REF2014
Research Excellence Framework

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Member: Main Panel B (Physical Sciences and Engineering)
Chair: Sub-Panel 14 (Civil and Construction Engineering)

Overview of the process

REF assessed the quality of research in all UK universities, in all disciplines. It was carried out by 36 expert panels, grouped into 4 main panels.

Main Panel A: **Medical and life sciences**

Main Panel B: **Physical sciences and engineering**

Main panel C: **Social sciences**

Main Panel D: **Arts and humanities**

2011-12

Preparation

Panels were appointed. Guidance and criteria were published.

2012-13

Submissions

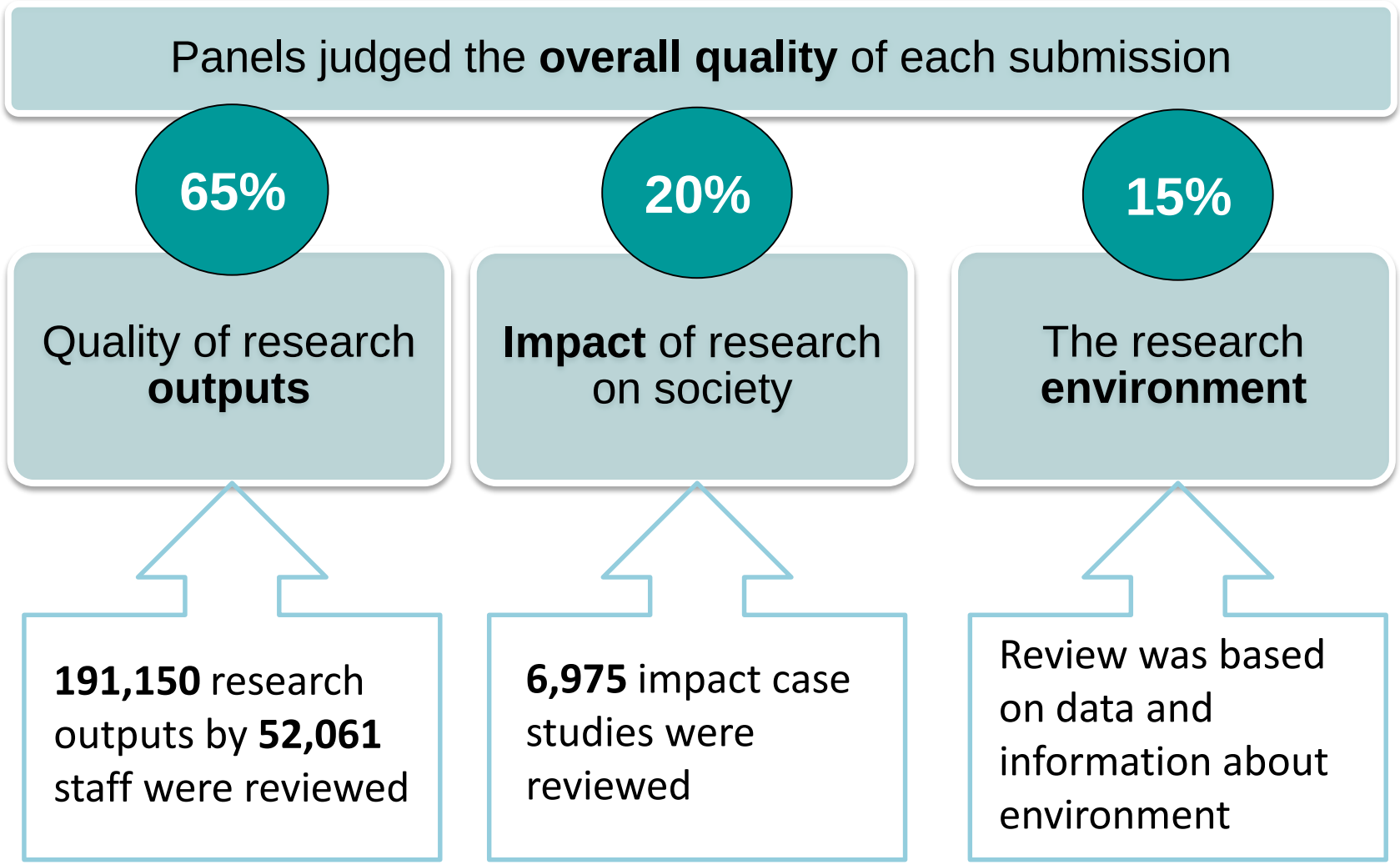
Universities made submissions in whichever subjects they chose to.

