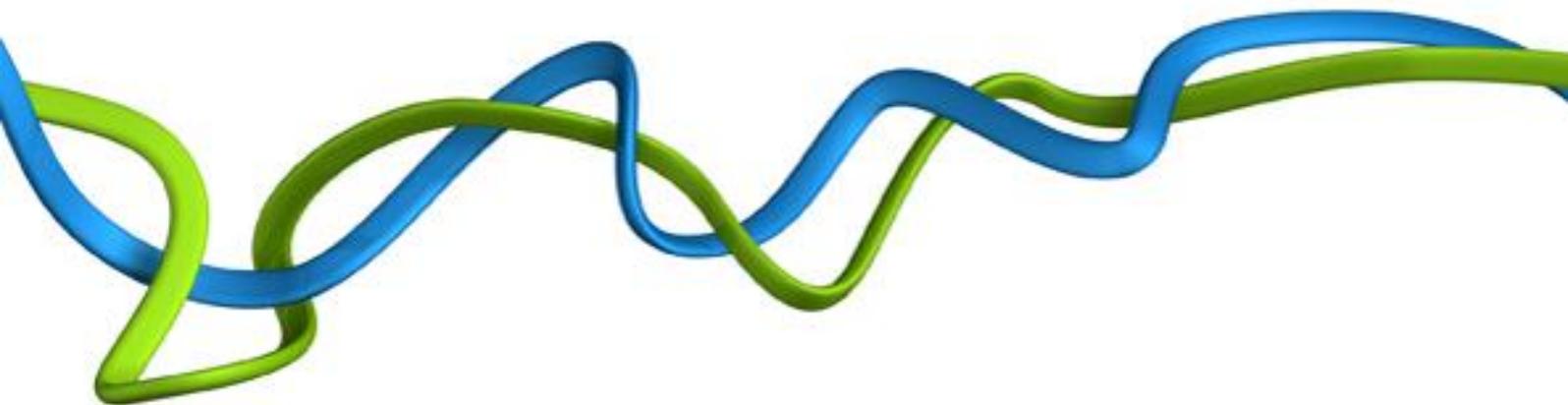


# **Consultation on the second Research Excellence Framework**

UK higher education funding bodies

Submission from the Royal Academy of Engineering

March 2017



***About the Royal Academy of Engineering***

*As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering.*

## **Consultation on the second Research Excellence Framework**

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### **Q1. Do you have any comments on the proposal to maintain an overall continuity of approach with REF 2014, as outlined in paragraphs 10 and 23?**

The Royal Academy of Engineering welcomes the opportunity to submit evidence to the consultation on the second Research Excellence Framework (REF). The Academy's Fellowship represents the nation's best engineering researchers, innovators, entrepreneurs, and business and industry leaders. This response has been prepared following extensive consultation with the UK's engineering and computer science research community. The Academy held consultation events in London, Cardiff and Edinburgh, which were attended by researchers across all career stages and from a wide range of institutions.

There is a strong desire from the engineering community to maintain overall continuity of approach with REF 2014. Where appropriate, the Academy encourages utilising the learning and experience from REF 2014 to inform REF 2021, with improvements to guidance and the use of exemplars. However, it is clear from the recommendations of the Stern Review of the REF and the proposals outlined in the consultation document that many of the proposed changes are not incremental and will not maintain continuity with REF 2014.

### **Q2 What comments do you have about the Unit of Assessment structure in REF 2021?**

#### **Summary**

The engineering disciplines present a complex challenge for Unit of Assessment (UOA) configuration. Recognising this, the Academy worked closely with the funding councils to support the development of the REF 2014 UOAs for engineering and would be pleased to do so again for REF 2021. This section sets out the key messages that emerged from the Academy's consultation with the engineering community, including through a range of events held across the UK, that were most relevant to the determination of UOA structure. For ease of reference, the key messages are summarised below, prior to a more detailed discussion of the topic.

- No consensus emerged from the Academy's consultation with the engineering community regarding the optimal UOA structure. This is not surprising in view of the fact that the boundaries between engineering disciplines do not obviously give rise to a UOA structure that would be administratively acceptable or consistent with the approaches taken for other disciplines.
- There is widespread agreement that the UOA structure must continue to be able to accommodate submissions under general engineering, and that the criteria and guidance for general engineering submissions should be further refined to provide sufficient differentiation from other engineering disciplines.
- The REF2014 UOAs do not represent an optimal structure, though this was not felt to have impacted negatively in any significant way on fairness or robustness of the outcome.
- If a single UOA is established for engineering, there will clearly be a need to introduce mechanisms to allow for appropriate assessment and visibility of all the engineering disciplines. A stronger case would need to be made than has been done to date regarding the benefits a single UOA would offer over having multiple UOAs.

