



**Report of the Research Councils UK
Efficiency and Effectiveness of Peer
Review Project**

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1. EXECUTIVE SUMMARY

1.1 *Introduction*

1. This report describes a project to analyse the full economic cost of the Research Council peer review process and the potential for improving its efficiency whilst maintaining effectiveness. The project began in February 2006 and involved all eight UK Research Councils.

2. The scope of the project comprised the full range of activities involved in preparing and reviewing proposals for Research Council funding, including, those relating to the assessment of studentship proposals and project “final reports”. The analytical stage of the project sought to identify the full economic cost of these activities, including those costs borne by the wider research community in terms of time and effort.

3. The UK research base is widely regarded as being highly productive and by many measures is second only to the US in terms of the quality of its output. The peer review system operated by the Research Councils has underpinned this success. The study took as a starting premise the continued commitment of UK government to the principles of a project-based peer review system.

4. Peer review is fundamental to the business of the UK Research Councils, all of which make extensive use of the process to inform their allocation of research funding. Given the importance of peer review to their operations, it is incumbent on the Research Councils to ensure that the process continues to be both effective and efficient. A key characteristic of the Research Council process is that it seeks to assess the *potential* of research rather than just evaluate previous research outcomes. This contributes to, for example, ensuring the agility and responsiveness of the research base but also has implications for how the process is structured.

5. A number of earlier studies such as the Advisory Board for the Research Councils’ report of 1990 (“the Boden report”) and a Royal Society report of 1995 concluded that peer review remained the most effective mechanism for taking funding decisions. However, both reports acknowledged the burden placed on peer review communities when success rates were low. This project sought to relate its work to these earlier studies.

1.2 *Methodology and Evidence*

6. The evidence collected by the project included the internal costs of peer review *within* each Council, aggregated to provide the full internal costs across all the Research Councils. The time and effort required to support Research Council peer review processes within Higher Education Institutions (HEIs) was determined by a survey, conducted by consultants DTZ Pineda.

7. Outline benchmarking studies of research funding organisations similar to the Research Councils were carried out to identify alternative approaches and to identify best practice. These studies helped the Project Board to produce a list of possible options for improving the effectiveness and efficiency of peer review. Selected options were modelled and analysed by the Project Board using data supplied by the Research Councils.

1.3 Results

8. The total cost to the UK of preparing and reviewing proposals and reports for Research Council funding is estimated, given current volumes, at £196 million per annum. Of this, the time of investigators, reviewers, and administrative staff in universities forms by far the largest part. The costs incurred *directly* by the Research Councils themselves amounted to some £9.8 million. The estimate of total cost is regarded as an upper limit. It has not, for example, been discounted to reflect that some proposals may be slightly amended resubmissions of earlier proposals or that the preparatory work in planning projects is a necessary part of any research system and not just those associated with an application for Research Council funding.

9. Of the 33,608 research grant and studentship proposals and reports peer reviewed by the Research Councils in the sample year, nearly 50% were full research proposals. The costs of producing and processing these full proposals represented 84% of the £196 million. For all types of proposal and report, the largest cost element is the effort spent on initial preparation and submission; for full research proposals this represented 74% of the cost - or 62% of the £196 million. Any options for significantly improving the efficiency of peer review will need to focus either on reducing the time taken to prepare proposals or on reducing the number of proposals.

10. The DTZ Pidea survey included an investigation of the experiences and opinions of researchers and administrators. The principle of awarding research funding on the basis of expert peer review was strongly supported by those surveyed, with 93% of university researchers agreeing that it was a worthwhile activity despite the effort involved in preparing unsuccessful proposals. A majority of both administrators and researchers rated the Research Council peer review process and the new electronic systems that support it as excellent or good.

11. In the time available it was possible to benchmark a small number of other grant-giving organisations. The benchmarking studies showed basic peer review procedures varying little between organisations. The UK compares favourably with other major countries on the overall efficiency of research funding. In particular, the UK Research Councils' administration costs, as a proportion of total budget (4%), are low when compared to most other grant giving organisations referenced by the Project Board. Many of the researchers surveyed felt that the UK peer review system compared favourably with other countries.

12. The efficiency of the peer review process itself is addressed in this report, principally in terms of the ratio of application and review work to funding. Trends over time were explored. Key findings were:

- The annual number of proposals to Research Councils has doubled since 1988/89, and increased by 20% in the last nine years.
- Average Research Council success rates fell from around 41 % in 1988/89 to around 28% in 2005/06.
- Despite the increased volumes, total Research Council administration costs as a proportion of budget fell from an average of around 4.7% between 1988/89 and 1992/93 to 4% in 2005/06 (i.e. an efficiency gain of £17.7 million per annum). Direct peer review costs are, of course, only one element of total administrative costs, and efficiencies in other areas contribute to the reduction too.
- The increased volumes mean that the total effort needed to support peer review has increased in relation to the research funded. The estimated cost of peer review-related work as a percentage of total Research Council funds distributed rose from 5.4% in 1988/89 to 5.9% in 2005/06.

1.4 Discussion

13. The survey results provide a strong endorsement of the effectiveness of Research Councils' peer review processes in allocating funds wisely and fairly, and show they enjoy the confidence of the research community. Overall the project validated the continued use of peer review as the basis for funding decisions whilst noting the potential for further improvements, for example with respect to speed of decision-making, referee selection, supporting high risk research and with feedback processes.

14. Whilst using success rates as one measure of efficiency, the Board was clear that unsuccessful proposals do not in themselves imply an inefficient system. They represent the consequence of a competitive research process and of selectivity in funding - features that contribute directly to effectiveness. Furthermore, the work involved in preparing proposals (e.g. background research, discussions and experiments) and the feedback received from peer review, help investigators both generate and improve their ideas and contribute to creating a healthy and vibrant research base.

15. But nevertheless, with an increasing ratio of application/review effort to research effort the questions that must be answered are: Within what range is the success rate acceptable? Is the current rate healthy? And what should be done if the rate continues to fall?

16. The Project Board's view is that a success rate above 20% and below 50% represents an acceptable balance between the benefits of competition and the cost/effort to support the system. The overall Research Council success rate of 28% is within this range. However, in some research areas success rates are under greater strain (around, or below, 20% in some fields). Furthermore, if trends continue, the average success rate across all Councils could fall below 25% by 2012/13. The Project Board concludes that

action should now be considered to avoid further deterioration in success rates and system efficiency.

17. The Project Board considered a wide range of options for changes to the peer review system that would change the pattern of awards, suppress the number of applications or reduce the time invested in peer review in order to increase overall efficiency. Integral to this analysis was the recognition that peer review is a complex social process with sensitive dynamics between researchers, the organisations who employ them and the Research Councils. Any changes to the system must pay particular attention to the impact they would have on these dynamics and must include consideration of the wider influences on behaviour. The risks that changes may simply transfer costs between different parts of the system (e.g. from Research Councils to institutional peer review processes) rather than reduce overall demands on the system or may unduly disadvantage different categories of research or researcher (e.g. new researchers, high risk research etc.) must be considered.

18. The Board concluded that some options either offer little scope for improving efficiency or have negative effects that outweigh any identified benefits. Such options include: charging for processing proposals; commissioning research projects; and funding people rather than projects. These were not modelled in detail.

19. One option concerns the communication of best practice and the publication of more detailed success rate data, with the aim of facilitating more active demand management *within* universities. The Board consider this to be an attractive option that could be progressed by the Research Councils without the need for significant further analysis or consultation.

20. The remaining options were analysed in greater depth and modelled to determine the theoretical impact of implementation in terms of the savings they might bring about. Savings in the report are described as “cash-equivalents”, recognising that for the most part they represent a saving in time and effort within the research base.

21. Using the results of the models, the Board was able to balance the potential savings against the likely effect of implementing each option. In this way, those options offering the greatest scope for improving the efficiency of the peer review system were identified.

22. Three of the modelled options would provide modest savings and would have limited impact on the way researchers and HEIs work. These are: i) increasing Research Council sifting/triage rates ii) tailoring peer review so that it better reflects project risk and complexity; and iii) introducing a new or modified final report process. These options are worthy of further consideration by the Research Councils. A fourth option, the use of specific disincentives for the small number of individuals who place a disproportionate burden on the system with large number of unsuccessful proposals, is also worthy of consideration.

23. The four options that offer greatest potential for savings are more complex to introduce and inherently contain greater potential risk to the overall effectiveness of the research system. These options are:

- **Consolidation** - to increase the proportion of Research Council funding allocated to larger and/or longer grants;
- **Institutional-level Quotas** - to introduce quotas either for all institutions or for those with particularly poor success rates;
- **Controlling resubmissions** – to introduce processes that limit the recycling of proposals within the system; and
- **Outlines** - to deploy an outline-bid stage for responsive-mode grant schemes.

24. Reflecting the risks associated with each of these options and recognising the essential contribution the research community itself makes in ensuring an effective and efficient peer review system, the Board considers that the Research Councils should actively consult with the community to determine if, and how, these options could be best implemented.

25. In addition, in support of the recommendations in the recent “Warry” report, the consultation should invite the research community to comment on how peer review can contribute to increasing the economic impact of Research Councils’ activities.

26. The Research Councils have already committed to working collectively in identifying and implementing best practice solutions as a result of this Project. The Board would commend such an approach where it supports the requirements and dynamics of the various research communities.

27. Finally, the Project Board’s view is that there is no single option that can be deployed to improve the efficiency of the peer review system but that a combination of approaches could deliver improved efficiency and maintain the effectiveness of the system. If carefully managed over a period of several years the Project Board believes that these improvements could be achieved in a way that would not unduly affect effectiveness nor perturb the dynamics of the research system.

2. INTRODUCTION AND SCOPE OF PROJECT

2.1 Introduction

In January 2006, the Director General of the Research Councils, Sir Keith O’Nions, asked the Research Councils to undertake a study to analyse the full economic cost of the Research Council peer review process and to identify the scope for improving its efficiency whilst maintaining effectiveness.

To take this work forward a project was established involving all eight Research Councils, Office of Science Innovation (OSI) and HMT to:

- analyse Research Council peer review processes and costs;
- analyse the costs to Higher Education Institutions (HEIs) of preparing application and reports and contributing to peer review;
- consider alternative models of peer review and post award review with a view to developing options for improving the efficiency and value-for-money of peer review.

This report presents the findings of the project for Research Council consideration. With respect to options development, the report presents the analysis and modelling that has been undertaken by the Board in terms of the possibilities that may exist for improving efficiency. It is recognised that the work contained here provides a partial picture of peer review and that the Research Councils will need to supplement this with their own detailed understandings and that of others before introducing any change. The Board does not therefore present specific recommendations for change.

2.2 Scope of project

The management of peer review is fundamental to the business of the Research Councils and the UK’s peer review system is regarded as an international benchmark of excellence. The project therefore took as its starting point the continuing commitment of Research Councils to the principles of a project-based peer review system as the primary mechanism for resource distribution.

The aim of the project was to provide a solid evidence base against which to consider where and how further efficiencies could be introduced without significant detriment to the quality of the system.

Following discussion with OSI, the scope of the project was finalised and is summarised as follows:

- a) The project would determine the cost of Research Council peer review. Activity supporting the peer review processes of other agencies, be they UK or international, was outside scope.

- b) Peer review costs incurred within the Research Councils and within both the academic and administrative parts of the research community would be included.
- c) Peer review was defined as including proposal (project) preparation, proposal submission and processing, peer review of proposals, post-project reporting and the peer review of such reports. Peer review of institute programmes was excluded from scope (except where it used the same process as HEI applications) as was programme evaluation. Steering committees, and internal peer-based structures within HEI which support Research Council programmes, were also considered out of scope.
- d) Fellowships, studentships and research grant proposals (including proposals for facility time and outline proposals) were included in the study where they involved peer review.
- e) Options for improving efficiency and effectiveness could include those involving demand management and those based on funding via formulae populated by the outcome of other peer reviews, for a fraction of the portfolio.
- f) The purpose of the project was to identify the costs of peer review and the options for change. The implementation of options and the change management that may be needed to support such implementation were out of scope.
- g) The peer review processes in a sample of other grant-giving organisations should be benchmarked as a potential source of options for change.
- h) Consideration of the level of funding for programmes (e.g. Research Council processes to determine relative funding balance between disciplines) was considered a strategy and planning process and therefore out of scope.
- i) For the analysis of costs, the project assumed that all peer review activity took place within the UK HEI environment. No attempt was made to consider the differential costs that may be incurred by utilising either non-academic peer reviewers or those based outside the UK.