2014

Assessment

36 expert panels reviewed submissions, guided by 4 main panels.

What was assessed



Outputs: Assessment Criteria

Criteria for assessing quality of outputs are **originality, significance and rigour**	
Four star	Quality that is world-leading in terms of originality, significance and rigour
Three star	Quality that is internationally excellent in terms of originality, significance and rigour but which falls short of highest standards of excellence
Two star	Quality that is recognised internationally in terms of originality, significance and rigour
One star	Quality that is recognised nationally in terms of originality, significance and rigour
Unclassified	Quality that falls below the standard of nationally recognised work. Or work which does not meet published definition of research for purposes of this assessment

Impacts: Assessment Criteria

Criteria for assessing impacts are **reach and significance**	
Four star	Outstanding impacts in terms of their reach and significance
Three star	Very considerable impacts in terms of their reach and significance
Two star	Considerable impacts in terms of their reach and significance
One star	Recognised but modest impacts in terms of their reach and significance
Unclassified	Impact is of little or no reach and significance; or impact was not eligible; or impact was not underpinned by excellent research produced by submitted unit

Expert Panels

- Submissions were assessed by 36 Sub-panels working under guidance of 4 Main Panels

Each Main Panel comprised:

- Chair and deputy chair
- Chairs of each sub-panel
- International members
- User members

Each Sub-Panel comprised:

- Chair and deputy chair
- Panel members
- Additional assessors (for outputs and impact)
- On average ~ 30 people ***(Civil 14)***

- The Equalities and Diversity Panel (EDAP) reviewed complex staff circumstances

Development of sub-profiles

- All outputs were graded using a 13 point scale:

  4* : World-leading

  3* : Internationally excellent

  2* : Recognised internationally

  1* : Recognised nationally

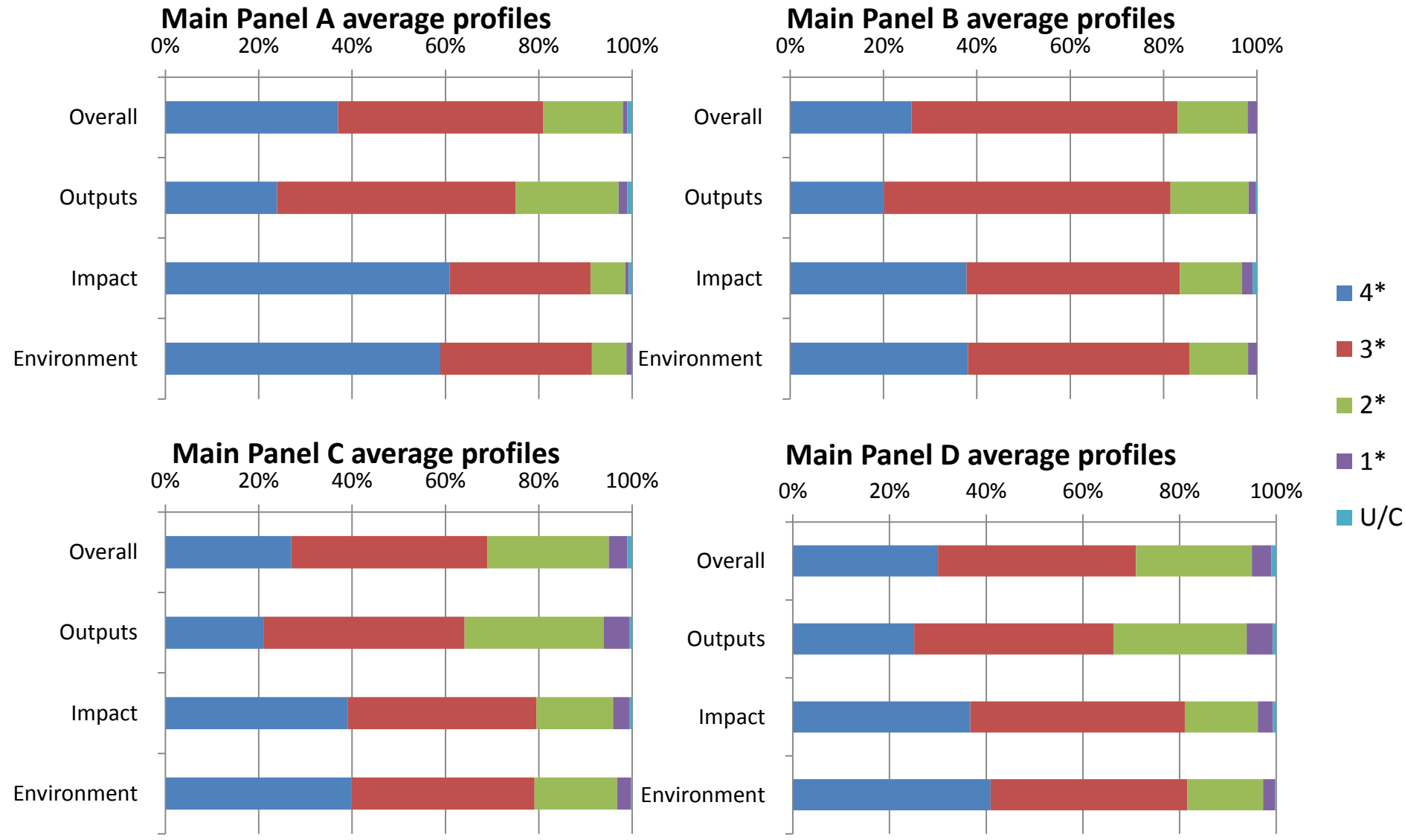
  U : Below the standard for 1* or deemed ineligible

