



## REF panel criteria and working methods

1. This document summarises and compares the REF Panel criteria and working methods published on 30 January 2012. The full documentation is available online at: [http://www.hefce.ac.uk/research/ref/pubs/2012/01\\_12/](http://www.hefce.ac.uk/research/ref/pubs/2012/01_12/)

2. The document includes summaries of Main panels A to D for those Units of Assessment (UoAs) relevant to the College. The UoAs covered in detail in this document are as follows:

Main Panel	Sub-panel (Unit of Assessment - UoA)
A	1 - Clinical Medicine
	2 - Public Health, Health Services and Primary Care
	3 - Allied Health Professions, Dentistry, Nursing and Pharmacy
	4 - Psychology, Psychiatry and Neuroscience
	5 - Biological Sciences
B	7 - Earth Systems and Environmental Sciences
	8 - Chemistry
	9 - Physics
	10 - Mathematical Sciences
	11 - Computer Science and Informatics
	12 - Aeronautical, Mechanical, Chemical and Manufacturing Engineering
	13 - Electrical and Electronic Engineering, Metallurgy and Materials
C	14 - Civil and Construction Engineering
	15 - General Engineering
D	18 - Economics and Econometrics
	19 - Business and Management Studies
	30 - History

3. Annex A provides a detailed breakdown of subject coverage and further detail on sub-panel differences. All UoAs will follow the panel criteria as summarised in this document, unless otherwise highlighted.

### Role of the Main panels

- ❖ Main panels will work with sub-panels to ensure adherence.
- ❖ Sub-panels will assess three distinct elements of each submission – outputs (65%), impact (20%) and environment (15%). Each sub-panel will be expected to assign separate sub-profiles for research outputs, impact and environment. To ensure consistent application of these across sub-panels, the Main panel and sub-panels will operate calibration exercises. Any substantial differences in the average overall profiles for each UoA will be investigated and understood before approval of the quality profile recommended by the sub-panel. Across all UoA's sub-panel memberships have experience of multidisciplinary and interdisciplinary work. Where required, additional assessors will be used to extend the breadth and depth of expertise.

### Cross-boundary submissions and cross-referral

- ❖ Where work crosses UoA boundaries, both the submitting institution (HEI) and/or the sub-panel receiving the submission may make a request to cross-refer all or parts of a submission. The final recommendations to the Main panel on assigning quality profiles will remain with the sub-panel for the UoA in which the submission was originally made.
- ❖ Sub-panels have the ability to seek advice from other sub-panels via cross referral but it is expected that this will be the exception rather than the norm.
- ❖ Pedagogic research may be submitted in the individual subject UoA or in UoA 25 (Education), as deemed appropriate by the submitting HEI.

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## Multiple submissions

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Main Panel	Multiple submissions expected	Comments
A	Sub-panel 3 only	Submissions covering distinct bodies of research should be structured by research group
B	Sub-panels 12 and 13 only	Not expected if total Category A FTE<10
C	Sub-panels 17 and 24 only	-
D	Sub-panels 27, 28, 34, 35 and 36 only	-

- ❖ HEFCE will invite requests for multiple submissions in February 2012, with deadlines for requests in April, September and December 2012. Each institution can submit requests at one deadline only and HEFCE will respond six weeks from each deadline date. Multiple submissions may be permitted exceptionally, subject to the sub-panel criteria and only with permission of the HEFCE REF manager. The exceptions are outlined on page 11 of the HEFCE REF guidance on submissions:  
[http://www.hefce.ac.uk/research/ref/pubs/2011/02\\_11/02\\_11.pdf](http://www.hefce.ac.uk/research/ref/pubs/2011/02_11/02_11.pdf)
- ❖ Sub-panels will only consider applications which put forward exceptional cases that go beyond the guidance on submission criteria for multiple submissions. Bodies of research and the research environments must be clearly separate and academically different and described as such in the multiple submission request. Multiple submissions will be granted in all UoAs where one of the submissions is joint with another HEI.