3. METHODOLOGY

The project began in February 2006 with the establishment of a Project Board chaired by Mr Attila Emecz, Director of Operations, EPSRC and the appointment of a Project Manager, Mrs Deborah Miller, PPARC (see Annex 1 for Membership).

The Project was required to present an interim report by end of June 2006 and the Project Board designed its work programme accordingly. The timetable precluded undertaking extensive background research, large scale in-depth surveys or study trips. Work was focused on a small number of key existing documents, on using samples and on internet-based research supplemented by a small number of discussions with informed individuals.

The project was divided into four workstreams that were carried out more-or-less in parallel. These were a) the calculation of the “internal” Research Council costs of peer review, b) a survey of the cost of peer-review in HEIs (“external costs”), c) benchmarking external organisations and d) developing options for change.

3.1 *Internal Research Council costs*

This workstream was concerned with understanding the current Research Council peer review process and its costs. By gathering data on the full internal cost of peer review, together with the survey data on the external costs, it would be possible to model the cost of peer-reviewing an average research grant or studentship award. The results could then be extrapolated to a) model the cost of peer-reviewing a range of grant types e.g. fellowships and b) to model the broad impact on costs of options for improving peer-review efficiency.

The project based some of its work on data that had already been obtained by the Research Councils’ Research Administration (RA) Programme during a recent comprehensive analysis of the staff costs associated with grant processing. The relevant information from this analysis was updated where necessary and expanded to include non-staff related internal costs e.g. payments made to referees, travel costs etc.

Data were assembled for the cost of each stage in the peer review process for research grants, outline proposals and studentship proposals. Data were also collected on volume metrics e.g. number of proposals, number of panel meetings, percentage of usable referees reports, and breakdown by schemes and grant complexity.

3.2 *External costs*

In order to determine the full cost of peer review, costs within the HEIs must also be considered. This includes the cost of academics reviewing applications and reports as referees and panel members and the costs associated with preparing applications and reports by both academic and administrative staff. An external contract was let to DTZ Pida to undertake a survey to identify these costs.

The approach agreed was for DTZ Pieda to interview a selection of academics and administrators based at ten universities. Universities were selected to provide a reasonable mix of involvement in peer review across the eight Research Councils. The Research Council representatives on the Project Board provided DTZ with a list of academic contacts in the selected universities who had a track record as both applicants and reviewers of research proposals and with administrative contacts involved in the management of research grants. In total 93 research community interviews and 27 administrator interviews were achieved.

In undertaking the survey DTZ were asked to:

- ensure that the survey enabled the time/cost of peer review at various stages to be analysed i.e. proposal preparation, proposal postal review, proposal panel review, final report preparation, final report postal review;
- draw out any differences relating to the complexity of research proposals using the classification of: simple, conventional and complex;
- seek the views of interviewees on the efficiency and effectiveness of the Research Councils' current peer review processes and how the process might be improved;
- record the nature and extent of any demand management processes operating within a university.

These data were supplemented through, and validated by, additional data collection by Research Council representatives e.g. for studentships.

3.3 Benchmarking

The purpose of benchmarking other research funding organisations was to identify whether best practice models existed elsewhere that could be applied by the Research Councils to improve the efficiency and effectiveness of peer review. Within the available timeframe only a limited number of organisations could be benchmarked and the following were chosen: DARPA, DEFRA, DFG, NSF, Research Council of Norway and the Wellcome Trust.

Information for the benchmarking was derived from a combination of some or all of the following sources: internet web sites; UK Research Council colleagues who had been on secondment or visits; and from contacts who are employed at the organisations. Direct information was particularly difficult to obtain from DARPA and even using indirect sources, such as contacts at OSI and HM Treasury, the Project was unable to obtain a detailed picture of its operations. Information in the report concerning DARPA is therefore largely derived from web sources.

OSI had asked that the project look at the specific costs of running the peer review process within the benchmarking organisations. Obtaining comparable cost data within the timeframe was not possible; instead the gross administration costs as a proportion of budget was used as a proxy measure of efficiency.

3.4 Options for change

Drawing and expanding on previous Research Council studies, this workstream focussed on developing options to improve the efficiency of the peer review process whilst still retaining an acceptable level of quality.

The development of options was progressed through brainstorming workshops at both the individual Research Council and cross-Council level. A subset of options was then selected for more detailed development, based on criteria including cost reduction, feasibility, acceptability, suitability and consistency.

4. THE CONTEXT OF RESEARCH COUNCIL PEER REVIEW

4.1 Use of Peer Review by the UK Research Councils

In simple terms peer review involves an assessment of a research proposal or research outcomes by researchers or others who have the requisite knowledge, training and experience to be able to judge the matter under consideration. All the UK Research Councils make extensive use of peer review to inform their allocation of research funding and have confidence in the peer review system. The process used by the Research Councils involves *ex ante* assessment of research. In other words, the Research Councils are seeking to judge the potential of research before it is conducted rather than just review research outcomes. This has implications for how the process is structured and operated.

As recognised in the 2004 Science and Innovation Investment Framework, the UK research base is “one of the most productive and influential systems of publicly funded research in the world”. With respect to measures of performance such as citation rates, the UK was considered second only to the US. The existing peer review system has therefore served the UK well in supporting a strong track record of delivering excellent world-class research.

Peer review systems represent the dominant allocation mechanism employed by the world’s main funding agencies. The organisations benchmarked during the study all operate peer review systems that, in their broad construction, are similar to those used by the UK’s Research Councils. Nevertheless, having taken as its starting point the premise that peer review would continue to form the primary allocation mechanism for the Research Councils’ support of research, the Project Board constructed its work such that this premise could at least be explored.

4.2 Historical background

Peer review as a tool for decision-making in research administration has a long history and is used widely, particularly as a means of selecting the best research proposals through competition. For more than 20 years, however, science policy researchers and those bodies such as the UK’s Research Councils who rely on peer review to deliver their missions have debated the efficiency and effectiveness of the system. In 1990 the then Advisory Board for the Research Councils (ABRC) commissioned a report on Research Council peer review (the Boden report) which as part of its remit sought to identify the strengths and weaknesses of the system then in place and to make recommendations for improving it (Boden, 1990). A second study, published by the Royal Society in 1995, examined the peer review process for funding projects (Royal Society, 1995). Both of these studies were referenced in the peer review “postnote” (POST, 2002) issued by the Parliamentary Office of Science and Technology, which presents a succinct summary of the topic.

The Boden study having explored, for instance, whether quantifiable measures could be used to replace peer review, concluded that there was no practical alternative to peer review for the assessment of basic research. The Royal Society recognised that the peer review system was under pressure but concluded that peer review must continue, although within the bounds of acceptable levels of efficiency. The report considered methods for improving efficiency through moderating demand for grants, streamlining the assessment procedure or consolidating support through larger awards, but did not reach firm conclusions as to how these measures might be implemented.

The operation of peer review and resource allocation in 2006 has marked differences to that which existed at the time of the Boden and Royal Society reports – this includes, for example, the increasing use of colleges, IT systems and algorithmic allocation methods that leverage the results of peer review. Before exploring the issue of efficiency and effectiveness of the current peer review system, it is worth reviewing the ideal characteristics of an efficient and effective peer review process, the strengths of the current system and those issues noted in earlier reports that remain valid concerns about the system today.

4.3 *Characteristics of an efficient and effective peer review system*

Drawing on the extensive experiences of the Research Councils in operating peer review, the Board identified the characteristics outlined below as being essential to the running of an effective and efficient peer review process. They are not presented in any form of priority order and it is recognised that, for at least some of them, balances and trade-offs are necessary.

The Board discussed whether “confidence of the community” should be noted as a specific characteristic here since, in the absence of such confidence, peer review would certainly not be effective. However, the concept itself is somewhat abstract and rather than include it as a separate point, the Board’s approach was to identify the more specific characteristics that enabled confidence to be built and maintained.

1. Quality of Funding Decisions

The peer review process must enable the best research projects to be funded in the context of the purposes of the programme or scheme to which they relate, and in the context of other UK and international research, while remaining free from any other biases (regional, historic, personality).

Those who are contributing to decisions must have the expertise and specialist knowledge relevant to the task and access to any relevant contextual information.

Decisions should involve a visible element of competition and tensioning (between proposals and between research areas) both to stimulate creative endeavour and to ensure that the taxpayer’s funds are deployed well.

An effective process will allow bold and decisive action and militate against any inherent conservatism that may, for example, inhibit work that is high-risk or multi-disciplinary.

2. Credibility and transparency

The process by which peer review is undertaken and the criteria used in that peer review should be clear and should be publicly available. Within the agreed process, all eligible proposals should be treated in the same manner and any conflicts-of-interest should be openly declared and managed.

3. Accountability

It should be possible for the Research Councils to: i) demonstrate how a particular decision was reached and who was involved and ii) track the use of taxpayer's funds.

4. Flexibility, agility, responsiveness and empowerment

By its very nature, research progress and outcomes cannot be accurately predicted. Balanced with other criteria, the system should be designed with as few constraints as possible in order to provide the freedom necessary for researchers to bring their ideas to fruition. Equally, the system should maximise the time the best researchers have for actually undertaking research.

An effective peer review system will need to have the capacity or freedom to allow both researchers **and** Research Councils the agility to respond to emerging research directions and areas. Furthermore, the peer review process needs to be designed to provide timely decisions given that timelessness is itself an important criterion in determining whether an idea is worthy of funding.

5. Anticipating and minimising unproductive game playing

The stakeholders in peer review will inevitably seek to adopt behaviours that will ensure the best outcomes for themselves and this may lead to unintended consequences – either poorer quality decisions, or greater administrative costs. In designing an efficient and effective system, due consideration should be given to the wider drivers of behaviour.

6. Cost

The cost of peer review when balanced with the other criteria will determine the overall value-for-money of the system.

4.4 Strengths of the peer review system

Having assessed the general characteristics of an efficient and effective system, the Board turned specifically to peer review as operated by the UK Research Councils. Without pre-judging the current project, Research Councils' assumptions about the strengths of the UK system are as follows:

Confidence of the Community

Peer review is a social process which, in order to be legitimate, requires acceptance by the communities who use it and are affected by it. The system cannot work without their engagement and support. Presenting work for review by external colleagues is an accepted part of the research endeavour and participating as reviewers is considered to be an important responsibility for those who are part of that process.

Both the Boden and Royal Society reports noted strong support for the peer review system by the research community. This is supported by the formal surveys undertaken by the Research Councils and by strong informal feedback obtained over the years from applicants, review committee members and other stakeholders. Arguably the most important positive characteristic of the current system is that it retains the broad support of the research community and their willingness to engage with it.

Improve ideas

A second strength attributed to the existing peer review system is that it improves the quality of the proposals that are submitted. As part of their assessment, reviewers may bring to an applicant's attention relevant work that is going on elsewhere and/or provide ideas on how the research approach or methodology could be improved. In addition, by participating in the assessment of proposals, peer reviewers themselves will hone their skills in developing robust research ideas.

The Research Councils have not previously undertaken any specific research to explore such effects, but informal feedback suggests that such improvements do occur in practice and are valued by the community.

Competitive System

The peer review system is by its nature competitive and such competition, although perhaps costly to support, helps ensure that the quality of research remains high. This effect is likely to operate on at least two levels. Firstly, those who submit research proposals are motivated to prepare novel and well thought through proposals. Furthermore, those holding awards will be motivated to ensure their work remains at the leading edge. Secondly, and more importantly, the strength of competition and the "natural selection" that occurs helps ensure the excellence of the projects that are selected for funding.

Minimises perverse incentives

There is a danger in any funding process that individuals or institutions modify their behaviours in a way that results in unanticipated and undesirable outcomes occurring. The current project-based peer review system provides a number of effective safeguards. For example, although an applicant will know the criteria by which their proposal will be assessed, they do not know the identity of the referees who will be assessing it; furthermore multiple assessments are made.

Accountability

The project-based system enables clear accountability in the use of taxpayer's funds to be demonstrated and makes clear the responsibilities of all those involved. It also enables peers to assess whether the resources requested appear to be well matched to the programme of work that is being proposed and the objectives that might be achieved.

4.5 Concerns about current peer review processes

Both the Boden and Royal Society reports noted a number of potential issues of concern about the peer review system such as the potential for leakage of ideas and/or a lack of impartiality by reviewers. These are issues that the Research Councils have addressed through their processes and in guidelines for reviewers and are probably not now subject to the same level of concern. For example, in general terms peer reviewers are provided with a higher level of training in Research Council policy and procedures than was the case in the early nineties. In addition, and where appropriate, Councils have increased the proportion of international reviewers they use in order to enhance the impartiality of reviews. Councils also maintain a high level of transparency in respect of their peer review procedure, for instance by publishing the names of panel members and providing feedback to applicants.