- Irrespective of the structure ultimately selected, clear and thoughtful guidance for both higher education institutions (HEIs) and panel members will be needed to maximise the chances that the system operates as intended and to mitigate potential downsides associated with the structure selected. It is therefore essential that the guidance and criteria are developed with sufficient expert input.

### **REF 2014 UOA structure**

The UOAs covering the engineering disciplines were rationalised from six in RAE 2008 to four in REF 2014, with computer science and informatics retaining its own UOA in both exercises. In REF 2014 there was a redistribution of staff to the General Engineering sub-panel 15, with an increase of 68% of Category A staff submitted compared to RAE 2008. By contrast, the three other REF 2014 engineering sub-panels all saw a fall in the number of Category A staff submitted, with reductions of -9.5%, -11.9% and -24.8% for sub-panels 12, 13 and 14 respectively. A similar trend was seen with the number of submissions, with an increase of 19.2% for General Engineering sub-panel 15 and reductions of -41.9%, -31.5% and -39.1% for sub-panels 12, 13 and 14 respectively.

There is a broad consensus that the assessment of engineering in REF 2014 was accurate and consistent, and the significant calibration and moderation activities were essential to achieving this. However, as noted in the consultation document, there was an inconsistency of approach across HEIs submitted to the four UOAs covering the engineering disciplines, which affected the comparability of outcomes in some areas and distributed workloads unevenly across the engineering sub-panels.

It appears that the inconsistency of approach to HEI submission can be largely attributed to the differing rationales of HEIs choosing to submit to the General Engineering sub-panel 15 and not to submit to the other engineering sub-panels. However, further detail and demonstration of the challenges posed by the engineering UOAs in REF 2014 would be welcomed to ensure that the most appropriate solution is developed.

### **General Engineering**

Many of the outputs submitted to the General Engineering sub-panel were highly interdisciplinary and internationally collaborative, reflecting the guidance and criteria for submissions to that sub-panel. The guidance specified multi-disciplinary and interdisciplinary engineering research in a diverse range of fields, and submissions from single organisational units within institutions that included activities spanning two or more of the other three engineering UOAs. However, it should be noted that the three other engineering UOAs also welcomed interdisciplinary research, not only in their guidance, but also in practice.

While there was considerable evidence of HEIs restructuring their engineering research during the REF 2014 assessment period and many HEIs submitted to the General Engineering sub-panel for the first time, there is a perception that not all submissions to General Engineering reflected a general engineering strategic approach to engineering research, but instead a strategic approach to the REF. The Academy has heard that some HEIs may have submitted to General Engineering rather than to the potentially more appropriate discipline-specific UOAs in a bid to try and improve or 'game play' their result. While the Academy is not supportive of such 'game playing' the consensus across the community is that 'game playing' will be inevitable regardless of the rules.

The Academy is supportive of the trend in growth of true General Engineering submissions and believes that it is essential that general engineering approaches are accommodated and

assessed in REF 2021. However, there is a consensus across the engineering community that a refinement of the guidance and criteria for submissions to the General Engineering sub-panel would be welcomed, along with a requirement for submissions to clearly justify their selection of sub-panel 15 and their decision not to submit to the other engineering UOAs.

## **Principles**

A broad consensus has emerged around principles that will determine a successful UOA structure for engineering:

- It is essential that research outputs should be assessed by panel members with relevant expertise, regardless of which UOA the outputs are submitted to. The Academy is confident that this was achieved with REF 2014. However, it is essential that the funding councils ensure that the wider research community also has sufficient confidence in the process. For example, the General Engineering sub-panel made relatively few cross-referrals compared to other sub-panels as they were confident that their expertise was sufficient to assess the vast majority of the outputs received. However, this was not necessarily the perception in the wider community.
- Consistency in assessment standards across the engineering disciplines is important for accuracy and confidence in the process by the wider research community, regardless of the engineering UOA structure.
- Engineering is an exceptionally diverse discipline, from civil engineering to electronic engineering and biomedical engineering. It is critical that the assessment of engineering research in REF 2021 allows for sufficient visibility of the diverse engineering disciplines. The engineering community greatly values the roles that the research assessment exercises have in indicating the health of engineering disciplines and as a successful benchmarking tool. Explicit recognition and accommodation of the breadth of engineering enhances the community's engagement and confidence in the assessment process.

## **REF 2021 engineering UOA structure**

Although the Academy has not discussed detailed proposals for alternative structures of the engineering UOAs with its community, there has been extensive discussion of the merits and implications of a single engineering UOA compared to a multiple engineering UOA structure, similar to that employed in REF 2014. The recurrent themes are outlined here.

- **A single engineering UOA**

A single engineering UOA would be the largest sub-panel in terms of submissions by a significant margin. Based on REF 2014 a single engineering sub-panel would have had 5,062 Category A staff submitted and 18,263 research outputs submitted, compared to the 3,571 Category A staff and 13,405 research outputs submitted to the Clinical Medicine sub-panel 1, the largest REF 2014 sub-panel. While the volume of staff and outputs submitted is not insurmountable and the engineering community could find a way to make it work if necessary, consideration would have to be given to the number of panel members required, multiple submissions and creation of sub-profiles.