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## Research Groups

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- ❖ All submissions can be structured by assigning staff to research groups. Research groups may be departments/research groups or units which may or may not be cognate. Research groups should be referenced consistently throughout (REF1 - staff, REF2 - Outputs, REF5 - Environment template, REF3a - Impact template).
- ❖ Main panels A and B explicitly encourage the use of research groups to structure to assist both with the description of submissions by HEIs, and with the assessment of submissions by sub-panels. Main panel A states that where submissions are structured using research groups, the sub-panels' written qualitative feedback to institutions will highlight individual research groups of particular note.
- ❖ Staff can be associated with more than one research group. Where an individual is a member of a single research group, all of their research outputs will be associated with that group. Where an individual is a member of more than one research group, individual research outputs may be allocated to the appropriate groups.  
Where used, environment data (REF4a/b/c) is not required to be disaggregated by research group.

## Assessment criteria: Research outputs

### Co-authored outputs

Main Panel	Additional information required for co-authored outputs	Permitted to select the same output for submission more than once within a UoA submission?
A	Where there are six or more authors and the submitted member of staff is not the lead or corresponding author (or easily identified as such in the output itself), institutions must affirm their substantial contribution by entering in REF2 the relevant predefined statement(s) provided in the guidance (p24).	Co-authored outputs may be selected by a maximum of two members of staff in very exceptional circumstances only (e.g. substantive, large scale or intensive collaborative research). Justification required (max 100 words).
B	Order of co-authorship/number of co-authors not important <u>except</u> for UoA 9 (Physics) where a description of the co-author's contribution (where there are 11 or more co-authors) is required (max 100 words).	Co-authored outputs may be selected by a maximum of two members of staff in exceptional circumstances only (e.g. substantive collaborative research). Justification required (max 100 words).
C	Order/number of co-authors not important. Information may be requested through audit to verify co-author's contribution.	Co-authored outputs may be selected by a maximum of two members of staff in certain circumstances (e.g. substantive co-authored research). Justification required (max 100 words).
D	Order/number of co-authors not important. Information may be requested through an audit to verify co-author's contribution.	Co-authored outputs may be selected by a maximum of two members of staff. Justification required (max 100 words).

- ❖ For all co-authored outputs, once the sub-panel has determined that an author made a material contribution to the research content, it will assess the quality of the output taking no further regard of the individual author's contribution. Where a sub-panel judges that an author has not made a material contribution, the sub-panel will grade the output as 'unclassified' for that author.

### Double-Weighting

- ❖ Institutions may request that an output of extended scale and scope be double-weighted (i.e. count as two outputs), using a supporting statement to justify the claim (max 100 words).
- ❖ Double weighting will be accepted in exceptional circumstances only. The request for double weighting may not be made for co-authored outputs which have been submitted twice in a single submission. Main Panel A expect to receive requests for single-authored monographs only; Main Panel B does not expect requests for journal articles or conference papers; Main Panel C (sub-panels 17, 18, 19, 21 and 23) do not expect requests for journal articles or book chapters.
- ❖ Where the claim for double-weighting is not supported, the missing output will be graded as 'unclassified'. All main panels will allow submission of a reserve output for each double weighted output; the reserve will only be assessed where the claim for double-weighting is not upheld.
- ❖ No more than two double-weighted outputs per academic may be submitted.

### Additional supporting information

- ❖ Where a research output contains significant material published prior to 1 January 2008, all panels require details of how the earlier work was revised to incorporate new material, new findings, new research or new insights (max 100 words). Panels will assess the original content or new insights only.
- ❖ An output first published in its final form after 01 January 2008, that was 'pre-published' during 2007, whether in full in a different form (e.g. an 'online first' article or preprint), or as a preliminary version or working paper *is* eligible for REF2014 provided that the 'pre-published' output was not submitted to RAE 2008.

