midwinter OBE FREng FRS

Professor D Newland FREng

Dr G Robinson CBE FREng

Mr P Saraga OBE FREng

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Assessment of Research Quality in Engineering

Background

The Royal Academy of Engineering published the report ‘Measuring Excellence in Engineering Research’ in Jan 2000.

Study identified five basic characteristics that determine excellence

- Mode 1 and Mode 2 research
- Research strategy
- Scholarship
- Vitality and sustainability

The latest report produced for the purposes of the 2008 RAE provides a workable methodology using these principles within the defined HEFCE framework

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Assessment of Research Quality in Engineering

HEFCE Framework

Research Assessment for a Unit of Assessment (department) to be presented as a profile of 4*,3*,2*,1*,0*grades of quality in 5% Gradations

Clear emphasis to be given to Applied (Mode2) research

Assessment to relate to outputs and not be directly attributable to individuals

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Mode 1 and Mode 2 Research

Mode 1 and Mode 2 research rarely exist in isolation making separate measurement of each element difficult

Mode1 research is normally performed by individuals whereas Mode 2 research is more likely to result from those individuals working as part of a group

Proxy measures for Mode 1 and Mode 2 research are proposed

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Basic Assumptions

The Unit of Assessment will normally be the Engineering Department

Research active staff will be submitted and allocated to natural groups

Ideally a researcher should be allocated to one group only

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Mode 1 and Mode 2 Assessment

Mode 1	Mode 2
Publications (4per individual)	Research Relationships and Income (group)
Esteem (group)	Research Impact (group)

Data provided under these headings is assessed as International (I), National (N) or Unrated (U) standard. The group marks are then assigned to the individual Publications

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Data for Mode 1 assessment

Publications

Refereed Paper in Journal or Conference
Book or Chapter in book
Software or patent

Esteem

Keynote addresses or papers
Lecture tours, Editorships, Editorial Board membership
Prize winning publications
Honours and Awards, Prestigious Fellowships - FREng FRS etc
Advisory Boards, Consultancies
Learned Society involvement

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Data for Mode 2 assessment (1)

Research relationships and income

Government funding (inc Europe)

Charitable income

Industry and other commercial income

Profile of research partnerships

Research Impact

Case studies on how research results have been exploited defining impact in quantified terms.

Spin-off companies including size, growth rate and profitability

Awarded patents and licensed income

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Data for Mode 2 assessment (2)

Note 1

4 Case studies per 20 researchers then one per 10 additional researchers. A spin-off company can be submitted as a case study. Case studies to be agreed with the participating party and approved by the Chief Executive of the Company concerned or the Technical Director for large companies.

Pro forma to be provided to ensure response is focussed

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Data for Mode 2 assessment (3)

Note 2

Where qualifying activity does not fit with current group activity, it can be included in the Departmental submission

Note 3

Where Case studies extend beyond the period under review they can be included but the impact assessment should relate to the review period.

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Research profile

The Initial research profile is arrived at using the research grades (I,N,U) allocated to each publication according to the following table

Rating	4*	3*		2*		1*	
Publications	I	I	N	N	U	N	U
Other 2 of 3	I,N	2N	2I	2N	I,N	N,U	2N

This approach avoids rewarding mediocrity implicit in averaging scores and gives flexibility in balance of Mode1 vs Mode 2 research

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Departmental assessment(1)

Purpose is to assess the departments strength with respect to Strategy, Scholarship, Vitality and Sustainability

It will serve to underpin or moderate the research profile derived from the individual and group Assessments

Where the initial profile is moderated the change must be recorded and fully justified

The profile resulting from this process is termed the Final Profile

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Departmental assessment (2)

Strategy

- Strategic vision including evolution since last RAE and achievements
- Balancing Mode 1 and Mode 2 Research

Scholarship

- Identify scholarly activities

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Departmental assessment (3)

Vitality and sustainability

- Encouragement of Creativity
- Training and career development activity
- Numbers of PhD students
- Staff breakdown and demography
- Total departmental Expenditure

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Summary of the proposed process

Step 1

Assess Publications, mark as international (I), National (N) or Unrated (U)

Step 2

Repeat Step 1 for group contributions. Allocate group scores to each publication category

Step 3

Combine the marks for publications and groups (best 2 of group scores) to arrive at a star rating profile

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Summary of the proposed process

Step 4

Combine group profiles to give initial profile for the department by proportioning using the number of publications in each star rating category

Step 5

Complete a departmental assessment and establish whether this is consistent with the initial profile. If not moderate as necessary and justify the change

Step 6

Produce the final profile in 5% gradations

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Summary

The proposal outlined above has been discussed with HEFCE and sent to them for consideration

The concepts proposed were broadly acceptable, although some concern was expressed over whether case studies can be an effective measure.

The R A Eng working group felt strongly that case studies were an essential part of the proposal.