One of the main advantages of a single engineering panel is perceived to be increased consistency in assessment across the engineering disciplines. In addition, a single engineering panel may allow for a distinct and clear narrative about the quality of engineering research in

the UK. However, that narrative will only be valuable if it is able to comment on the full range of engineering disciplines.

One of the greatest concerns articulated by the engineering community about the possible creation of a single engineering UOA is the potential of loss of identification of pinnacles of excellence and the potential for averaging out of scores. Similarly, the potential reduction in visibility of the full spectrum of engineering disciplines is also a significant concern.

The creation of sub-profiles for outputs, determined at the criteria-setting stage, is one possible method of mitigating the risk of loss of visibility for distinct disciplinary areas, as suggested in the consultation document. However, extensive consideration would need to be given to what would be appropriate sub-profiles, both in terms of number and discipline, and how they should be used, for example should the panel members or the submitting HEIs indicate the appropriate sub-profile?

It could be beneficial if sub-profiles were able to provide fine-grained information on engineering disciplines; in particular, if they were to include disciplines that have not been covered by the engineering UOAs previously, for example biomedical engineering. But this would need to be balanced against ensuring that the sub-profiles do not, in effect, become individual-level submissions for some smaller submissions. There is also a risk that, depending on how they are used, they could increase burden on HEIs and be vulnerable to 'game playing'.

The Academy believes that it would be necessary to have a 'General Engineering' sub-profile, but the criteria for such a sub-profile should be more reflective of a truly general engineering approach, as discussed above.

- **Multiple engineering UOAs**

In REF 2014, there were four UOAs covering the engineering disciplines, which were reduced from six UOAs in RAE 2008. Besides offering considerable consistency with REF 2014, the clear advantage to the engineering community of multiple engineering UOAs is that they allow visibility of different engineering disciplines. However, the visibility of the disciplines depends on how the engineering disciplines are divided into UOAs. During the Academy's consultation on the next REF, two themes regarding the division of disciplines in REF 2014 have repeatedly arisen and should inform the development of the engineering UOAs for REF 2021:

- The Civil and Construction Engineering sub-panel 14 had the lowest number of submissions in REF 2014 with 14 submissions and 1,384 research outputs submitted, which was significantly smaller than in RAE2008. This reduction is due to several HEIs with civil engineering units submitting to General Engineering sub-panel 15 and Architecture, Built Environment and Planning sub-panel 16 in Main Panel C. As a consequence, the Academy heard that sub-panel 16 assessed a significant amount of engineering research. While the quality of the assessment is not being questioned, there was a clear appetite in the Academy's engineering community to see the civil engineering submitted to Main Panel C, to be submitted to Main Panel B. The dispersal of civil engineering across multiple sub-panels in REF 2014 meant that it was hard to get an accurate indication of the quality of civil engineering research in the UK.
- Biomedical engineering and bioengineering are large and growing engineering disciplines, which, in Main Panel B were largely submitted to the General Engineering sub-panel 15. It is clear that there is an appetite in the engineering community to have

better visibility of biomedical engineering and bioengineering in REF 2021. However, it was agreed that a thorough analysis of relevant submissions to REF 2014 should be made before the proposal of a new UOA was suggested. Any such analysis should include investigation of relevant submissions to sub-panels in Main Panel A.

As has already been outlined, one of the greatest concerns articulated by the engineering community about the continued use of multiple engineering UOAs is the 'game playing' involved in selecting which UOAs to submit to. In addition, some in the community are also concerned about the difficulties faced when trying to draw comparisons between assessment of different sub-panels, which is believed to be exacerbated by the presence of a General Engineering sub-panel.

### **HESA cost centres**

The consultation proposes that the HESA cost centres should be used to map 'research-active' staff to UOAs. Although such an approach would negate concerns about HEIs using UOAs selection to 'game play', the Academy believes it would not outweigh the significant negative impacts associated with the proposal. Please see response to question 7 for more detail.

### **Q3a. Do you agree that the submissions guidance and panel criteria should be developed simultaneously?**

Without confirmation of what the engineering UOA structure will be for REF 2021, it is difficult to adequately answer questions 3a and 3b. It may be necessary for the sub-panel members to be involved in the criteria setting if very broad engineering sub-panels are established.

### **Q4. Do you agree with the proposed measure outlined at paragraph 35 for improving representativeness on the panels?**

The Academy supports the measures outlined in paragraph 35 for improving representativeness on the panels. In addition, the Academy recommends that the advertising literature and guidance for the open application for main and sub-panel chairs states clearly that applications are sought from diverse applicants.