Main panel	Specific Information requested
A	<ul style="list-style-type: none"> <li>- For non textual/practice based outputs, a description of the research process and research content is welcomed, where this is not evident within the output (max 300 words).</li> <li>- The sub-panels do not wish to receive additional information about the significance of outputs.</li> </ul>
B	<ul style="list-style-type: none"> <li>- For non textual/practice based outputs, a description of the research process and research content is required, where this is not evident within the output (max 300 words).</li> <li>- For reviews, identification of the original research or new insights reported welcomed (max 300 words).</li> <li>- Sub-panels 11, 12, 13, 14 and 15 invite factual information on the significance of an output, e.g. evidence about how an output has gained recognition, led to further developments, or has been applied (max 100 words). Claims related to industrial significance must include the name and contact details of a senior industrialist for verification.</li> </ul>
C	<ul style="list-style-type: none"> <li>- For any output where the research content and/or process is not evident from the output itself, a statement which identifies the research questions, methodology and means of dissemination.</li> <li>- Software and data sets must be supplemented by a full description in paper-based format to avoid accessibility problems. This must include details of how and where the output can be accessed.</li> <li>- Information about the significance of outputs where this information has only become available after the output became publicly accessible e.g. nationally or internationally awarded prestigious prizes or similar significant recognition (max 100 words).</li> <li>- Where essential, the paper based submission may be supplemented by limited visual material on DVD.</li> </ul>
D	<ul style="list-style-type: none"> <li>- Additional information on the research imperatives, research process and the research significance of practice-based outputs, including the medium and the location of the output if necessary (max 300 words).</li> <li>- A digital/physical portfolio demonstrating evidence of the processes and outcomes of the work may be submitted for ephemeral or a series of performances/exhibitions.</li> <li>- An English abstract for non-English outputs (unless in UoA 28).</li> <li>- Where anthologies, edited books and curatorial projects are submitted, submitting units may provide a statement to clarify the nature of an individual's research contribution (max 100 words).</li> <li>- Groups of short items (e.g. encyclopaedia entries) may be submitted as a single output, along with an explanation for the grouping (max 100 words).</li> </ul>

### Citation and Bibliometric data

- ❖ Where required by sub-panels, the REF team will provide citation counts (at a pre-determined date) for outputs, where available, as additional information for each output submitted.

Main panel	Will use citation data	Sub-panels
A	Yes	All
B	Yes	7, 8, 9 and 11 only Sub-panel 11 will also make use of Google Scholar for further citation data
C	Yes	18 only
D	No	-

- ❖ Citation data will contribute to the assessment as follows:
  - Used as one element of academic significance assessment and peer review judgements;
  - Absence of citation data will not mean lack of significance;
  - Sub-panels are mindful that citation data for some forms of output and for recent outputs may not be a reliable indicator.

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## Assessment criteria: Impact

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### Range of impacts

- ❖ In general, the types of impact the panels expect to receive are in the following spheres, although these are indicative only and all forms of impact will be accepted by all the main panels:
  - Main Panel A – the economy, society, culture, public policy and services, health production, environment, international development or quality of life, whether locally, regionally, nationally or internationally.
  - Main Panel B – culture, the economy, the environment, health, public policy and services, quality of life, or society, whether locally, regionally, nationally or internationally.
  - Main Panel C – creativity, culture and society, the economy, commerce or organisations, the environment, health and welfare, practitioners and professional services, public policy, law and services.
  - Main Panel D – civil society, cultural life, economic prosperity, education, policy making, public discourse, public services.
- ❖ Impacts on students, teaching or other activities within the submitting HEI are excluded. Impacts on students, teaching and other activities within the HE sector are included where they extend significantly beyond the submitting HEI.
- ❖ Public engagement activity may often be a part of the impact or benefit but should not of itself be claimed as impact without evidence of some benefit, change or effect beyond the engagement activity itself. Main panels B and C have stated that they welcome case studies that include impact achieved *through* public engagement. Impacts should still be based on specific research carried out within the submitting unit. Evidence of reach should go beyond number of people engaged and should include additional information such as the type of audience or media coverage. Examples of evidence of significance would be evaluation data, user feedback or evidence of sustainability through ongoing engagement.

### Confidential and sensitive impact

- ❖ All panel members, advisers, observers and others involved in the assessment process are bound by a confidentiality agreement. In addition, institutions may indicate which parts of the case study should be omitted from the published data.
- ❖ Panels do not anticipate many confidential or commercially sensitive case studies. If HEIs believe that there are main or sub-panel members who would have a commercial conflict of interest in assessing confidential reports, such individuals should be named when making submissions.

For case studies with a high level of confidentiality (e.g. relating to defence, national security or highly sensitive policy developments), about which only very limited information could be disclosed to the panel, HEIs should provide a statement to the REF manager containing outline information together with the security/other clearance required by assessors and contact details for additional information for the case study to be assessed (by December 2012). Permission to submit such case studies will be decided by the REF manager.