Other issues raised by the Royal Society report which remain concerns and are discussed in more detail below, relate to the potential conservatism (risk-aversion) of peer review and the burden that the operation of a peer review system places on the academic community.

The Board also note the recent publication of the report 'Increasing the Economic Impact of the Research Councils' (published by the DTI, 2006). This report recognises the role peer review can play in improving economic impact and recommends, for example, that reviewers are given guidelines concerning how they should assess the economic impact of proposals. With respect to the work of this project, the Board suggest a way forward in Chapter 8.

Conservatism

The Royal Society report noted that the peer review system may discourage individuals from putting forward their more radical ideas where such ideas challenge received wisdom. Furthermore, individuals with a track record in a specific research area may be discouraged from moving into new fields.

The Boden report drew attention to three areas where the peer review system may be less effective i.e. in the assessment of unorthodox ideas, in assessing interdisciplinary research proposals, and in assessment of proposals submitted by early research career staff (then termed “young” researchers) who may be disadvantaged by their lack of track record.

The Research Councils also recognised such problems and, within their portfolios, have introduced schemes and mechanisms specifically to help stimulate high-risk research and to encourage researcher movement between disciplines. However, the recently published consultation document “Science and Innovation Investment Framework: Next Steps” (Treasury, 2006) noted that the UK research base was still open to accusations of being risk averse. This issue is considered further in Chapter 8.

Burden of peer review

Exploring the time and effort required from those engaged with peer review is one of the primary objectives of this project and hence will not be explored in depth in this section. However, it is worth reflecting that concern in this area is long standing and formed part of the work of both the Boden and Royal Society working groups.

The Boden report concluded that at the time the peer review system was “exhibiting signs of strain” as a result of increased competition for resources driven in part by the increase in number of applications. The data available to the Boden team showed an increase in applications from 5,536 in 1980/81 to 6,402 in 1988/89. Since then applications have continued to rise with approximately 14,800 received in 2005/06¹ (with AHRC excluded to ensure like-for-like comparisons). The 1980/81 SERC annual report indicated a provisional success rate by number of 55%. By 1988/89 the figure had fallen to 41%. The current average success rate across the Councils just over 28% but there are areas of funding where success rates are both lower (20%) and higher (40%+).

Of course, these increases in numbers have occurred over a time in which the higher education sector has itself been expanding and the figures must be interpreted within this context. This is explored in later sections of the report.

¹ Research Councils provided data for either FY 2004/05, FY 2005/06 or calendar year 2005 whichever provided the most representative sample but the estimate for 2005/06 is considered robust for this analysis.

4.6 Dynamics of the UK Research Base

The system that existed at the time of the Royal Society report was recognised as being under pressure and it was accepted that it was “in everyone’s interest to improve its efficiency”. The current Project reflects this emphasis within the Royal Society report recommendations by concentrating on identifying ways in which the efficiency of peer review might be improved. However, improvements in the efficiency and effectiveness of the Research Council peer review process can only be brought about through collaboration with the research community and therefore it is essential to understand what drives the behaviour of the research community in applying for grants.

There is competition between HEIs for staff, students and research income. In such an environment, the process of Research Council funding can be considered to be a “zero sum game” with any resources received by one university then not being available to another. As an autonomous body, a university is likely to adopt behaviours that maximise the resources it can secure for itself. To maximise research funding staff are encouraged to apply for grants with their contribution often being measured in terms of the number of grant applications they submit. There are notable exceptions to this behaviour in departments that operate internal quality control of grant applications and reward staff on the basis of the quality of proposals and awards won rather than applications submitted. However, there is little evidence that such practice is widespread (see DTZ Piedad report).

Securing Research Council funding not only has implications for immediate research objectives but also feeds into decisions by the Higher Education Funding Councils on university base funding and into promotion decisions on individual researchers. There is a strong link therefore between receiving Research Council funding and both university-level success and individual career prospects. In such a context, the preferred solution of the Royal Society for managing proposal demand, i.e. self-regulation by researchers and universities, may be particularly difficult to achieve. This was recently emphasised by Eric Thomas (Vice Chancellor, Bristol University) who, when commenting on proposals relating to RAE reform, stated that: “The incentives are to go for as much grant income as possible and probably to go for as much research council income as possible” (Thomas, 2006).

It must be assumed that decisions to apply for funding are made rationally and that universities and individual researchers also consider the opportunity costs of applying for grants. When the costs of applying exceed the benefits of so doing, the assumption must be that application numbers will fall. Application numbers have continued to rise since the Boden report which suggests that researchers still feel it worthwhile investing time in writing grant applications, despite the falling success rates in many Research Council schemes. In addition, it can be assumed that sufficient peer reviewers willing to undertake the assessment of these increased numbers still currently exist. However, one assumption in the above analysis is that information concerning the full costs and benefits of applying is available to all relevant stakeholders and this may not be the case. Given that the costs of peer review (in terms of time and effort) fall heavily on researchers, there is likely to be a high level of general understanding within that group but this is less likely to be the

case within, for example, university management. Indeed, even where such costs are fully understood, the pressures to apply will remain strong. However, it should not be forgotten that one of the principal reasons for most investigators applying is the desire to pursue their research ideas.

As will be discussed later, the government has specifically provided above inflation increases in funding to the Research Councils in order to support research as part of its commitment to a knowledge economy. This is likely to have helped maintain success rates; indeed, a desire to keep success rates at a reasonable level may in itself have served to stimulate demand.

In noting the points above, it should, however, be recognised that the research community is not homogeneous and there are many discipline or sub-discipline specific effects. In particular, some research communities are highly dependent on the Research Councils for funding, others have access to a range of funding sources. Many medical research groups are able to draw upon extensive charitable funding, for example and in the arts and humanities, the Funding Councils represent the major source of research support. Many engineering groups draw on industry for support and may access this source in preference to Research Council funding.

The dynamics *within* universities are also important in setting the framework for changes to peer review. Most, if not all, universities operate under a principle of “academic freedom” allowing individual staff significant flexibility in setting and delivering their own research objectives and work programmes. For many researchers, having a restriction imposed on their freedom to submit grant applications could be viewed as career limiting. Furthermore, a Head of Department may be unwilling to place restrictions on his or her colleagues’ research activities, especially where the post of Head of Department is regularly rotated such that the roles could be reversed.

The prevalence of such cultural factors within the university base has major implications for any initiative by the Research Councils to seek demand management at, for example, an institution or department level. Any such initiative could not be achieved without some change to the social dynamics that exists within universities and is likely to be resisted in some quarters even with careful change management in place. In its report, the Royal Society drew explicit attention to the fact that it may be undesirable for Research Council action to shift power from an individual researcher to the department head.

Finally, the relationship between individual researchers and the Research Councils in peer review should be specifically noted. Researchers willingly participate in the process and do so for little or no financial return because they believe this to be a necessary and worthy contribution to the research system. One of the *quid pro quos* of this relationship is that the Research Councils allow such researchers to submit research grants. Measures that directly or indirectly restrict an individual’s ability to apply may result in a reduced willingness to participate in peer review. If such a feeling were to become pervasive, the risk would be that the whole peer review system could be undermined.

5. OVERVIEW OF THE CURRENT RESEARCH COUNCIL PEER REVIEW SYSTEM

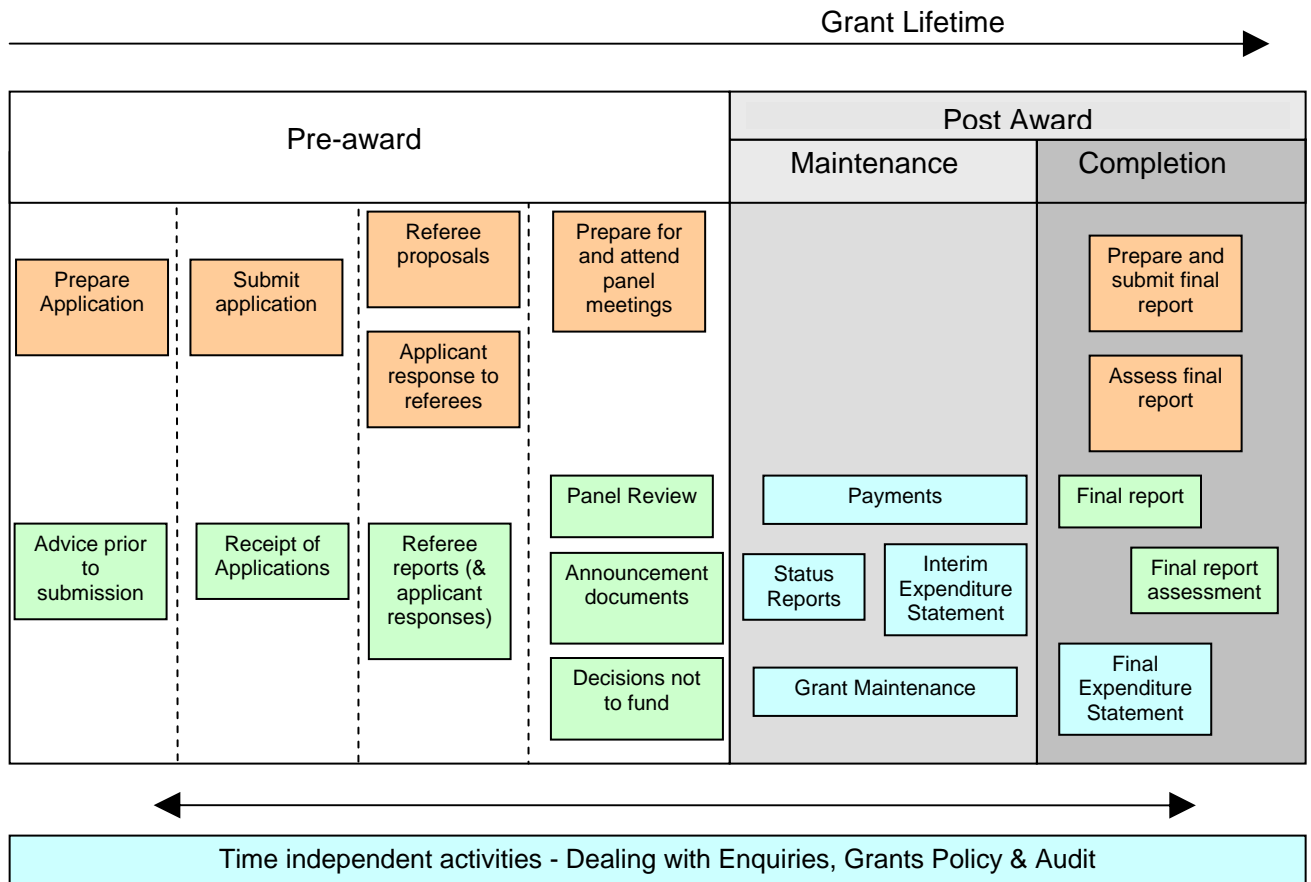
5.1 *Existing Research Grant Peer Review Processes*

Whilst all Research Councils have very similar approaches to the delivery of peer review, the tasks, sequence of tasks and management of this process varies between Councils and streamlined or enhanced procedures may be operated for certain types of activity. This chapter is not intended to document these variances but rather provides a description of the generic peer review process used by the Research Councils. In overview the process involves the following steps:

- Provide advice to applicants prior to submission.
- Receive an application via an electronic submission system, acknowledge the application, and then undertake a fault check to ensure that all documents and data are present.
- Check applications to ensure that they are eligible and within remit before they are allocated to two or more referees for assessment. The applicant is able to nominate referees on the application form and independent referees are also selected either by peer review Panel Members or by Research Council staff. The referee typically receives a copy of the application form and associated supporting documentation, some guidance notes on the information required and a pro-forma to complete. The information required comprises free text comments on various aspects of an application together with grades for some Councils.
- The referee replies within three to six weeks, following which the applicant is typically given an opportunity to respond to the referees' reports. Some Councils will carry out a sift at this stage, other Councils take all applications to Committee or Panel Meetings. In the case of larger grants some Research Councils arrange for a panel of experts to visit the applicants.
- A Panel/Committee meeting is held and applications are generally introduced by one or two assessors who recommend a score or ranking. The Panel/Committee then agrees a final score/ranking to obtain a priority list for all applications.
- Following the decision meeting, the applicant receives either a rejection letter or an award letter.
- At the end of the grant lifetime, final reports are obtained and may be assessed in a similar fashion to the refereeing of initial applications. Assessors for final reports may be external referees, peer review panel members or internal Council staff. Most Research Councils try and use an assessor or referee that was involved in the pre-award phase. Most Research Councils will not allow applicants to apply for new grants if they have any final reports outstanding.