### **Q5a. Based on the options described at paragraphs 36 to 38, what approach do you think should be taken to nominating panel members?**

The Academy thinks the approach detailed in paragraph 37, requiring the nominating bodies to complete a structured form on the equality and diversity characteristics of their membership and how equality and diversity was taken into account when selecting nominees, is the best approach.

### **Q5b. Do you agree with the proposal to require nominating bodies to provide equality and diversity information?**

The Academy agrees that the nominating bodies should provide equality and diversity information.

### **Q7. Do you have any comments on the proposal to use HESA cost centre to map research-active staff to UOAs and are there any alternative approaches that should be considered?**

HESA cost centres are not a suitable mechanism to map 'research-active' staff to UOAs for engineering research, as HESA cost centres reflect teaching structures rather than research structures. The use of HESA cost centres would risk misalignment between research outputs and panel expertise, and result in difficulties for the appropriate submission of interdisciplinary research.

The engineering community believes that the HEIs are best placed to determine which UOAs their 'research-active' staff should be submitted to. To limit 'game playing' it will be necessary for HEIs to justify their submission rationale in a way that is evidenced and auditable.

**Q8. What comments do you have on the proposed definition of 'research-active' staff?**

For the engineering community, a measure of independence is regarded as critical in the definition of 'research-active' staff. Without a measure of independence there is a considerable risk of the submission of staff to the REF who have no substantial role in conducting research, but who are categorised as 'Teaching and research'.

For engineering, a suitable measure of independence would be similar to that used in REF 2014 to distinguish early career researchers: 'they undertook independent research, leading or acting as principal investigator or equivalent on a research grant or significant piece of research work'. The definition of 'research-active' staff should include individuals who are recipients of competitive peer-reviewed awards that enable the awardees to have significant autonomy, such as the Academy's Research Fellowships. Consideration should be given to increasing the guidance regarding the eligibility of those who are recipients of institutional research fellowships and other more complex funding mechanisms.

The Academy believes that using a measure of independence to define 'research-active' staff should mitigate concerns about movement of staff on to 'Teaching only' contracts and the negative perception of 'Teaching only' contracts that this risks perpetuating.

**Q9. With regard to the issues raised in relation to decoupling staff and outputs, what comments do you have on:**

**a. The proposal to require an average of two outputs per full-time equivalent staff member returned?**

There are mixed views among the engineering community on how best the number of outputs should be determined. However, there is agreement with the concern outlined in the consultation document that the proposals have the potential to reduce the power to discriminate between submissions that contain large amounts of high-quality work. The loss of the ability to distinguish between world-leading and internationally excellent research would diminish the purpose of the REF. To determine the extent of the risk of the loss of discrimination, it may be helpful if the potential impacts of the proposals were explored using the REF 2014 results.

**b. The maximum number of outputs for each staff member?**

The Academy has heard concerns that the proposed maximum of six outputs for each staff member is too high, and, as with the proposed average of two outputs, risks further reducing the power to discriminate between submissions that contain large amounts of high-quality work.

Furthermore, it is unclear how introducing a maximum of six outputs for each staff member (while maintaining a similar number of overall outputs submitted) will result in a reduction of burden for HEIs. If the pool of possible outputs is increased it is likely that HEIs will face a greater burden with regard to output selection.

**c. Setting a minimum requirement of one for each staff member?**

If non-portability is to be introduced, then the minimum number of outputs for each staff member will have to be zero to accommodate research-active staff recruited near to the end of the assessment period. It is unlikely that recent recruits will have had sufficient time at the submitting HEI to produce research outputs.

However, if portability is to be retained, many in the engineering community would prefer to see the minimum requirement of research outputs for each staff member set at one.

The flexibility in the number of outputs that can be returned by staff goes some way to addressing the Academy's concerns about accommodating staff who may have moved into academia from the private sector, and as consequence, have a reduced number of outputs. Please see response to question 15 for further detail.

**Q10. What are your comments on the issues described in relation to portability of outputs, specifically:**

**c. Would non-portability have a negative impact on certain groups and how might this be mitigated?**

The Academy recognises that the desire to decouple staff from research outputs is a contributing factor in the proposed introduction of non-portability. However, the engineering community remains to be convinced of the benefits of non-portability and queries the notion that it is feasible or logical to separate research outputs from researchers.

The Academy understands that the intention for introducing non-portability is also in part to limit 'game playing' associated with HEI hiring practices that took place ahead of REF 2014. However, the engineering community broadly questions if there is sufficient evidence of questionable hiring practices and resulting negative impacts to warrant the introduction of non-portability, a significant departure from consistency with REF 2014. There is also a risk that the introduction of non-portability will just result in the hiring practices that the Stern Review recommendation intended to prevent, being transposed to a different time-frame within the assessment period. A further concern articulated by the engineering community is that the introduction of non-portability will risk reducing the mobility, internationalism and dynamism in the UK's engineering research base. The risk of either of the outcomes articulated above occurring, questions whether the benefits that have been attributed to non-portability will be realised.