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## Assessment criteria: Environment

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### Environment template

- ❖ The weightings for each element of the environment template will vary by sub-panel, as follows:

Component	Main Panel A	Main Panel B	Main Panel C	Main Panel D
Overview: Organisation and structure	25%	For info only	For info only	For info only
Strategy: Strategic research aims and goals		20%	Weightings not specified	25%
People: - Staffing strategy and staff development - Research students	25%	30%		25%
Income, infrastructure and facilities	25%	30%		25%
Collaboration and contribution to the discipline	25%	20%		25%

Environment data

- ❖ Number of doctoral degrees awarded (as returned annually to HESA in the Student Record);
- ❖ Research grants and contracts income (as returned annually to HESA in the Finance Statistics Return - FSR);
- ❖ Research income in kind (estimated Research Council facility time, provided by HEFCE);
- ❖ Some sub-panels have requested additional data as follows (to be included in the Environment Template):

Main Panel	Additional environment data required
A	None
B	<ul style="list-style-type: none"> <li>- Sub-panels 8 only: To inform 'Research Students', FTE of registered postgraduate research students on 31 July of each year during the assessment period 1 January 2008 – 31 July 2013.</li> <li>- Sub-panel 9 only: To inform 'Income, infrastructure and facilities', Time awarded (and total cost if available) at major national and international facilities not supported by the Research Councils, which was awarded after competitive review by a panel of internationally recognised experts.</li> </ul>
C	<ul style="list-style-type: none"> <li>- Sub-panels 19 and 25: To inform 'People: research students', Number of doctoral degrees awarded should be disaggregated to distinguish PhDs and research-based professional doctorates.</li> </ul>
D	None

Environment criteria and sub-profiles

- ❖ Quality of the research environment assessed in terms of its **vitality** and **sustainability**, taking account of the information presented in the template, and evidenced by the data.

## Annex A

### Main Panel A

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#### Discipline boundary definitions

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##### 1 - Clinical Medicine

- ❖ Includes research into all aspects of Clinical Medicine and its cognate sub-disciplines except for bodies of research more explicitly linked to other UoAs in Main Panel A.
- ❖ Sub-panel expects submissions that demonstrate integrated strategies relating to all aspects of medical research. Submissions may cover the full range of research related to medicine from basic underpinning studies through experimental medicine to clinical trials. The sub-panel expects some degree of overlap with UoA 4 (Psychology, Neuroscience and Psychiatry) in the fields of neurology and ophthalmology and with UoA 5 (Biological Sciences) in the area of basic biological sciences underpinning medical research.

##### 2 - Public Health, Health Services and Primary Care

- ❖ Includes research that is focused on public health, health services and/or primary care. The research may be applied, theoretical or methodological research from any relevant health or healthcare discipline.
- ❖ The sub-panel expects submissions in this UoA from all areas of public health and epidemiology (from aetiology to intervention), health services and primary care including clinical trials, health social sciences, health policy research and health care management, and from other related disciplines having a relevance to the research covered by the UoA. It recognises the breadth and diverse range of single, multidisciplinary and/or multi-professional research across public health, health services and primary care.

##### 3 - Allied Health Professions, Dentistry, Nursing and Pharmacy

- ❖ Includes research into all aspects of the disciplines of allied health professions, dentistry, nursing, midwifery, and pharmacy. Its boundaries include research in underpinning science, laboratory-based work, applied clinical research and research into public health, social care and health promotion. Research into psychosocial, philosophical and ethical aspects of health care, as well as education, policy and methodology relevant to these disciplines, is also included. It is anticipated that such work will use qualitative, quantitative and mixed methods, as well as theoretical approaches.
- ❖ For allied health professions, submitted research is expected to underpin clinical practice, social care, and policy development and implementation, and includes research in biomedical and nutritional sciences, **vision** sciences, optometry, orthoptics, **diagnostic imaging**, **therapeutic radiography**, **audiology**, podiatry, occupational therapy, physiotherapy, speech and language therapy, **clinical linguistics**, paramedics, prosthetics/orthotics, music therapy, drama therapy, and arts therapy. For dentistry it includes research in basic and applied dental, oral and craniofacial sciences encompassing all the related clinical disciplines, primary dental care, biomaterials sciences relevant to oral and craniofacial science, and other such sciences relevant to dentistry. For nursing and midwifery it includes specialist, community and public health nursing, and all the contexts within which they operate. For pharmacy it includes all aspects of the design, synthesis, formulation, action and use of pharmaceuticals (including biological and neutraceuticals), to include medicinal chemistry, pharmaceuticals, pharmacology, clinical pharmacy, underlying biomedical science, and the practice of pharmacy.
- ❖ Submissions may cover the full translational range of research, from basic underpinning studies through to implementation research. It is expected that there will be some overlap with UoAs 1,2,4,5 and 6.