High Level Grants Processing Life-cycle

The diagram below illustrates the key elements of the grants processing lifecycle that is common to all Research Councils. Internal peer review activities are shown in green and internal non-peer review activities are shown in blue. External activities are shown in orange. (Source: RCUK, JGPF Report V2.0). Within the context of the Project, the “pre-award” and the “completion” aspects are included.



5.2 Existing Studentship Processes

There are a range of different methods used to award studentships, using institutional and/or departmental quotas, awarding direct to an institution, company or student, and also awards based upon specific projects or courses. In general terms the process is as follows:

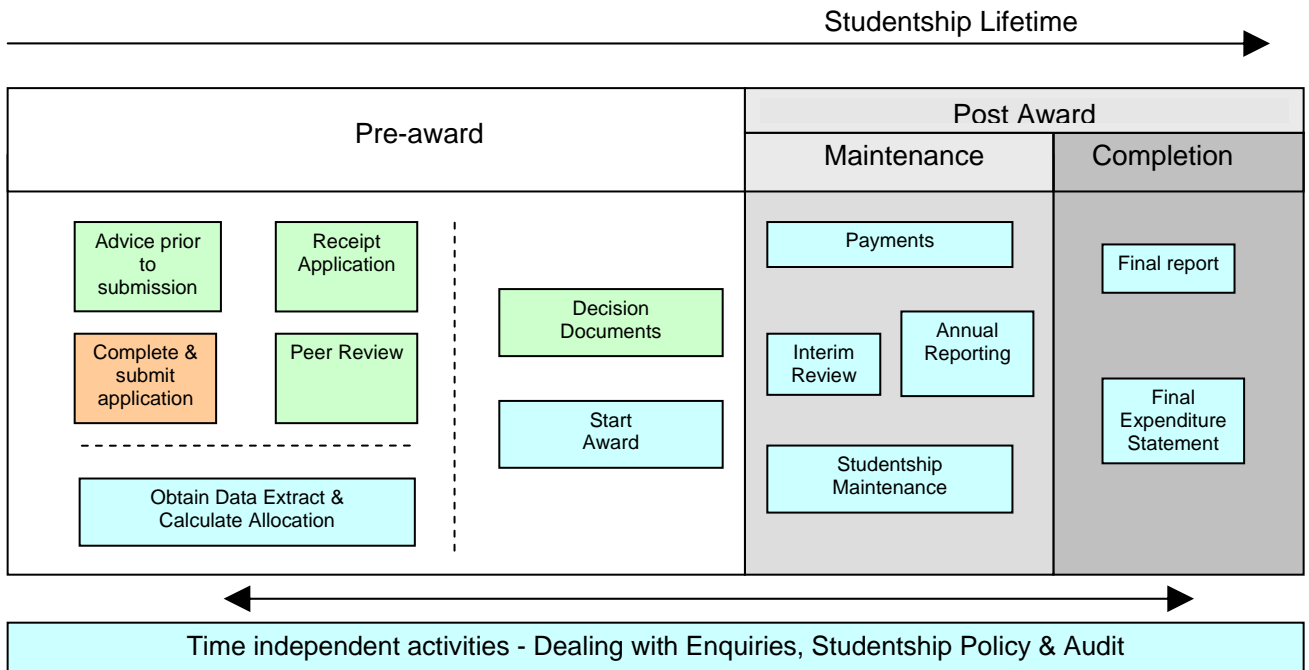
- Direct advice to applicant/institution/department/company prior to submissions.
- Application forms are downloaded from the Council website, completed and submitted via email or post.
- Applications are acknowledged and checked to ensure that the application has been completed correctly. If any supporting documents are not received by the due date

the student/proposal may not be considered. An eligibility check is undertaken, where appropriate.

- They are then assessed by Panel Members and the Panel agree on final rankings; similar to the Panel review process for grants.
- Following the decision stage, the applicant will receive a rejection or award letter. The award letter dictates various terms and conditions which the applicant is expected to operate within. Often the award is conditional upon deliverables such as degree results, deadlines to complete Masters courses etc. Many Councils request a final report and/or final expenditure statement.

High Level Studentship Processing Life-cycle

The diagram below illustrates the key elements of the studentship processing lifecycle. Not all of the key elements are applicable to all Councils. Internal peer review activities are shown in green, internal non-peer review activities are shown in blue. External activities are shown in orange. (Source: RCUK, JGPF Report V2.0). Within the context of the Project, the “pre-award” and the “completion” aspects are included.



5.3 Eligibility of Organisations and Individuals to Apply for Research Grants

As a general statement, all UK universities and similar research organisations may apply for research grants to the Research Councils. Certain schemes or modes of funding are also open to other research organisations with eligibility being defined within the context of the scheme.

Whilst specific eligibility requirements may be operated for different funding schemes, Principal Investigators are normally expected to be employed by an eligible organisation for at least the full duration of the proposed award and to be resident in the UK, excluding any periods engaged on overseas fieldwork.

6. OVERVIEW OF BENCHMARKING

Six funding agencies were chosen for the benchmarking studies:

- A UK government department with a substantial research-funding activity – the Department for Environment, Food and Rural Affairs (DEFRA)
- A major UK research-funding charity – the Wellcome Trust
- A major European funding agency – The Deutsche Forschungsgemeinschaft (DFG), the German Research Foundation
- A major US funding agency – the National Science Foundation (NSF)
- A smaller European funding agency, and one that was formed from the merger of previously separate agencies – the Research Council of Norway (RCN)
- A funding agency known to operate in a significantly different way to the UK, and other, Research Councils – the US Defense Advanced Research Projects Agency (DARPA)

In general, the benchmarking studies have revealed no new potentially cost-saving practices that have otherwise escaped consideration. This is perhaps not surprising since the considerable networking and information exchange that routinely takes place between the major funding agencies, including secondment of staff between the UK Research Councils and other funders, ensures a higher level of awareness of the processes in operation.

In each of the organisations considered, the essential processes are very much the same as in the UK Research Councils: grant proposals are submitted (increasingly by electronic means), the proposals are assessed (by some combination of external referees, peer-review panels and expert programme managers) and, for those that are successful, final (and sometimes annual) reports are provided.

The differences in detail that have potential for increasing efficiency are explored below. Whether they can increase efficiency needs to be explored in the UK context since it is intrinsically difficult to examine whether the peer review apparatus of other organisations is more or less efficient than that of the UK Research Councils. Even such simple a measure as the operational cost of peer-review as a proportion of programme budgets is an intractable statistic given the different ways in which costs are attributed in different organisations. Perhaps the best approximation that can be obtained is the percentage of a funding agency's overall budget spent on administration. This is shown, for a range of organisations (not just those in the benchmarking study) in Fig. 1.

By this measure, the UK Research Councils compare well, but this too should be treated with caution because different organisations calculate administration costs in different ways, and the proportion of these costs accounted for by the operation of peer review will vary between organisations, depending on their particular missions and business models. A further difficulty with such measures is that they say nothing about *effectiveness*. If quick decision-making and risky roads to innovation are the priority, then there is less to be gained from investing heavily in the detailed scrutiny of research proposals provided by complex peer-review processes. But you may have to be prepared to accept a higher project failure rate. For most funding agencies, including the UK Research Councils, the premium is on maximising scientific return on the investments made. In measures of this, the UK tends to compare favourably with other major countries (e.g. May, 1997), suggesting that, in terms of the overall efficiency of research funding, the UK starts from a strong position.

Administration as percentage of total budget

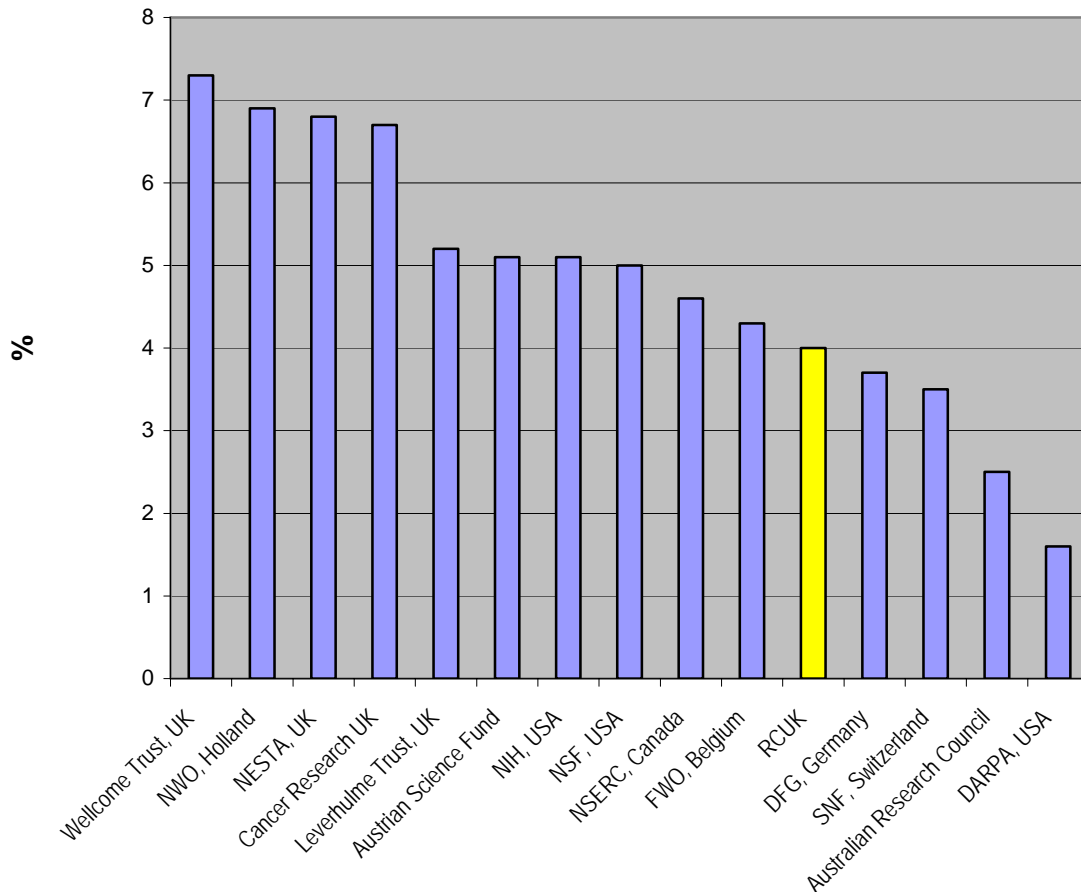


Fig. 1 percentage overall budget spent on administration

The possible ideas for change that emerge from the benchmarking fall into two broad categories: practices with potential for reducing the cost of preparing proposals; and those with potential for reducing the cost of the peer review process itself.

6.1 Practices offering scope for reducing the cost of preparing proposals

Reduced length of proposal

The NSF accomplishment-based renewals system reduces the effort required in preparing proposals by placing more emphasis on the assessment of past research. Instead of the normal project description, proposers submit copies of up to six reprints of publications from the previous five years. This switches the emphasis from assessing proposals to assessing proposers. Since the effort involved in writing proposals is the single biggest external cost in the peer review process, any initiative to reduce this cost needs to be considered. However, this system was applied to less than 0.2% of NSF proposals in 2004 and in the assessment of its normal proposals, much less emphasis seems to be put on past track record. Furthermore, the NSF accomplishment-based renewals process still requires submission of a brief (up to four pages) description of future plans, so, even in this model, some of the existing costs of proposal-preparation would remain.

Increased use of outline proposals

Outline proposals are used within the UK Research Councils for some directed programmes, where they are used primarily to evaluate the likely fit of the proposed research to the programme's specific objectives. There is no tradition of outline proposals in responsive mode. The international benchmarking provides only limited support for extending the use of outline proposals. They are used for some responsive mode programmes in the Wellcome Trust, but in this case mainly to assess eligibility for the particular type of funding on offer (five-year programme grants and fellowships). Within DEFRA and DARPA they are used routinely, but for directed programmes. The NSF makes only limited use of outlines (2,310 received in 2004, compared with over 42,000 full proposals).

Single annual deadline for proposals

The RCN limits opportunities for proposals by having a single annual submission deadline. There is no evidence that this acts as a restraint on demand, however. Indeed, the RCN's success rate is particularly low (11%) and it is possible that reducing the number of opportunities to apply increases the incentive to apply to each around. Nevertheless, opportunities for resubmissions are reduced and when PPARC moved recently from two rounds a year to one (in astronomy) the initial result was indeed a reduction in the annual number of proposals (by ~20%²).