If non-portability is to be introduced, significant measures to mitigate multiple negative impacts will be required. Consideration will need to be given to ensuring that the introduction of non-portability does not result in a disproportionate burden to HEIs, funding councils and panel members, which outweighs the perceived benefits non-portability is intended to achieve.

In REF 2014, the four sub-panels covering the engineering disciplines and the Computer Sciences and Informatics sub-panel all made use of the 100-word information statements that HEIs were invited to submit about the significance of the research outputs, which was non-evident from the output itself. The Main Panel B report stated that this information was very helpful in assessing the significance of outputs. There is considerable concern in the engineering community that the introduction of non-portability will make it logistically difficult for the relevant information to be submitted

alongside the output, if the key academic involved in the production of the output is no longer working at the submitting HEI.

The introduction of non-portability means that HEIs may be rewarded for research where entire research groups, or even departments, have left the submitting HEI. The Academy is unconvinced that such an outcome is in the spirit of the Stern Review's recommendations and believes that such information should be captured.

There is also a risk that early-career researchers will be particularly vulnerable to negative impacts on their career development and mobility. However, it should also be noted that the Academy has heard concerns from engineers across the spectrum of career stages that non-portability may also impact on their career development and mobility.

The Academy has received a number of suggestions for how non-portability could be incorporated into the next REF, while also trying to address some of the concerns its introduction raises. For example, non-portability could be applied to: a set number of each researcher's outputs; a proportion of outputs from each HEI submission; or a specific time-frame of the assessment period. However, it is clear that implementing any of these suggestions would result in an increased burden on all parties involved and all are as susceptible to 'game playing' as portability.

If the date of acceptance is used to determine where an output was demonstrably generated, the Academy believes that there will be a risk of introducing unintended publishing behaviours that will be susceptible to 'game playing'.

**Q12. What comments do you have on the proposal to remove Category C as a category of eligible staff?**

While the proposal to remove Category C as a category of eligible staff is not a particular concern to the engineering community, the proposal has the potential to have a significant impact on the medical sciences. Please refer to the submission from the Academy of Medical Sciences for more detail.

**Q14. What comments do you have on the proposal for staff on fractional contracts, and is a minimum of 0.2 FTE appropriate?**

The Academy welcomes the proposal to require a short statement outlining the connection of staff on fractional contracts to the submitted unit.

**Q15. What are your comments on better supporting collaboration between academia and organisations beyond higher education in REF 2021?**

As highlighted in the Academy's response to the Stern Review of the REF and the *Dowling Review of Business-University Research Collaborations*, the inclusion of impact in REF 2014 has had a hugely positive influence on increasing the prominence of business-university collaborations. The Dowling Review went on to recommend that the REF could be further adapted to provide explicit recognition for staff who have moved between industry and academia, in either direction, by offering allowances, similar to those made for researchers who have taken parental leave. However, the Academy agrees that the proposals outlined in the consultation document relating to the decoupling of staff and outputs, and the flexibility in the number of outputs that can be returned by submitted staff, go some way to achieving the same outcome as the Dowling Review recommendation. It will be important that the proposed

changes are communicated in such a way that emphasises that they are intended to benefit people who have been engaged in inter-sector mobility.

The Academy agrees that the environment element should be used to give more recognition to collaborations between academia and organisations beyond higher education, including inter-sector mobility. Please refer to the response to question 35 for more detail.

**Q17. What are your comments on the assessment of interdisciplinary research in REF 2021?**

Engineering is an inherently interdisciplinary discipline. The research outputs and impact case studies submitted to REF 2014 demonstrated the results and benefits of interdisciplinary working, and the engineering community fully supports the inclusion and encouragement of interdisciplinary research in REF 2021.

The HEFCE analysis showing that interdisciplinary research was assessed fairly in REF 2014 aligns with the experience of the engineering community. Nevertheless, interdisciplinary research was found to be underrepresented in REF 2014 and the Academy is supportive of introducing further measures to encourage its submission. However, it will be important to ensure that any measures introduced do not have unintended consequences, such as increasing the misplaced perception that interdisciplinary research is not fairly assessed in the REF, and therefore act as a disincentive for the submission of interdisciplinary research.

The Academy believes that it should be incumbent on all panel members to assess interdisciplinary research and cross-refer as appropriate. There is a risk that the creation of interdisciplinary champions could result in other panel members assuming that it is not their responsibility to assess interdisciplinary research and could mean that the responsibility for assessing interdisciplinary research would fall on one appointed panel member. Similarly, the Academy would not welcome the creation of an 'interdisciplinary panel' involved in the assessment of interdisciplinary research. However, there could be value in a role that takes an overview of the quality of interdisciplinary research.

The engineering community would welcome increased clarity on the purpose of the interdisciplinary identifier field. It was suggested that there was a perception in the research community that using the interdisciplinary identifier field would disadvantage the assessment of the flagged research outputs.