- Each impact case study and each section of environment template was graded on a scale from 4* - U, using 'half-marks' for borderline judgments.
- Each sub-profile for each submission was collectively agreed by Sub-Panel and recommended to Main Panel for approval.
- Overall quality profile for each submission aggregates the three sub-profiles, according to standard weightings.

Across exercise as a whole, output quality was found to have improved significantly since RAE2008

- 22% of outputs were judged world-leading (4*), up from 14% in 2008 RAE
- 50% were judged internationally excellent (3*), up from 37% in 2008 RAE
- This is in line with independent evidence about improved performance of UK research
- International members of each main panel confirmed that assessment reflected international standards
- Impact is new and cannot be compared with RAE
- Environment was assessed differently so also cannot be compared directly with RAE

Average profiles for four main panels



For first time, REF has demonstrated impact of UK research

- Across exercise, over 250 research users judged impacts, jointly with academic panel members.
- Across exercise, **44%** of impacts were judged outstanding (4*) and a further **40%** were judged very considerable (3*).
- Impressive impacts were found from research in all subject areas.
- REF shows many ways in which research has fuelled economic prosperity, influenced public policy and services, enhanced communities and civic society, enriched cultural life, improved health and wellbeing, and tackled environmental challenges.

Main Panel B submissions – Physical Sciences, Engineering

		Number of submissions	Cat A FTE staff	% change in Cat A FTE	Number of outputs	Impact case studies
Main Panel B	2014	403	13,347	+9.1%	49,317	1,667
	2008	485	12,234		50,669	-
UOA 7	2014	45	1,381	+17.1%	5,250	175
	2008	42	1,179		5,091	-
UOA 8	2014	37	1,229	+6.8%	4,698	152
	2008	33	1,151		4,930	-
UOA 9	2014	41	1,705	+1.1%	6,446	203
	2008	42	1,686		7,156	-
UOA 10	2014	53	1,931	+0.4%	6,995	236
	2008	115	1,923		7,707	-
UOA 11	2014	89	2,045	+11.2%	7,665	280
	2008	81	1,839		7,491	-
UOA 12	2014	25	1,153	-9.5%	4,154	138
	2008	43	1,274		5,222	-
UOA 13	2014	37	1,071	-11.9%	4,028	141
	2008	54	1,216		4,965	-
UOA 14	2014	14	391	-23.8%	1,384	51
	2008	23	513		2,066	-
UOA 15	2014	62	2,447	+68.3%	8,697	291
	2008	52	1,454		6,041	-