##### 4 - Psychology, Psychiatry and Neuroscience

- ❖ Includes research into all aspects of psychology, neuroscience and its clinical sub-specialities, and psychiatry.
  - ❖ For psychology the sub-panel expects submissions in this UoA covering the full range of the discipline from all areas of psychology, plus all aspects of neuroscience from the molecular through to whole-system behavioural research, genetics and varieties of imaging, incorporating neurodevelopmental as well as adult work. It will include work on the understanding and treatment of all types of brain injury, stroke, neurodegenerative and neurodevelopmental disorders, as well as all aspects of psychiatry including biological, community, developmental,
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genetic, and neuropharmacological research.

- ❖ The sub-panel is aware of the breadth of its remit, which will cover submissions that inform, or have the potential to inform, practice as well as submissions reporting theoretical and methodological advances in basic research. It is expected that there will be some overlap with UoAs 1, 2, 3, 5 and 6.

#### 5 - Biological Sciences

- ❖ The sub-panel expects submissions in this UoA from all areas of biological and biomedical sciences, including: research that encompasses the full spectrum of the basic and applied biology of all organisms, at all levels of organisation from the molecular to the ecosystem, employing a diversity of approaches including experimental, theoretical, computational and mathematical; biochemistry, physiology, pharmacology and anatomy at the genetic, molecular, cellular, organ system and whole organism level. It includes work relevant to the nervous and cardiovascular systems at all levels of enquiry.
- ❖ Submissions may include work which is on the boundaries of other UoAs in Main Panel A as well as (but not exclusively) UoAs in other Main panels: UoA 7 (Earth Systems and Environmental Sciences); UoA 8 (Chemistry); UoA 9 (Physics); UoA 10 (Mathematical Sciences); UoA 11 (Computer Science and Informatics); UoA 17 (Geography, Environmental Studies and Archaeology) and UoA 26 (Sport and Exercise Sciences, Leisure and Tourism).

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#### **Multiple submissions**

- ❖ Sub-panel 3 expects that there is a case for multiple submission in its UoA.
- ❖ Sub-panels 1, 2, 4, 5 and 6 do not consider there is a case for multiple submissions in their UoA, other than due to merger between HEIs or if one of the submissions is joint with another HEI.

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#### **Assessment criteria: Research outputs**

- ❖ When assessing research outputs, sub-panels will look for evidence of the following:
  - Scientific rigour and excellence, with regard to design, method, execution and analysis
  - Significant addition to knowledge and to the conceptual framework of the field
  - Potential and actual significance of the research
  - The scale, challenge and logistical difficulty posed by the research
  - The logical coherence of argument
  - Contribution to theory-building
  - Significance of work to advance knowledge, skills, understanding and scholarship in theory, practice, education, management and/or policy
  - Applicability and significance to the relevant service users and research users
  - Potential applicability for policy in the UoAs of Main Panel A, e.g. health, healthcare, public health, animal health and welfare.
- ❖ Unless there is evidence of at least one of the above, research outputs will be graded as 'unclassified'.

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#### **Assessment criteria: Impact**

##### Evidence of impact

- ❖ Sub-panels recommend that institutions refer to the following list of characteristics when preparing case studies:
  - All the material required to make a judgment is included – no further reading is required.
  - Clear definition of non-academic beneficiaries.
  - Coherent narrative, clearly explaining the relationship between the research and the impact, and the nature of the changes or benefits arising.
  - Indicators used are meaningful, contextualised and precise in support of the case study and the evidence is focused and concise.
  - Supporting evidence and claims can be independently checked and are verifiable.
  - Brief explanation of what is original or distinctive about the research insights that contributed to the impact.
  - Case study includes details of the names of researchers, their position in the institution, and the dates and locations of the research activity.



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- Specific and appropriate independent sources of corroborating information are supplied.
  - Where the research was carried out in collaboration with other institutions, or was part of a wider body of research, the institution must distinguish the submitting institution's input and subsequent impact.
  - For case studies claiming impact from public engagement:
    - o Clear link between the research and the engagement activity.
    - o Evidence is provided about dissemination as well as a clear explanation about the significance or the benefits to audiences.
    - o The activity goes beyond 'business as usual' engagement.