² in the final two years (2001 and 2002) in which two grant rounds were operated the total number of standard (non-rolling) proposals received was 298; in the most recent two years of operating a single grant round (2004 & 2005), a total of 231 standard proposals were received. In 2003 there were only 68 proposals, but this particularly low number may have been a transitional feature.

Research grants consolidation

The benchmarking studies reveal little evidence of a systematic approach to consolidating research grant support in other funding agencies, but the Wellcome Trust does provide programme grants for longer term (five years) support. The National Science Foundation, which also provides some longer-term funding, notes the importance of large awards and stresses that such awards allow the engagement of more students and allow researchers to spend a greater proportion of their time on actual research rather than on writing and reviewing proposals.

Perhaps the most developed approach seen is that of the DFG, which provides some long-term (typically, up to 12 years) consolidated support for interdisciplinary research centres. These are subjected to rigorous peer-review, with a visiting panel making recommendations to a specialist grants committee.

6.2 Practices offering scope for reducing the cost of peer-review assessment

Reduced use of referees

The DFG and, in its responsive mode schemes, the RCN, approach just two referees (although others will be approached if the first two disagree) compared with an average of over four within the UK. However, the DFG compensates with a two-stage panel process and the RCN pays its referees, which perhaps helps ensure a good response rate.

In some of its other schemes, the RCN dispenses with referees altogether, relying on panel assessment only. While this may be easier to achieve in more closely-defined, targeted research areas, RCN is currently considering whether this approach could be extended to the responsive mode. It is looking at the cost implications of this move which would save on payments to individual referees but may require increasing payments to panel members, in recognition of the extra workload that would be placed on them. There is also concern about how interdisciplinary proposals would fare (one option would be an interdisciplinary panel comprising generalists).

Conversely, while the RCN perceives interdisciplinarity to be a potential obstacle to panel-only review, the NSF, which increasingly uses panel-only review, believes that panels can often deal more effectively with multidisciplinary or interdisciplinary proposals. In addition, the NSF considers panel-based review to be more efficient since it saves on administration costs and – of particular import in a time of increasing proposal numbers – relieves pressure on referees. Accordingly, in 2004, the NSF decided that all programme areas would eventually operate in this fashion (K. Mow, PhD thesis, in preparation) and, in the same year, panel-only review became the predominant mode of peer review within the organisation (see below). The NSF's greater use of expert program managers, with more responsibility for deciding outcomes, may help instil greater confidence in the one step process.

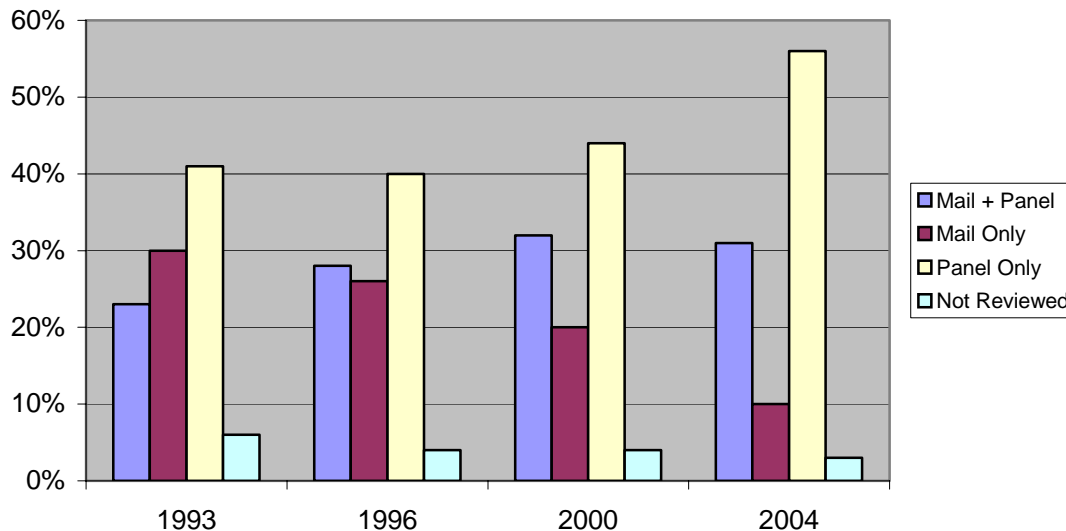


Fig. 2 Changing balance of assessment method, National Science Foundation

In Australia, the National Health and Medical Research Council has also recently (2006) announced plans to move to panel-only review. Its aim is to shorten grant-processing timescales and, again, to reduce the burden on referees, although this reduction may to some extent be offset by its plan to compensate for the loss of specialist refereeing by increasing the size and number of peer-review panels. In the UK, DEFRA uses panel-only review in programmes that are focused enough for the panel to possess sufficient expertise.

An alternative way of reducing the amount of time spent by UK-based researchers refereeing grant proposals would be to seek more referees' reports from overseas-based experts: the Wellcome Trust obtains around two thirds of its reports from outside the UK. However, whilst overseas peer review can provide an important element of international benchmarking and crucial peer review expertise, experience within the Research Councils has shown that unfamiliarity with the UK system, and the greater difficulty of guiding or training overseas-based referees, can often reduce the reliability and comparability of their reports. Furthermore, and with respect to just the financial dimension, shifting costs on to other countries does not seem to be a very internationally-enlightened way of operating. It could even result in more proposals from overseas being sent to UK-based researchers to referee.

Elimination of feedback prior to panel meeting

The UK Research Council practice of feeding back referees' reports to applicants in advance of panel meetings is shared only by the Wellcome Trust, and then only for their longer-term programme grants and senior fellowship renewals, and by some DEFRA programmes. However, while eliminating this step could reduce internal costs, it is not an obvious priority for saving on external costs – in this case, the time applicants spend

responding to them – because it has proved very popular with applicants for whom it provides an opportunity to address any questions or correct any misconceptions. The UK councils believe this step adds significantly to the quality and transparency of the peer review process. In Australia, legislation introduced to ensure fairness and transparency in decision-making *requires* applicants to be given the opportunity to respond to refereeing assessments (K. Mow, PhD thesis, in preparation).

Elimination of peer review for some types of proposal

The DARPA model removes some elements of peer review altogether and replaces it with in-house assessments made by expert programme managers, recruited from research organisations or industry for periods of 4-6 years. It is a system designed to promote fast decision-making and to encourage risk and innovation. To help manage these greater risks, there is much more emphasis, compared with the UK, on monitoring the performance of research projects (including a requirement for annual reporting) and of terminating them if progress is not encouraging.

This more dynamic, more risky approach is geared to the Agency's particular focus on sponsoring innovative defence-related applications. Its specific niche lies in exploiting the military potential of the advances in basic science primarily funded by other agencies. Unlike the UK Research Councils, it funds little basic research itself and has no responsibility for maintaining or building the capacity of the national research base. As a consequence, it is able to tolerate a much higher project failure rate and so, although its streamlined decision-making system seems to result in low administration costs (Fig 1), the model is unlikely to be reproducible in a UK Research Council context and may equally not compare so favourably in terms of research outputs/£. Indeed, assessments of the DARPA Program conducted as part of its own governance arrangements have commented on the limited peer review. The following comment provides an example: “A large part of the [applied research] program is executed either without the benefit of military or scientific expertise in choosing the funded work or without allowing the applications process to be open to all capable research.” In this respect the DARPA model does not appear to fit well against the characteristics of an efficient and effective peer review system identified by the Board as appropriate for the Research Councils.

While the DARPA approach of an entirely internal assessment process, reflecting the Agency's specific mission, may not be appropriate in the quite different context of the UK Research Councils, the NSF approach of eliminating peer review for certain types of grant could be explored. However, these grants – small grants for exploratory research – comprise just 3% of NSF awards in 2004, and if replicated at this level in the UK, the scheme would not offer much potential for cost reduction.

Elimination of the peer review of final reports

While all the funding agencies we looked at require submission of final reports, only DEFRA subject them to peer review. In the case of the others, final reports are instead reviewed internally by programme managers and in the case of the NSF, form an input to

3-5 yearly programmatic reviews carried out by external committees. Given that, within those UK councils that do peer review final reports, alternative approaches are being explored, the benchmarking exercise supports the case for discontinuing the practice. However, if final reports were still to be required, it would be important to ensure that effective use was made of them, perhaps as input to broader programme-level evaluations.

Increased use of technology

The NSF makes increasing use of virtual panels and videoconferencing. While there may be greater incentives in this direction in a country the size of the USA, the increased use of technology to save on travelling time and costs should clearly be considered where practicable.

7. RESULTS OF THE INTERNAL & EXTERNAL DATA GATHERING

7.1 Introduction

In this section the results of the Research Council analysis of internal and external costs are presented. Information concerning the internal costs of operating peer review was provided by the Research Councils based on the actual costs incurred in running peer review. External costs have been extrapolated from a survey undertaken on behalf of the Research Councils by DTZ Pida. As well as collecting information on costs the DTZ Pida study also analysed the perceptions of peer review within the community. A summary of the results of their findings is also presented here. The full report can be found on the RCUK web site (<http://www.rcuk.ac.uk/>)

All costs presented in the report are based on 2005/06 prices unless otherwise stated.

7.2 Activity Levels

The following table provides an indication of the aggregate activity levels reported by the Research Councils relating to peer review. These activity levels provide the context for the costs described later.

	Full Research Proposals	Final Reports	Outlines	Facility Access Proposals & Reports	Studentship Proposals ¹
Number received	16764	3721	1214	2473	9436
Referees' reports requested	69027	4618	0	753	2864
Number of full time equivalent Committee/panel meetings held ²	384	18	27	42	31
Number of meeting days	477	23	27	44	37

¹ 6,000 of the studentships relate to the AHRC's postgraduate competition which is currently being reviewed. Referee reports do not include the reports (references) that are submitted alongside AHRC studentship proposals.

² Committee/panel meetings may often be convened for more than one purpose (e.g. prioritise proposals and assess final reports). Where this occurs, the time taken has been allocated pro rata to the different activities.

The figures have been based on data submitted by Research Councils for a typical 12 month period. Some Research Councils provided data for a calendar year and others for a financial year but such differences do not alter the overall picture. It should also be stressed that processing times are such that the various activities presented cannot be

assumed to directly relate to each other e.g. a proposal received in one year may be refereed and assessed at a panel in a subsequent year. The activity levels are simply those that were recorded in the year selected. Panels often undertake more than one task (e.g. assess full research proposals and reports), where this occurred time has been apportioned between the activities based on Research Council estimates of actual time taken for the activity.

Not all referees will provide usable responses to requests. Data provided would suggest an average response rate within the range 65% - 75% although there is variation between Research Councils.

7.3 Internal Research Council Costs of Peer Review

The internal Research Council costs of peer review are indicated in table below. The figures represent the aggregated total for all the Research Councils.

	Proposals	Final Reports	Outlines	Facility Access Proposals & Reports	Studentship Proposals
Annual Staff Costs (£k)	4848	469	64	133	676
Additional Cash Costs (£k)	2979	283	30	110	169
Total Research Council Costs (£k)	7826	751	94	242	845
Numbers received	16764	3721	1214	2473	9436
Average internal Research Councils' processing cost per proposal or report (£)	467	202	78	98	90

In undertaking this project only those activities that are subject to peer review have been included. For example, for allocating at least some of their studentship portfolio, a number of Research Councils now operate an algorithm-based funding method with awards made through a Doctoral Training Account (DTA). DTAs do not require the submission of a proposal and nor are they subject to peer review. The cost of operating DTA-type schemes is therefore not included within the above data set.

The data have also been adjusted to ensure that they are representative of a typical year. For example, some Research Councils do not operate peer review of studentship activities on a yearly basis but rather undertake reviews every, say, 4 years. Where such approaches are employed, the data have been annualised.

Staff costs have been calculated incorporating direct costs, national insurance and superannuation costs and staff overhead costs. The overhead figure excludes some cost categories such as depreciation. When coupled with other additional direct costs this enables a full economic cost to the Research Council to be estimated.

The “additional cash costs” line indicated in the table includes any payments made to referees and to peer reviewers for their time attending panel meeting as well as any associated travel and subsistence costs. The costs of establishing and maintaining peer review Colleges have not been included in the above figures.

The studentship figures combine proposal processing and report processing (where it occurs). The Project Board agreed that resource estimates for studentship report processing were not material within the context of the report and need not be subject to separate analysis. However, to ensure that the full economic cost could be disclosed, the Board agreed that it was important for these to be captured.

The operation of a separate facility-access application process is restricted to PPARC and CCLRC.