The engineering community supports the proposal of an explicit section in the environment template that can be used to capture institutional initiatives that support and reward excellent interdisciplinary research, in order to increase visibility and further promote interdisciplinary research.

**Q18. Do you agree with the proposal for using quantitative data to inform the assessment of outputs, where considered appropriate for the discipline? If you agree, have you any suggestions for data that could be provided to the panels at output and aggregate level?**

The engineering community does not support the use of quantitative data for the assessment of excellence in engineering research. The Academy maintains that the most common and developed form of metrics, bibliometric indicators, are not yet capable of providing a robust indication of research quality for engineering subjects. In REF 2014 citation data provided by the Scopus database was not used by the four engineering sub-panels, while the Computer Science and Informatics sub-panel made very limited use of it.

**Q19. Do you agree with the proposal to maintain consistency where possible with the REF 2014 impact assessment process?**

The introduction of the assessment of impact in REF 2014 was widely welcomed by the engineering community, and the assessment process proved to be an accurate and reliable way to assess impacts arising from research. The case study format successfully captured diverse impacts across the full breadth of excellent research that the UK supports.

The engineering community fully supports the proposal to maintain consistency where possible with the REF 2014 impact assessment process. Maintaining consistency will allow learning from REF 2014 to be further embedded in the community and has the potential to reduce the burden and costs on HEIs as they can build on their experience from REF 2014.

**Q20. What comments do you have on the recommendation to broaden and deepen the definition of impact?**

The overall consensus in the engineering community is that the definition of impact as used in REF 2014 remains appropriate and should be maintained. However, improvements to the guidance and the use of exemplar impact case studies from REF 2014 would be welcomed to ensure that the definition of impact is not narrowly interpreted by submitting HEIs.

The definition of impact used in REF 2014 captured a wide range of impacts arising from research within Main Panel B, including impacts on the economy, public policy and services, culture and creativity, as well on security and products. Nevertheless, it was observed that in some instances across the engineering sector the definition of impact was narrowly interpreted when compiling case studies, with a particular preference for demonstrating economic impacts. Therefore, it would be beneficial to improve guidance and use the breadth of impact case studies submitted to REF 2014 to encourage submission of all types of impacts. For example, the engineering community would like to encourage greater submission of impacts arising from policy, public engagement, interactions with the NHS and from specific sectors, in addition to impacts on individual companies. The Academy would also like to encourage increased submission of social impacts, such as international development impacts, arising from engineering research. The sharing of exemplars of social impacts submitted by other disciplines would be welcomed.

The Academy agrees with the proposal that ground-breaking academic impacts, such as research leading to new disciplines, should be assessed through the output and environment elements rather than the impact element.

**Q21. Do you agree with the proposal for the funding bodies and Research Councils UK to align their definitions of academic and wider impact? If yes, what comments do you have on the proposed definitions?**

The engineering community welcomes the proposal for the funding bodies and Research Councils UK to align their definitions of academic and wider impact, and is reassured that the proposed definition of wider impact is consistent with the definition used in REF 2014.

**Q22. What comments do you have on the criteria of reach and significance?**

The Academy has heard that a lack of clarity on how the criteria of reach and significance would be assessed led to a lack of confidence in submitting impact case studies with a relatively 'localised' reach. There was a perception that impact case studies with international reach would be assessed more highly than national or regional impacts. However, those involved in the REF 2014 assessment process believed that this perception was not borne out

in the actual assessment of the impact case studies. It would be beneficial to share examples of the ranges of reach and significance from REF 2014 impact case studies to encourage a greater diversity of submissions in REF 2021.

**Q23. What do you think about having further guidance for public engagement impacts and what do you think would be helpful?**

The engineering community believes that it is essential for public engagement impacts to be linked to underpinning research. However, it is clear that more clarity is needed on the means of assessing the relationship between public engagement impacts and its underpinning research. The proposal to allow impacts to be underpinned by research activity and bodies of work may go some way to addressing this concern. Please see response to question 29.

The engineering community agrees that it was important to evidence public engagement impacts, but acknowledges that it could be difficult in practice to evidence their reach and significance. It was agreed that dissemination alone was not sufficient evidence of reach and significance, but a balance needs to be achieved to ensure the evidence required is reasonable.

**Q24. Do you agree with the proposal that impacts should remain eligible for submission by the institution or institutions in which the associated research has been conducted?**

The engineering community broadly agrees with the proposal that impacts should remain non-portable, despite concerns that challenges can arise when tracing information or evidence relating to staff that have left the submitting HEI. It is anticipated that such challenges will reduce as HEIs can build on past experiences to further improve record-keeping and evidence gathering.

The engineering community would welcome clarification on the criteria for submitting impacts arising from collaborations between multiple institutions, for example where a joint centre has been created.