#### Distinctiveness of research contribution

- ❖ Institutions are expected to have produced research that made a distinct and material contribution to the impact in the case study. Institutions are advised to be specific and clear about own contributions and acknowledge contribution of other, especially for wider bodies of research, collaborations etc.

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#### **Assessment criteria: Environment**

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- ❖ Environment data is not required to be reported by research group.
- ❖ Common definitions of 'vitality' and 'sustainability' will be applied by all sub-panels in the assessment of Environment:
  - **Vitality:** the extent to which a unit provides an encouraging and facilitating environment for research, has an effective strategic plan, is engaged with the national and international research community, is able to attract excellent postgraduate and postdoctoral researchers through a worldwide reputation and, where appropriate for the subject area, is supported by a portfolio of research funding.
  - **Sustainability:** a coherent vision for the future, and investment in people and infrastructure.

## Main Panel B

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### Discipline boundary definitions

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- ❖ All sub-panels welcome interdisciplinary nature of research and expect submissions may contain work contributing to other disciplines.

#### 7 - Earth Systems and Environmental Sciences

- ❖ Includes geophysics; geochemistry; palaeontology; geology; mineral physics; evolution of planetary atmospheres, surface and interiors; earth surface processes; the physics chemistry, and biology of the environment including ecology; atmospheric, oceanic, freshwater, terrestrial and soil sciences; innovative measurement systems; global change; natural resources; natural hazards and environmental management.

#### 8 - Chemistry

- ❖ Includes experimental and theoretical chemistry, including appropriate areas of pharmacy, chemical engineering and materials science.
- ❖ Submissions are expected from all areas of chemistry with the majority of research having a direct contribution to the UoA. The panel welcomes the increasing interdisciplinary nature of research and expects submission may contain work contributing to other disciplines such as Biological Sciences (UoA 5), Earth systems and Environmental Sciences (UoA 7), Physics (UoA 9) and others where appropriate.

#### 9 - Physics

- ❖ Includes theoretical, computational and experimental studies of: quantum physics; atomic, molecular and optical physics; plasma physics; fusion and energy; particle physics; nuclear physics; surface and interface physics; condensed matter and soft matter physics; biophysics; semiconductors, nanoscale physics, lasers, optoelectronics and photonics magnetism, superconductivity and quantum fluids; fluid dynamic; statistical mechanics, chaotic and nonlinear systems; astronomy and astrophysics, planetary and atmospheric physics; cosmology and relativity; medical physics applied physics; chemical physics; instrumentation; pedagogic research in physics' history and philosophy of physics.

#### 10 - Mathematical Sciences

- ❖ Includes pure mathematics and the development and application of mathematical and statistical techniques. Algebra; analysis; category theory; combinatorics; computational complexity; dynamical systems; geometry; mathematical logic; number theory; ordinary differential equations; operator theory and operator algebras; partial differential equations; probability; stochastic analysis; topology; development, analysis and solution (or approximate solution) of problems arising from mathematical models in areas outside mathematical including associated experimental and computational studies, and the development and application of mathematical theories and techniques that further these; methodological, applied and theoretical research in statistics, probability and mathematical aspects of operational research, including statistical methods, mathematical statistics, applied probability, probability theory, actuarial science, biostatistics, social statistics as well as applications in biology, finance, government, health and social sciences, industry and commerce, medicine and other sciences and fields.
- ❖ Applied statistics research whose focus is business or management would not normally be submitted to this panel.
- ❖ Physics submissions with a primary mathematical focus may be submitted.
- ❖ The panel expects to receive outputs in history of the mathematical sciences, as well as interdisciplinary outputs where mathematical sciences play a significant role that are not more suitably submitted to the other sub-panel.

#### 11 - Computer Science and Informatics

- ❖ Includes the study of methods for acquiring, storing, processing, communicating and reasoning about information, and the role of interactivity in natural and artificial systems, through the implementation, organisation and use of computer hardware, software and other resources. The subjects are characterised by the rigorous application of analysis, experimentation and design.

#### 12 - Aeronautical, Mechanical, Chemical and Manufacturing Engineering

- ❖ Includes engineering research in: acoustics; aeronautical engineering; automotive engineering; bio-chemical and bio-medical engineering; computational methods; control;

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dynamics; engineering design; engineering management; environmental and systems engineering; failure analysis; food process engineering; fluid power; fluid mechanics; fluidics; fuel technology and energy engineering; heat transfer; manufacturing (technology, processes and systems); physical ergonomics; materials, material processing; maritime engineering; mechatronics; naval architecture; optical engineering; product design; product and process engineering; solid mechanics; sustainable engineering; thermodynamics; turbo-machinery and propulsion; and vibration. Also includes pedagogic research in aeronautical, mechanical, chemical and manufacturing engineering.