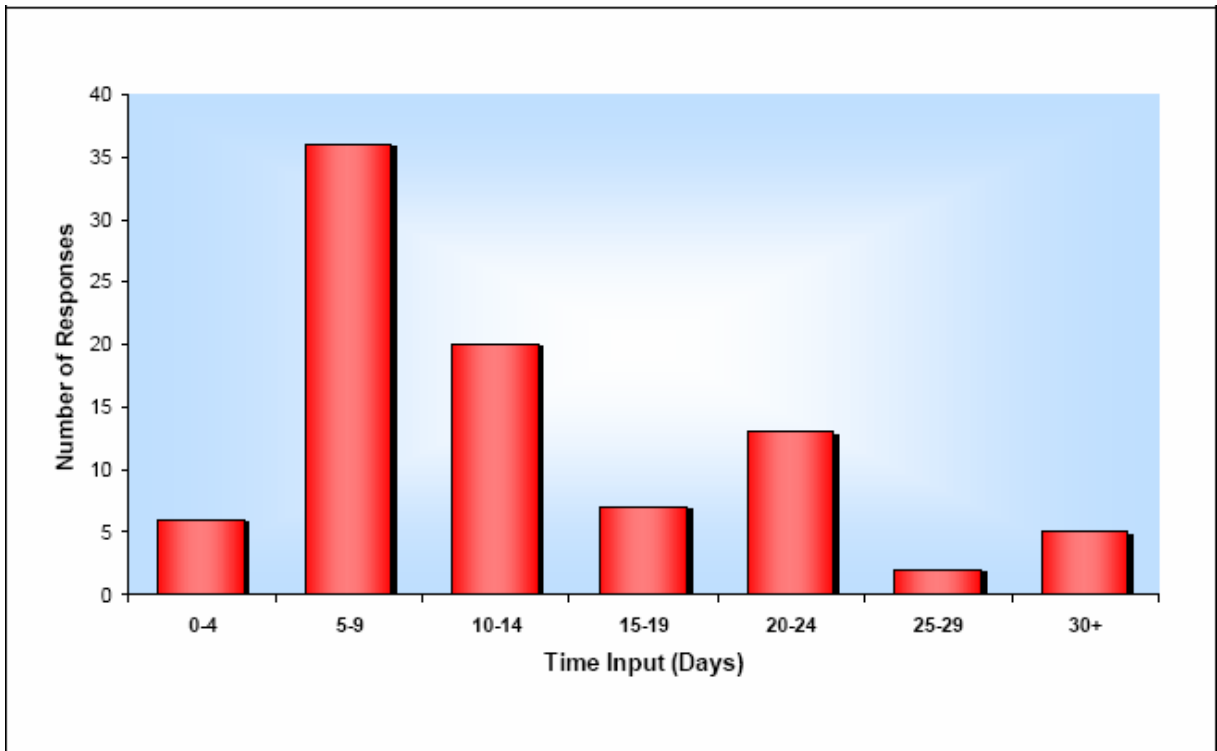
7.4 Findings of the Survey of Higher Education Institution (HEI) Peer Review Costs

The focus of the HEI survey was to identify the cost associated with supporting peer review in the wider research community. The consultants (DTZ Pidea) undertaking the survey were specifically asked to identify the time (in terms of effort) needed to undertake various peer review activities rather than the cost. Research Councils would convert the time to cost using data that had been submitted by universities on applications under the Full Economic Costing regime.

The consultants reported separately on effort associated with researchers and administrators in the HEI community. The consultants were also asked to report on the perceptions of peer review in the community.

Survey Findings – Time and effort associated with peer review activities

The results of the survey are outlined in the tables and narrative below. It must be stressed that the simple averages shown are likely to mask a wide variety of differences between research communities and with individuals themselves. This is exemplified by the wide variation in time taken to prepare a conventional proposal, as illustrated in the graph overleaf.



DTZ report particular disparity in the time taken to write complex grants and outlines. The table below illustrates the issue with respect to outline proposals.

Time input	Number of responses
1-2 Days	23
3-5 days	14
5-9 days	3
10+ days	5

Based on other Research Councils analysis, and in particular work undertaken by NERC, the Project Board view would be that the average time taken to prepare outline proposals may be underestimated and the average time taken to prepare complex proposals may be overestimated.

The data themselves and the subsequent modelling should be considered to be illustrative rather than definitive. The data are considered sufficiently robust to provide a good overall picture of peer review activities but may not necessarily be representative of any single research area or discipline for example.

Time Spent by Researchers on Proposal Preparation

Activity	Average time (effort) taken	Sample size
Preparation of conventional proposal	12 days	89
Preparation of simple proposal	5 days	53
Preparation of complex proposal	30 days	42
Preparation of outline proposal	2 days	45

Time Spent by Researchers on Refereeing, Responding to Referees and Panel Preparation

Activity	Average time (effort) taken	Sample size
Refereeing conventional proposals	4 hours	90
Refereeing simple proposals	2 hours	41
Refereeing complex proposals	8 hours	55
Responding to referees' comments	10 hours	71
Preparing for a Panel meeting	4 days	64

Time Spent on Final Report Activities

Activity	Average time (effort) taken	Sample size
Preparing conventional final report	4 days	79
Preparing simple final report	3 days	22
Preparing complex final report	8 days	20
Refereeing conventional reports	3 hours	53
Refereeing simple reports	2 hours	13
Refereeing complex reports	4 hours	19

In preparing proposals and reports, the time and effort may be shared amongst a number of research colleagues. The survey was designed to capture all the contributions made in this respect rather than just the contribution of the principal investigator.

The DTZ study did not capture time spent at the panel meetings themselves but Research Councils have this information and it has been included in the later analysis.

Time Spent by HEI Administrators

Activity	Average time (effort) taken
Submission of conventional proposal	4 hours
Submission of simple proposal	2 hours
Submission of complex proposal	20 hours
Submission of final report (conventional, simple or complex)	0.5 hours

Survey Findings - Perceptions of Peer Review

Grant application process

- i. Around 70% of researchers and almost 85% of administrators believed the Research Councils' grant application process to be excellent or good. Respondents generally felt that the Research Council process was better than those employed by other funding agencies in the UK, the EU and US, which are perceived to be more bureaucratic, more time consuming and require a lot more paperwork. However, the US system was commended for its high level of collaboration with applicants and for providing better feedback.
- ii. Despite concerns about time spent on developing unsuccessful proposals, some respondents specifically commented that this was an inevitable consequence of the competition for funding, and that such competition was necessary to support world-class research.
- iii. The survey indicated support amongst some respondents for longer-term grants or larger, more flexible grants. In addition, a frequent response was for the Research Councils to consider increasing the use of outlines e.g. for responsive mode proposals.
- iv. The most frequent comment on the grant application process was that it took too long and that other agencies were quicker.
- v. Almost 70% of university academics and 100% of administrators surveyed agreed that the Research Councils' Joint Electronic Submission System (Je-S) had made the grant application process more efficient, particularly in reducing time and paperwork costs and enabling the development of collaborative proposals. Where respondents were less positive (10%) this tended to be related to the introduction of the full economic costing (FEC) funding model rather than a criticism of Je-S itself. Administrators noted that full economic costing had made the process more complicated.

Peer review

- vi. The principle of awarding research funding on the basis of expert peer review is strongly held by the academic community, with 93% of university researchers supporting its use. Researchers recognised that although peer review does entail a substantial time commitment, it is open, transparent and fair, and generally identifies the highest quality research proposals. Furthermore, the majority of respondents rated the Research Councils peer review process as excellent or good.
- vii. The survey highlighted perceptions amongst the research community regarding the importance of high quality referee reports. Ensuring referees have the right experience is considered critical by investigators and panel members alike and some commented that this is not always the case. The issue of some referees not responding to requests is recognised as adding to this problem.

vii. The benefits of high quality feedback was further emphasised by respondents in this section.

Final reporting

ix. In general, the survey indicated that the majority of the community remains reasonably happy with the process of producing and submitting final reports on their research to the Councils, although a significant number of respondents were also neutral about this or thought that the process was poor. It was clear from a number of the comments made that many academics are uncertain about the value of these reports and how they are assessed or used.

University Internal Assessment

x. There appeared to be no formal demand management processes within HEIs sampled except where funding schemes restrict the number of applications that can be submitted by a university.

7.5 Costs Analysis and Calculation

Within this section, the results of the internal and external survey will be analysed and combined to provide an indication of the full overall cost of operating the Research Council peer review system. The main assumptions are as follows:

- The sample results from the DTZ Pidea survey allow extrapolation to the wider community. This assumption is believed to be relatively safe as, to a first approximation, the results were in accordance with Research Councils' own data on peer review. Furthermore, a very rough estimate of the time spent in preparing a research proposal was also included in the Boden report where a figure of 2 weeks was reported. This provides some additional reassurance regarding the survey results.
- The cost of academic time was calculated using the data available from FEC grants submitted to Research Councils during the period 01/09/05 to 30/4/06 indicating an average salary cost of £36/hour. Overhead on this was calculated at £27/hour, again based on recent FEC data. These are assumed to be representative and give a total hourly cost of £63/hour.
- The cost of administrator time has not been separately accounted because, under FEC, these costs should be included within the overhead.
- It has been assumed that all proposals are subject to refereeing. This results in an overstating of costs as a fraction of proposals will be withdrawn or office rejected before peer review is undertaken. However, as a first approximation, this assumption is considered acceptable.

- It has been assumed that all peer reviewers are UK-based academics which is clearly not the case, but is considered to be an acceptable first approximation for the analysis.
- The cost in the research community of preparing and reviewing studentship proposals or facility access proposals was not included within the DTZ Pieda survey in order to ensure the survey could be completed within the time available. Research Councils therefore contacted a small number of representative individuals within their communities for advice on the time and effort required. The results of these surveys have been incorporated here.
- Certain activities associated with proposal preparation (planning the programme, background research etc) would be incurred within any system and not just those associated with peer review. No adjustments have been made to the data to account for this.

Full Research Proposals and Final Reports

Proposals and reports have been modelled to account for proposal complexity using the DTZ Pieda data and a Research Councils sample of proposals and grants analysed against the complexity classification. Complexity varies across Research Councils with AHRC recording the highest proportion of simple proposals and EPSRC the highest number of complex proposals.

Adjusting for complexity, the results of the cost analysis were as follows:

	Analysis based on Research Council breakdown of Portfolio into simple, conventional and complex grants	
	Peer Review of Proposals	Peer Review of Final Reports
Research Councils' annual internal costs (£k)	7826	751
Research community costs of preparation and submission (£k)	121693	8955
Research community costs of peer review (refereeing, investigator response and panel membership time) (£k)	35418	1198
Total Cost of Peer Review (£k)	164937	10904
Total cost as proportion of Research Council budget spent in HEIs¹	12.6%	0.8%
Total cost as proportion of Research Councils HEI funding and Funding Councils QR budgets²	5.8%	0.4%
Number of proposals/reports received in year	16,764	3,721
Average cost of peer review process for a typical proposal/report (£)	9839	2931
Fraction of cost associated with initial preparation by researchers (i.e. pre- submission)	74%	82%
Fraction of costs associated with time spent by researchers on refereeing, committee/panel membership, responding to referees	21%	11%
Fraction of costs associated with internal Research Council peer review activities or direct cash costs e.g. payments to reviewers	5%	7%

- ¹ Research Councils expenditure in HEIs during 2005-06 was estimated at £1,305 million. These figures can be used to give an approximation as to the scale of peer review costs in relation to what is supported. The comparison is though artificial in that the majority of the costs (i.e. preparation costs) are still outside this regime and are rather provided by the Funding Councils
- 2 Using a QR allocation of £1,526 million for 2005-06.

It should be noted that whilst assessment procedures for proposals within Research Councils follow a broadly similar approach, the same is not true for assessing final reports. For final reports the range of processing varies from undertaking no external peer review assessment through to a replication of the proposal assessment procedures i.e. refereeing followed by panel consideration.

Sensitivity Analysis of Recycled Proposals

One of the main assumptions underpinning the analysis above is that all the proposals received by the Research Councils are effectively new proposals. In reality, many proposals are resubmissions or recycled versions of previous proposals and the expectation would be that these take less time to prepare.

Within the timeframe of the study, it has not been possible to determine the number of proposals that are recycled within the system, how many times they were recycled or how much time and effort is spent by investigators making such amendments. This could form an interesting area for further study. It has therefore not been possible to draw any firm conclusions relating to the impacts of such recycling but instead a sensitivity analysis was undertaken to determine what impact recycling may have upon the overall conclusions.