**Q25. Do you agree that the approach to supporting and enabling impact should be captured as an explicit section of the environment element of the assessment?**

The engineering community broadly agrees that the approach to supporting and enabling impact should be captured as an explicit section of the environment element of the assessment. As detailed in the Academy's submission to the Stern Review of the REF, incorporating the impact template into the environment element will have the advantage of further encouraging institutions to embed their impact strategies within their research strategies.

**Q26. What comments do you have on the suggested approaches to determining the required number of case studies? Are there alternative approaches that merit consideration?**

The Academy would be supportive of increasing, or at a minimum, maintaining the number of impact case studies submitted to REF 2021 for REF 2014. The requirement for every UOA submission to provide impact case studies should be maintained.

Concerns have been raised about the potential risk of negative media portrayal of the next REF exercise if the UK research base appears to be producing fewer impacts yet more research-active staff are submitted.

**Q27. Do you agree with the proposal to include mandatory fields (paragraph 96) in the impact case study template, to support the assessment and audit process better?**

Mandatory fields in the impact case study template would be beneficial in ensuring that submitted case studies are described accurately and consistently, and to increase the ease of reporting data. However, the introduction of fields, mandatory or otherwise, should not result in the loss of narrative.

**Q28. What comments do you have on the inclusion of further optional fields in the impact case study template (paragraph 97)?**

The REF 2014 impact case studies provide a unique and rich data source to be used by the government and the wider research community. Therefore, the Academy broadly supports the inclusion of further optional fields to facilitate the analysis of the impact that has been achieved.

**Q29. What comments do you have on the inclusion of examples of impact arising from research activity and bodies of work as well as from specific research outputs?**

From an engineering perspective it was felt that, in the majority of cases, it would always be possible to trace an impact back to a specific research output. Nevertheless, the engineering community broadly welcomes the proposal to include examples of impact arising from research activity and bodies of work, as well as specific research outputs. The engineering community suggested that impacts arising from research activity or bodies of work could facilitate the submission of impact case studies linked to industrial work, where there may be a lack of published research outputs, and where there may have been issues around the confidence of the REF 2014 process with regard to confidentiality and commercial sensitivity, for example, defence and nuclear impacts.

However, it will be essential that impact case studies involving impacts arising from research activity and bodies of work are required to meet the same standards as those arising from research outputs, including in terms of quality of underpinning research and the link to the research. Please see response to question 31 for more detail.

**Q30. Do you agree with the proposed timeframe for the underpinning research activity (1 January 2000 to 31 December 2020)?**

The engineering community broadly agrees with the proposed timeframe for the underpinning research activity.

**Q31. What are your views on the suggestion that the threshold criterion for underpinning research, research activity or a body of work should be based on standards of rigour? Do you have suggestions for how rigour could be assessed?**

The engineering community believes that it is essential that any underpinning research, research activity or body of work that gives rise to an impact case study must meet or exceed a minimum standard of rigour, which should be applied consistently across the different types of underpinning research.

The engineering community has mixed views, with some suggesting that, as long as the impact is significant, 1\* research outputs should be permitted, while others felt that the 2\* criterion should be maintained. It was suggested that the panel members involved in the REF 2014 assessment were permitted a degree of flexibility in assessing the rigour that was found to be useful.

**Q32. Evaluation of REF 2014 found that provision of impact evidence was challenging for HEIs and panels. Do you have any comments on the following:**

**b. The development of guidelines for the use and standard of quantitative data as evidence for impact?**

Increased guidance on suggested standards, objective measures and definitions would be welcomed, but it should be emphasised that the guidelines are not signalling a hierarchy of evidence or preferred types of impact.

**c. Do you have any other comments on evidencing impacts in REF 2021?**

Although industry has strongly welcomed the increased focus on impact in academia, for REF 2014, companies were, understandably, sometimes reluctant to divulge commercially sensitive corroborating information, despite assurances of confidentiality. Having witnessed the first round of impact assessment, it is hoped that industry will be more confident in the strengths of the confidentiality measures for the next impact assessment.

For REF 2014, industry was often reluctant to evidence the benefits of impact in purely financial terms, preferring instead to use non-monetary quantifications, such as CO<sub>2</sub> emission reductions. The guidelines should not articulate a preference for economic benefits, as this may discourage business involvement.

Implementation of robust mechanisms to ensure companies are aware that they are being cited as the locus of impact and are able to verify any corroborating statements would be welcomed. However, this needs to be tensioned against preventing any increased burden on industry that might reduce their willingness to participate in the production of impact case studies.

**Q33. What are your views on the issues and rules around submitting examples of impact in REF 2021 that were returned in REF 2014?**

The engineering community broadly supports the proposal to allow REF 2014 case studies to be resubmitted where there is evidence of additional impact occurring within the REF 2021 assessment period. A clear trajectory of increasing impact would be required, for example, accessing new markets. Allowing resubmission of impact case studies recognises longer-term impacts arising from research and encourages longer-term engagement with industry. Indication that an impact case study is being resubmitted must be required and the guidance on what qualifies as additional impact will need to be robust.