- ❖ The panel welcomes the increasing interdisciplinary nature of research and expects submission may contain work contributing to other disciplines such as Electrical and Electronic Engineering, Metallurgy and Materials (UoA 13), Civil and Construction Engineering (UoA 14) and General Engineering (UoA 15)

#### 13 - Electrical and Electronic Engineering, Metallurgy and Materials

- ❖ Includes all research carried out in all areas of electrical and electronic engineering as well as research into both fundamental and applied aspects of the structure, properties, manufacture, processing and applications (and their interrelationships) of all categories and forms of material. It also includes pedagogic research into electrical and electronic engineering, metallurgy and materials.
- ❖ The panel welcomes the increasing interdisciplinary nature of research and expects submission may contain work contributing to other disciplines such as Chemistry (UoA 8), Physics (UoA 9), Computer Science and Informatics (UoA 11), Aeronautical, Mechanical, Chemical and Manufacturing Engineering (UoA 12), Civil and Construction Engineering (UoA 14) and General Engineering (UoA 15).

#### 14 - Civil and Construction Engineering

- ❖ Includes construction design; infrastructure management; fluid mechanics; hydraulics and hydrology; computational mechanics and informatics; structures and materials; surveying; transportation; geotechnical, geo-environmental and earthquake engineering; environmental management (including air, water, waste and contamination); offshore and coastal engineering (including extreme events, impact of and adaptability to climate change); sustainability; building physics; safety and risk assessment aspects of the above. It also includes pedagogic research in civil and construction engineering.

#### 15 - General Engineering

- ❖ Includes multidisciplinary and interdisciplinary engineering research areas such as: mineral and mining engineering; offshore technology; renewable energy; energy conversion; industrial studies; medical engineering; bioengineering and environmental engineering. Submissions are expect from departments or centres which include two or more of the main branches of engineering, i.e., chemical, civil, electrical and electronic, metallurgy and minerals, mechanical, aero and manufacturing engineering. Also includes pedagogic research in engineering.

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### **Assessment criteria: Environment**

- ❖ Common definitions of 'vitality' and 'sustainability' will be applied by all sub-panels in the assessment of Environment:
  - **Vitality:** the extent to which a unit provides an encouraging environment for research, has an effective strategy, is engaged with the national and international research and user communities, and is able to attract excellent postgraduate and postdoctoral researchers.
  - **Sustainability:** leadership, vision for the future and investment in people and infrastructure and, where appropriate for the subject area, the extent to which activity is supported by a portfolio of research funding.

## Main Panel C

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### Discipline boundary definitions

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#### 18 - Economics and Econometrics

- ❖ Includes all aspects of economics and econometrics (including, where appropriate, economic history).
- ❖ Research of all types – empirical or theoretical, strategic, applied, or policy-focused – will be considered of equal standing. Submitting units are encouraged to submit their strongest work irrespective of the form of output or the extent of its interdisciplinary nature, even if the research is at the boundaries of the UoA.
- ❖ Overlap with 19 - Business and Management Studies is expected.

#### 19 - Business and Management Studies

- ❖ Includes accounting and finance; business history; business and industrial economics; corporate governance and risk management; corporate social responsibility; employment relations; entrepreneurship and small firms; human resource management; information management and business systems; innovation and technology management; international business; management education and development; management science; marketing; operations and project management; organisational psychology; organisational studies; public sector management; public services and third sector; service management; strategic management; and any other field or sub-field aligned to business and management.
  - ❖ Overlap with UoA 10 - Mathematical Sciences, UoA 18 - Economics and Econometrics, and UoA 36 - Communication, Cultural and Media Studies, Library and Information Management are expected.
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### Cross-boundary submissions and cross-referral

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- ❖ The preferred approach within Main Panel C is that the majority of work submitted in a UoA will be assessed by that sub-panel. An exception is for UoA 19 (Business and Management Studies) where significant aspects of submissions are expected to fall within the remit of UoA 18 (Economics and Econometrics). These aspects may be cross-referred to sub-panel 18 for advice. Sub-panel 19 will retain responsibility for recommending the quality profile.
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### Assessment criteria: Impact

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#### Evidence of impact

- ❖ Case studies must describe how activity has led to impact or benefit, for which simple descriptions of activity will not suffice. Evidenced links between the underpinning research and any impact or benefit are required.