Assuming the main effect relates only to the preparation of proposals, the impact on the above results would be as follows:

- 10% recycling with each recycled proposal taking 50% of the time, reduces costs by 3.7% i.e. by £6,103k
- 20% recycling with each recycled proposal taking 25% of the time, reduces costs by 11% i.e. by £18,143k.
- 30% recycling with each recycled proposal taking 25% of the time, reduces costs by 16.6% i.e. by £27,380k.

Studentship Proposals

The Research Councils use a variety of methods for distributing funds for the support of postgraduate research training, some involving the submission of proposals followed by peer review assessment. The table below captures postgraduate training support where this is undertaken by peer review. The Research Councils exhibit far greater variation in this aspect of their operations compared to research grants. The variation ranges from operating annual activities involving submissions of individual students through department-level proposals to business plans at the institution level which are assessed

only periodically e.g. every 4 years. Where activities are periodic, costs have been included within the data as annualised figures.

	Peer Review of Studentships Proposals and Reports
Research Councils' annual internal costs (£k)	845
Research community costs of preparation and submission (£k)	6801
Research community costs of peer review (refereeing, investigator response and panel membership time) (£k)	1429
Total Cost of Peer Review (£k)	9082
Number of proposals/reports received in year	9,436
Average cost of peer review process for a typical proposal/report (£)	962
Fraction of cost associated with initial preparation by researchers (i.e. pre- submission)	75%
Fraction of costs associated with time spent by researchers on refereeing, committee/panel membership, responding to referees	16%
Fraction of costs associated with internal Research Council peer review activities or direct cash costs e.g. payments to reviewers	9%

Outlines

The Research Councils use outline proposals in a number of more directed programmes but not generally in responsive mode. These outlines are typically much shorter in length and contain less detail of both the research programme and the resource needs. The use of outlines is tailored to the needs of each specific programme and hence significant variation exists with respect to the detail required and how the outlines are assessed. The Research Councils do not typically capture the cost of processing outlines and the data presented here has been extrapolated from the information provided for the processing of full proposals. The DTZ survey did, however, explicitly ask for information concerning the time needed for outline proposal preparation.

	Peer Review of Outline Proposals
Research Councils' annual internal costs (£k)	94
Research community costs of preparation and submission (£k)	1224
All Panel member assessment costs	1043
Total Cost of Peer Review (£k)	2361
Number of proposals/reports received in year	1,214
Average cost of peer review process for a typical proposal/report (£)	1945
Fraction of cost associated with initial preparation by researchers (i.e. pre- submission)	52%
Fraction of costs associated with time spent by researchers on refereeing, committee/panel membership, responding to referees	44%
Fraction of costs associated with internal Research Council peer review activities or direct cash costs e.g. payments to reviewers	4%

Facility Access Proposals

Proposals for access to facilities for instrument time form an important aspect of the role of both CCLRC and PPARC and separate mechanisms are in place to support their assessment. Proposal forms for such facility access are not as comprehensive as for standard research proposals and resource requests beyond the facility time itself much more limited. For this analysis, these proposals have been assumed to be similar to “simple proposals” and costs allocated accordingly. Reports following the completion of facility-access grants are required for only a sub-set of awards and only by CCLRC. The costs are shown in the following table:

	Peer Review of Facility –Access Proposals	Peer Review of Facility-Access Final Reports	Total
Research Councils' annual internal costs (£k)	240	3	243
Research community costs of preparation and submission (£k)	6232	953	7185
Research community costs of peer review (refereeing, investigator response and panel membership time) (£k)	910	0	910
Total Cost of Peer Review (£k)	7382	955	8337

Number of proposals/reports received in year	2,473	630	2473 (proposals only shown)
Average cost of peer review process for a typical proposal/report (£)	2985	1516	3371 (based on proposals only)
Fraction of cost associated with initial preparation by researchers (i.e. pre- submission)	85	99.7%	86%
Fraction of costs associated with time spent by researchers on refereeing, committee/panel membership, responding to referees	12%	0%	11%
Fraction of costs associated with internal Research Council peer review activities or direct cash costs e.g. payments to reviewers	3%	0.3%	3%

7.6 Summary of the Cost of Peer Review Analysis

Whilst it is not possible to provide a definitive figure for the cost of peer review, the analysis above provides indicative figures which can be used in the analysis of options aimed at improving efficiency.

Based on 2005/06 prices and assuming a demand of some 16,700 proposals across the Research Councils, the annual cost of peer review activity for research proposals is likely to have been between £159 million (adjusted for 10% recycled at 50% cost) and £147 million (adjusted for 20% recycled at 25% cost).

An upper limit for the annual cost can be given at £165 million reflecting an adjustment for complexity but without any adjustments made for proposal recycling or other factors. The Project Board will use this upper limit figure in its later analysis.

Based on receipt of some 3,700 reports and assuming the continuation of current Research Council practices in processing, the peer review activity associated with reports processing is approximately £11 million.

Figures for studentships, facility-access applications and outlines have been subject to less modelling and, for studentships in particular, there is significant variation between Research Councils concerning the processing methods used. The figures in the tables shown above have been accepted without further adjustment i.e. £9.1 million for studentships proposal and report processing, £8.3 million for facility-access proposals and reports processing, £2.4 million for outline processing.

The total cost of annual peer review activity associated with Research Council operations can therefore be estimated (using the upper limit assumptions) as approximately £196 million. The total Research Councils expenditure in HEIs in 2005/06 was approximately

£1,306 million and the peer review cost can be seen to equate to 15% of that total. However, the majority of external costs are not paid for through Research Council funding and perhaps a more meaningful measure is to compare the cost of peer review to the Research Council funding in HEIs combined with Funding Council QR funding (which during 2005/06 stood at £1,526 million). On this basis, peer review costs represent 6.9% of the combined Research Council & QR total.

Within the total cost, the peer review of research grant proposals represents by far the largest activity. The largest single cost element in all aspects of the peer review systems is the time taken by applicants in preparation and submission. As a proportion, this figure is at its lowest in the processing of outlines reflecting the more simple nature of such proposals. The proportion associated with submission is at its greatest for final reports reflecting the much more limited external peer review assessment (if any) undertaken by some Research Councils.

8. DISCUSSIONS AND OPTIONS

8.1 *Effectiveness of Peer Review*

Overview

The survey and analysis conducted by the Project has served to emphasise the importance of peer review to the UK research endeavour. In line with the Boden and Royal Society reports before it the Project Board concludes that peer review remains the most effective approach for supporting research.

The characteristics of an efficient and effective peer review process as set out in Section 4.3 are prominent within the current system and the Board would particularly stress here the importance of agility and responsiveness in ensuring a healthy research base. A project-based approach which employs peer review to judge the potential of the proposed research is a crucial component of that system.

In reaching this conclusion, the Project Board note the relative standing of UK research on the international stage and believe that the current peer review system has contributed to this success. The Board also note that peer review remains the dominant system for allocating research in the world's main funding agencies and that the organisations benchmarked as part of the study tend to employ similar peer review systems.

Peer review clearly carries with it costs, not least in the preparation of research proposals. The Project Board would stress, however, that such costs do not in themselves represent wasted effort or lost opportunities. On the contrary, preparatory activities such as undertaking background research, conducting initial experiments and holding discussions with colleagues help investigators generate or improve their ideas and therefore actively contribute to ensuring a healthy and vibrant research base. Such preparation time is likely to be a key part of the system's effectiveness. Equally, feedback following peer review often helps individuals to improve their ideas and to prepare better proposals. Such feedback is particularly valued by the community. Peer reviewers themselves also learn through their involvement in the process, in particular developing a better understanding of what constitutes a strong research proposal.

Furthermore, the competitive element of the peer review system is fundamentally important in promoting the submission of the highest quality ideas. If competition is to be real some proposals must be unsuccessful. To consider such unsuccessful proposals simply to represent inefficiencies would risk undermining the effectiveness of the system.

Areas of specific consideration

The availability and quality of feedback from peer review is of particular importance to the research community and serves to influence their perceptions of its effectiveness. The Boden report recorded this to be the single biggest area of complaint during its study.

Research Councils actively responded to the findings of the Boden report and, in particular, now routinely provide copies of the referees' reports to investigators. Indeed, going beyond the original Boden recommendation, such feedback is typically provided in advance of the panel meeting with investigators invited to reply to the comments received.

Given its importance, the Board was not surprised to find feedback again recorded as an issue within the current DTZ survey; however, it was instructive to note that the comment was no longer being made by large numbers of respondents (eight respondents from a sample of 93) and comments made were often of a general nature. Some respondents suggested Research Councils need to be more direct in saying that a proposal was unfunded purely as result of resource limitations.

The Board therefore concluded that much progress had been made in providing feedback and that this had led to a better peer review experience for investigators. Nevertheless, feedback is an area where Research Councils should continually seek opportunities for improvement. Three respondents to the DTZ survey suggested that systems in the US were better than in the UK; best practice may therefore exist that had not been found during the limited benchmarking undertaken as part of this project. The Board believe there would be merit in Research Councils further exploring the issue of feedback as part of their response to this report. In comparing feedback processes in other international organisations, due consideration would need to be given to the specific context in which they operate and to the wider process models they have adopted.

As discussed earlier, there are long running concerns regarding the potential for conservatism to exist within the peer review system. Where conservatism occurs, there will be an impact upon the effectiveness of peer review and steps to mitigate this are therefore essential. The recent "Next steps" consultation raised particular concerns in this respect regarding the treatment of both adventurous and interdisciplinary research.

The Project Board accept the Research Council view that, in general, the UK system does provide sufficient funding and flexibility to support adventurous research. All of the research funded by the Research Councils includes a substantial degree of novelty. However, Research Councils do accept that, in some sectors, further incentives are needed to stimulate more speculative research.

The Board noted that conservatism can be mitigated using structural and process mechanisms. Research Councils have already introduced specific schemes to support, for example, early career researchers, have widened the range of individuals engaged as peer reviewers e.g. through the use of colleges and international representation and have improved communication and training in this area. Informal and formal feedback to the

Research Councils from the research community (e.g. through surveys) regarding such measures has been positive.

However, there is no room for complacency and the Board were encouraged to note that Research Councils are continuing to refine their operations. At the time of writing, a revised policy to support inter-disciplinary research cutting across Research Council remits is being implemented. Research Councils also recognise that the final report process can be a barrier to interdisciplinary research and are giving active consideration as to how this process can be modified. As the research environment evolves, further refinements in Research Council operations will inevitably be necessary.

The recent “Warry report”, “Increasing the economic impact of Research Councils” (published by DTI, 2006) included a series of recommendations concerning changes to peer review aimed at improving the economic impact of Research Council activities. The Project Board noted that the Research Councils have taken steps over the years to emphasise better potential economic impact and societal benefit within the grant application and peer review process. The Warry report suggests more needs to be done and the Project Board believes that this should build upon existing platforms and frameworks.

In parallel with this project, the Research Councils have established a new high-level cross-Council group, the RCUK Knowledge Transfer and Economic Impact Group (KTEIG), to oversee a programme of work aimed at improving Research Council activities in this area. KTEIG will explicitly consider all the recommendations in the Warry report including how best to take forward those that relate to peer review. The Project Board supports the integration of the peer review elements within the broader programme of work of this group.

As discussed later, the Project Board believe that a consultation with the research community should follow the publication of this report. The consultation should include the contribution peer review can make to improving economic impact. The research community itself has much expertise to offer in terms of implementing the Warry report recommendations. The chair of KTEIG has welcomed the inclusion of such a question within the consultation.

Summary

The Project Board would emphasise its earlier conclusion that peer review remains an effective method for supporting research in the UK. Its acceptability to, and support among, the research community are critical factors that are well demonstrated by the results of the DTZ Pieda survey. This found that 93% of respondents believed the system to be worthwhile despite the costs and burdens associated with it – a figure that represents a strong endorsement of peer review.

The benefits associated with peer review and the continued support of those who are engaged within it should not, however, be seen as a reason for complacency. Research Councils must ensure that the system remains optimised for both efficiency and

effectiveness and must do so in a complex and dynamic environment. It is essential that peer review continues to evolve in line with such changes and the conclusions and recommendations in both the Warry report and the Next Steps consultation provide evidence of that.

8.2 Cost of Peer Review

The project has demonstrated that the peer review process requires significant resource to operate and maintain. The analysis estimates that the annual total peer review activity (i.e. incorporating studentships, fellowships and all types of research grant) associated with distributing Research Council funds is about £196 million (05/06 prices). The breakdown between the various forms of peer review and the cost of preparation is shown below:

Activity	Cost of activity as % of overall cost of peer review	Cost of preparation as % of the cost of the activity
Peer review of full research proposals	84%	74%
Peer review of research final reports	6%	82%
Peer review of studentship proposals and reports	5%	75%
Peer review of outline proposals	1%	52%
Peer review of facility-only access proposals and reports	4%	86%

It is clear that the peer review of full research proposals represents the most significant activity within the system and that in all activities the main cost is associated with researcher preparation and submission. Any options seeking to *significantly* reduce the overall cost of peer review will need to focus on this aspect.