**Q34a. Do you agree with the proposal to improve the structure of the environment template and introduce more quantitative data into this aspect of the assessment?**

The Academy is supportive of the proposal to improve the structure of the environment template and to introduce more quantitative data, and is reassured that the starting point will be to consider data that is already held by institutions. However, these changes need to be balanced against allowing a sufficient narrative element to capture valuable contextual information about the UOA submission to inform the assessment, including for the proposed explicit section on approaches to supporting and enabling impact.

The Academy believes that the environment element should also capture measures undertaken by HEIs that promote good and robust research practice.

**Q35. Do you have any comment on the ways in which the environment element can give more recognition to universities' collaboration beyond higher education?**

Consideration should be given to capturing the number of industry-funded PhDs, including CASE awards, participation in Knowledge Transfer Partnerships, the number of research outputs co-created with industry, the number of collaborative grants awarded and data about mobility between the submitting UOA and businesses, both inward and outward. The engineering community is also keen to capture and encourage interactions with the health sector, particularly the NHS.

The Academy suggests that the environment element should also capture activities that support and encourage translation and the delivery of impact, such as providing incubator space, partnerships with science parks, engagement in national innovation programmes, industrial secondments, networking events and entrepreneurial mentoring, as well as the key role that universities can play in start-ups as well as spin-outs. This would go some way to addressing the widespread frustration in the engineering community that the REF does not sufficiently capture the key role that universities play in enterprise and entrepreneurship.

**Q38. What are your views on the introduction of institutional-level assessment of impact and environment?**

The Academy's submission to the Stern Review of the REF acknowledged that REF 2014 did not capture institutional strategies and activities that have significant benefits at the UOA level. Therefore, the Academy welcomes the intention to pilot institutional-level assessment of environment.

The Academy is less convinced of the need for institutional-level assessment of impact, particularly in the form of impact case studies. The rationale for the inclusion of institutional-level impact case studies is to ensure that impacts arising from multidisciplinary, interdisciplinary and collaborative research are captured. However, the consensus view from the engineering community is that no barriers were faced in REF 2014 in the submission of impact case studies arising from multidisciplinary, interdisciplinary and collaborative research, including that which involved work from multiple UOAs.

During the Academy's consultation activities, participants tried to envisage what institutional-level impact case studies could look like, but with limited detail provided in the consultation document, it was not an easy task. Where suggestions were made, it was regularly concluded that the example would be more appropriately included in an institutional-level assessment of environment. The Academy would not welcome a significant repurposing of impact case studies in the institutional-level assessment.

**Q39. Do you have any comments on the factors that should be considered when piloting an institutional-level assessment?**

If institutional-level impact case studies are to be introduced they should be aligned as closely as possible with the way impact case studies at the UOA level are defined, compiled and assessed. Therefore, they should be linked to underpinning research, research activity or a body of work that is based on standards of rigour (see answer to question 31). The assessment of institutional-level impact case studies should be conducted by individuals with the most relevant expertise. Considering the diversity of impacts that may be eligible for submission, the Academy does not believe that the institutional assessment panel, as described in the consultation document, would be sufficient. Instead, they should utilise the range of expertise in the sub-panels.

The pilot of institutional-level impact case studies should consider possible consequences on the impact case study submission behaviour within HEIs. The engineering community is concerned that tensions may arise within HEIs over decisions of whether an impact case study should be submitted as an institutional or UOA case study.

If institutional-level impact case studies are to be introduced, the Academy considers the proposal of 20% of impact case studies to be required to be institutional-level as too high, and would prefer the lower boundary of 10%. There was some support in the engineering community that if institutional-level impact case studies were to be introduced, they should be optional.

**Q40. What comments do you have on the proposed approach to creating the overall quality profile for each submission?**

The broad consensus in the engineering community is that the scores for institutional-level assessment of environment and impact should not contribute to the quality profile for each submission. The institutional-level assessment should be considered separately.

**Q41. Given the proposal that the weighting for outputs remain at 65 per cent, do you agree that the overall weighting for impact should remain at 20 per cent?**

The Academy is supportive of the overall weighting for the impact remaining at 20%, especially taking into account the removal of the impact template.

**Q42. Do you agree with the proposed split of the weightings between the institutional and submission-level elements of impact and environment?**

The Academy's preference is for the institutional-level assessment to be considered separately to the submission-level assessments.

In response to the proposed split of weightings between the institutional and submission-level of impact, the Academy believes that the weighting for institutional impact should be reduced. Consideration should be given to making the weighting of institutional-level impact proportional to the percentage of institutional-impact case studies submitted. With regard to the weightings for environment, the Academy is content with the proposal, but would not want the weighting for institutional-level environment to be further increased.