SP14 Civil and Construction Engineering Specific Comments

Summary of Submissions

- 14 submissions comprising 391.45 FTE Category A staff.
- Several HEIs with civil engineering units submitted to MPB General Engineering and MPC Architecture & Built Environment
- SP14 comprised 12 full members and 1 assessor only; with 10 academics + 1 recently from industry, and 2 from industry.
- All scoring calibrated both against that of other engineering sub-panels (via MPB) and between individual panellists.
- Submissions covered full spectrum of quality - approximately one-quarter being world-leading or outstanding.
- Overall improvement in research quality submitted compared with RAE2008.
- Impact case studies and statements particularly informative.

Summary of Outputs (Papers etc.)

- 1,384 outputs submitted across a range of media: vast majority were journal papers; some conference papers, books, software.
- Sub-panel split into 4 specialist teams of 3 or 4 members, each assessed outputs in their broad specialist area. Assessors took full account of 'additional information' details (100 words), which were found useful in many, but by no means all, cases.
- *Research areas that were particularly strong*:
  - Environmental and water research, Structures, Transport and Geotechnical engineering all strongly represented
  - Encouraging levels of multidisciplinary research in: flood risk management; climate change, renewable energy; geochemistry; environmental assessment; sensor technology, acoustics and remote sensing.

Summary of Outputs (Continued)

- *Areas of growth or decline; emerging areas of research:*
  - Growth in sustainability, resilience, life cycle analysis and climate change.
  - Decline in non-destructive testing and structural health monitoring.
  - Strong growth in marine renewable energy, and water, food and energy security.
  - Continued growth in flood risk assessment, ecosystems services, remote sensing, geomatics and big data.
  - Growth in water sanitation & health in developing countries.
  - Geotechnics showed trend away from experimental and theoretical geomechanics to environmental geotechnics, geothermal (THM) and geochemistry.

Summary of Impacts (Case Studies)

- 51 impact case studies submitted comprising: 15 - economic impact, 15 - engineering practitioners, 12 - public policy and services, 8 - environment and health and 1 - societal impact.
- Increasing evidence of multidisciplinary impact involving industrial, societal and government agency engagement.
- Commercialised products and software reported, involving both spin-outs and direct arrangements with companies from SMEs to large multinational consulting and contracting firms.
- Considerable evidence of technology transfer and high impact via early engagement with end users.
- Strong evidence of research impacting on national and international best engineering practice and public policy.

Summary of Impacts (Continued)

- High proportion of case studies demonstrated considerable to outstanding significance and reach, with examples of major benefits to UK economy, and built and natural environment.
- Highest quality studies often associated with groups with strong links with industry, or government agencies.
- All case studies were assessed by the 2 industrialists, plus 2 academics with relevant research expertise.
- High degree of consistency between panellist scores.
- All panellists involved in discussing and agreeing final scores for all case studies and impact statements.
- Academic and user members worked well together, bringing respective strengths and perspectives to strengthen process.

Some Personal Reflections

- Disappointed by shift in submissions away from Civil to General Engineering. Don't know why this has happened, but could lead to our profession having less influence on research funding?
- Sub-Panel worked really well together as a strong team, but pool of **appropriate** candidates nominated by ICE etc. is limited.
- Need wider pool of **appropriate** candidates from industry as assessors – who only need assess Impact Case Studies.
- Impact Case Studies have changed shape of research in UK for the better, encouraging closer engagement with industry.
- Case studies on health, sustainability and green issues have potential for outstanding deliverables and good for profession.

Some Questions for ACED

- How can ACED ensure that more Civil Engineering HEI Units submit to Civil and Construction next time?
- Should ACED work with ICE/IStructE to encourage name change for REF2020 to Civil and **Environmental** Engineering?
- How can ACED contribute to creating a more **appropriate** pool of Sub-Panel candidates from academia and industry?
- Can we encourage ICE/IStructE to focus publicity on Impact Case Studies, e.g. Special Papers – for REF2014 and future?
- Will there be more grouping of civil engineering departments in future as for Edinburgh and Heriot Watt?

Thank You

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Further information

www.ref.ac.uk includes:

- The results and submissions
- Summary data and analysis
- Panel overview reports