#### Underpinning research

- ❖ Sub-panels do not anticipate that submitting units will need to cite more than five references. Submissions should include references that best demonstrate the quality of the underpinning research.
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### Assessment criteria: Environment

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- ❖ Common definitions of 'vitality' and 'sustainability' will be applied by all sub-panels in the assessment of Environment:
  - **Vitality:** The existence of a thriving, dynamic and fully participatory research culture based on a clearly articulated research strategy, displayed both within the submitting unit and in its wider contributions, and in terms appropriate to the scale and diversity of the research activity that it supports.
  - **Sustainability:** The extent to which it is capable in the future of continuing to support and develop such research activity as defined in the quality levels, both within the submitted unit and the discipline more generally

## Main Panel D

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### Discipline boundary definitions

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#### 30 - History

- ❖ Includes all aspects of the study of the past (except those specifically falling within the remit of other UoAs), including but not limited to: business history; cultural history; economic history; environmental history; global history; heritage; historiography; history and memory; history of Britain, Ireland and Continental Europe (late Roman to the present); history of ideas; history of North America, South America, Africa, Asia and Australasia; history of science, technology and medicine; imperial/colonial history; international history; labour history; local and regional history; material history; media history; military history; oral history; political history; public history; religious history; social history; theory of history; transnational history; urban history; women's and gender history.
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### Cross-boundary submissions and cross-referral

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- ❖ All classical history will be automatically cross-referred to Sub-panel 31 (Classics); Byzantine history will also normally be cross-referred to sub-panel 31. The sub-panel may also cross-refer other submitted outputs as appropriate, for example to Sub-panel 27 (Area Studies).
  - ❖ The sub-panel welcomes the submission of interdisciplinary research, which may include areas such as history in relation to literature or art history.
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### Assessment criteria: Impact

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- ❖ The following list offers submitting institutions some examples of impact:
    - Generating new ways of thinking that influence creative practice beyond the academy.
    - Creating, inspiring and supporting new forms of artistic, literary, linguistic, social, economic, religious, and other expression beyond the academy.
    - Contributing to innovation and entrepreneurial activity through the design and delivery of new products or services.
    - Contributing to economic prosperity via the creative sector including publishing, music, theatre, museums and galleries, film and television, fashion, tourism, and computer games.
    - Informing practice or policy as a result of research on the nature and extent of religious, ethnic or linguistic discrimination.
    - Research into the languages and cultures of minority linguistic, ethnic, religious, immigrant, cultures and communities used by government, NGOs, charities or private sector to understand and respond to their needs.
    - Helping professionals and organisations adapt to changing cultural values.
    - Contributing to continuing personal and professional development.
    - Preserving, conserving, and interpreting cultural heritage for audiences external to the academy.
    - Developing stimuli to tourism and contributing to the quality of the tourist experience.
    - Informing and influencing the design and delivery of curriculum and syllabi in schools, other HEIs or other educational institutions.
    - Contributing to processes of commemoration, memorialisation and reconciliation.
    - Contributing to a wider public understanding of basic standards of wellbeing and human rights conceptions.
    - Informing or influencing the development of expert systems in areas such as medicine, human resources, accounting, and financial services.
    - Influencing the methods, ideas or ethics of any profession.
    - Providing expert advice to governments, NGOs, charities and the private sector in the UK and internationally and thereby influencing policy and/or practice.
    - Engaging with and mediating between NGOs and charities in the UK and internationally to influence their activities, for example in relation to health, education and the environment.
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#### Impact criteria and sub-profile

- ❖ Each case study will be assessed by a group consisting of at least one user member (or assessor) and at least one academic member of a sub-panel, with relevant expertise.

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**Assessment criteria: Environment**

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- ❖ Common definitions of 'vitality' and 'sustainability' will be applied by all sub-panels in the assessment of Environment:
  - **Vitality:** The extent to which the research environment supports a research culture characterised by intellectual vigour, innovation and positive contribution within the discipline(s) and profession.
  - **Sustainability:** The extent to which the research environment ensures the future health and wellbeing of the unit and discipline(s).