8.3 Efficiency of Peer Review

Activity Levels within Peer Review

Before an analysis of efficiency can be effectively undertaken, levels of activity need to be understood and here the historical data available can provide some useful evidence. In real terms government policy has led to an increase in the level of funding available to the Research Councils to support research. A large proportion of this funding will have been directed to the HEI base. The increase in funding levels is demonstrated in the table below showing the Science Budget provided to Research Councils at selected years.

Year	1988/89	1990/91	1992/93	1994/95	2000/01	2002/03	2005/06 ¹
Cash Value £M ²	665.2	844.8	989.1	1149.8	1385.6	1625.9	2456
Indexed to 05/06 prices £M	1162.57	1277.62	1365.69	1524.21	1579.64	1756.29	2456.00
Indexed values as % of 1988/89 budget	100%	110%	117%	131%	136%	151.07%	211%

¹2005/06 figure excludes AHRC to enable like for like comparison.

² Science Budget less the funding directly allocated by OSI-DTI

Increases have also occurred in that part of the research system funded through the Funding Councils. Data from HESA and the Funding Councils indicate that over the period 1995/96 to 2005/06, real-terms QR funding increased by some 48%.

A large fraction of the additional Research Council funding will have been used to improve the sustainability of research in the UK (e.g. the initial introduction of overheads, and recent change to full economic cost funding). Some will be accounted for by cost increases above inflation, driven by international competition and increased research sophistication. However, a significant proportion of the additional funding has increased research volume.

Turning to proposal activity, over the last nine years, Research Council data indicate an upward trend in application numbers with figures in 2005/05 being some 20% higher than in 1997/98. AHRC is excluded from this analysis as it has only relatively recently become a Research Council. It is also possible to compare recent data with data in two years specifically quoted in the Boden report (1980/81 and 1988/89). AHRC has again been excluded from this analysis. To enable a more ready comparison with the previous table, 1988/89 has been used as the benchmark year.

	1980/81	1988/89	2005/06
Number of proposals	5,536	6,402	14,800
Numbers and cost as percentage of 1988/89 baseline	86%	100%	231%

It is relatively safe to conclude that activity in the peer review system has increased. So any increase in absolute cost of peer review will to some extent be explained by the increased activity rather than simply representing any actual or perceived reduction in efficiency.

Research Councils' Internal Efficiency

Given the complexities that would have been involved, the Project Board did not undertake any comparisons of the direct internal (office based) costs of peer review with other funders. However, comparisons of overall administrative costs are possible – though care is needed even with this comparison given, for example, the different objectives and business models such organisations will have and the different definitions they will use. Overall administration costs, in addition to direct internal peer review costs, will include: award administration, evaluation, stakeholder liaison, strategy development, knowledge transfer, institute management, communications, accountancy, and corporate governance.

The survey of external grant giving organisations indicated that administration costs as a proportion of budgets ranged from 2.5% to 7.3%, although DARPA with its different mission and funding mode reports an estimate for administration costs as low as 1.6%. At

4% the Research Councils' proportion of administration costs is toward the lower end of the sample.

Research Council administrative expenditure can also be compared with those reported in earlier years (e.g. at and around the time of the Boden report). The Research Councils did not exist in their current form and so the cost of the largest Council at that time, SERC, has been used as a benchmark. The proportion of administration costs during the period 1988/89 to 1992/93 in SERC was 4.7% (5 year average). This compares with 4% in 2005/06 for the Research Councils as whole. A 0.7 percentage point annual reduction in relative administration costs represents an efficiency gain of £17.7 million (based on a resource allocation of £2,525 million for 2005/06).

Indicators of Overall System Efficiency

The tables above indicate that the number of proposals relative to Research Council budget has increased. If the average cost of preparing a proposal has remained constant, it can be estimated that the cost of peer review as a percentage of overall budget has increased from 5.4% in 1988/89 to 5.9% (adjusted to exclude AHRC) in 2005/06. Thus efficiency – defined in this instance as the ratio of peer review activity to research funds available - may have fallen slightly.

If proposals are assumed to be the input to the peer review system and funded grants to be the output, it is also possible to use success rates as an indicator of efficiency. SERC can again be used as a baseline for the overall UK position in earlier years. In its 1980/81 annual report, SERC reported a provisional success rate (by number) of applications of 55% for that year. This had fallen to 41% by 1988/89. In 2005/06, the collective success rate for the Research Councils was around the 28% mark. This suggests a more significant drop in efficiency than the first measure. However, some caution is needed when using success rates in this capacity given that it is the quality of research, and the use of that research, that are the real system outputs and not the number of grants funded.

Peer Review and Research Active Staff

Another measure of efficiency would be the total amount of effort expended on peer review as a proportion of the total amount of effort available in the community. A larger research active community can be expected to submit more proposals than a smaller community without efficiency suffering (unless the burden falls disproportionately on some members). Limited data have been available to the Project Board in this area, and that which is available is contradictory. Data from HESA indicated that the number of professors, senior lecturers, lecturers and researchers increased from 62,928 in 1995 to 72,350 in 2003 (an increase of some 15%). However, using the same grade analysis, the numbers of “research active” staff recorded by HESA fell from 44,150 in 1995/96 to 31,470 in 2004/05 (a fall of some 29%). This anomaly probably results from decisions on how research staff are classified for the RAE.

Research Councils' own data suggest that the numbers of active researchers have increased. For example, comparing the engineering and physical sciences community of SERC with the comparable EPSRC community shows an increase from 2,361 applicants in 1989/90 to 4,812 in 2004/05. The mean number of applications submitted had only marginally increased (1.35 to 1.5). This Research Councils' data therefore indicate a larger active community but without necessarily indicating any tendency for the individuals in that community to be any more active. It should be noted that there is no direct link between the HESA classification of "research active" and application activity with the Research Councils.

With respect to the tasks of refereeing and panel membership, the assumption is that there are now more peer reviewers available. However, to counter the risk of placing a disproportionate burden on individuals, some Research Councils have set a limit to the number of reviews a person will be asked to undertake in a given period.

Summary

In summary, the situation with respect to efficiency is complex and the data available not robust enough to provide definitive conclusions. However, it does appear that more overall effort is now required to distribute the available funds than was the case in the past and that this is linked to an increased number of applications and a decrease in success rate. In addition, the Research Councils and the wider research community alike have raised the impact of rising proposal numbers and/or falling success rates on system efficiency as an issue of concern. This would indicate that some interventions aimed at improving efficiency would be beneficial. However, given the contribution peer review makes to the overall research endeavour, it is worth stressing again the danger of simply equating lower success rates with lower efficiency.

Given the above analysis, and accepting that success rates can at least provide an indication of peer review efficiency, it seems that the questions that must be answered are: Within what range is the success rate acceptable? Is the current rate healthy? And what should be done if the rate continues to fall?

8.4 An Acceptable Range for Success Rates

Introduction

Success rates vary between Research Councils, funding stream, panels and between different funding rounds. They reflect the dynamics of specific research communities, the available funding and can also be strategically employed to meet the objectives of a particular funding scheme. For example, success rates may be higher than the norm in areas the Research Councils are specifically aiming to stimulate. Even within individual communities or funding schemes, oscillations in success rates will occur over time. When considering acceptable ranges it is therefore necessary to consider success rates over the longer term and within the context of the wider research environment; the overall trend being experienced by the research community is arguably as important as the position at

any specific point in time, or within any specific funding mechanism. These points serve to frame the rest of the discussion here.

Low success rates have a demoralising effect on the research community. Both the Royal Society and the Boden reports noted this effect, and the Project Board has no reason to question those conclusions. In such circumstances, the best and most productive members of the UK's research community may ultimately be tempted to advance their careers elsewhere. Furthermore, if success rates become too low there is a risk that peer review finds it more difficult to select the best research projects (as fine judgements are needed to distinguish between uniformly high-quality proposals), and that the consistency of decision making falls to an unacceptable level. On the other hand, if obtaining funding became too easy there is a risk that lower quality research would receive support and this could be to the detriment of the standing of the overall UK research system.

Finally, the Project Board re-iterate that success rates are only one indicator of the efficiency and effectiveness of peer review and the system must be seen holistically if policy changes are to be introduced. As an illustration of the issues that may arise, the Project Board notes that a real-terms increase in funding may itself serve to stimulate demand, as investigators perceive more potential for reward in relation to the effort required to apply. This may, in part, explain some of the increase in proposal numbers since 1989/90, despite falling success rates.

Determining an acceptable range

The Project Board reviewed the success rates reported in selected other countries. Success rates at DFG in Germany (at between 46% and 51% depending on discipline) tend to be higher than for the UK Research Councils. Reported rates in Austria (37.7%) and Switzerland (62%) are also higher. By contrast, in 2004, Norway (at 10% in its division of science) and Finland (19%) had lower rates. In Canada, NSERC have a high success rate by number (75%) in their Discovery Grants programme reflecting a practice of funding many grants but at a reduced level of resource. The success rate in NSERC by value is much lower than it is by number, although at 43% it is still higher than in the UK. NSF in the USA reported a success rate by number in 2005 of 23%. However, success rates across many of these organisations have been declining.

The Project Board recognise that the variations seen amongst international organisations can reflect different research cultures and ways of working. In particular, the Canadian practice exemplifies the inherent risk of simply equating efficiency to success rates as judged by number of proposals. In the UK, success rates by value are much more closely aligned to those by number. Furthermore, whilst awarding a higher proportion of grants at reduced value may be appropriate in the NSERC context, the Board did not believe the approach would improve system effectiveness and efficiency in the UK because it is seen as more important to ensure the best researchers have the resources necessary to compete in an increasingly competitive environment.

Turning specifically to the UK context, it should be noted that whilst many excellent proposals remain unfunded, not all proposals received are fundable. Some may be technically flawed and others may not provide a sufficient return in terms of the quality of their research outputs. They may simply not add sufficiently to the credibility of the UK research endeavour. The proportion of such proposals will vary but the point here is that Research Councils would not wish to fund all the proposals they receive.

Success rates in the early 1980s were around the 50% mark and the Project Board did not find any evidence to suggest that, at this level, success rates were a concern for either the Research Councils or the research community. It may be possible to take this level as a baseline for this study.

As success rates began to fall to 40% (and below) and with the trajectories being downward, consideration began to be given to the impact. The Boden report for example included efficiency of peer review within its terms of reference. The Research Councils were also active in analysing the efficiency of the process and commented upon the effect of success rates on peer review operation. For example, in one annual report (EPSRC, 1997/98), it was noted that: “Peer review does work well when success rates are running at about 40%. However, if success rates were to fall to 20% or less, then the whole process becomes less efficient and potentially less effective.”

This Research Council perspective, which of course may only be valid in the specific UK context, may be seen in their use of “managed programmes”. In such programmes, the Research Councils can exert much greater influence over success rates as they can control the funding levels, the eligibility to apply and the method of application. Even with such controls available, it is still common to find managed programmes operating with success rates between 20% and 50% (although exceptions do exist).

Taking account of these points, the Project Board was of the view that for the UK system as a whole, success rates within the region of 20% to 50% effectively balance the need for competition with the cost and effort required to support the system. Success rates routinely below 25% and also on a downward trajectory should be considered a cause for concern. If success rates regularly fell below 20%, the Project Board believes the added risk of an ineffective or inefficient system would warrant more active intervention by the Research Councils and research community. However, the Project Board was keen to stress that its comments here should not be directly extrapolated to, for example, individual funding schemes.

The Project Board also noted that, in common with other funding agencies around the world, UK success rates had generally been falling. The competitive pressures existing in the research base are such that this trend could very well continue. It was recognised that such trends may not be linear and that equilibrium points may be reached. However, by extrapolating linearly from an 11 year data set using a least squares method, the Project Board estimate that the average success rate could fall below 25% in 2012/13 and below 20% in 2019/20. Variations between the individual Research Councils are to be expected.

In addition, when compared with the overall position, certain research areas are experiencing lower average success rates (around or below 20% in some fields) and are already at greater risk of falling efficiency.

Success Rate and System Costs

The Project Board also considered the effect that improving success rates could have in cost terms. The principal assumption used is that the number of grants funded remains constant and therefore it is proposal numbers that are adjusted to give the different success rates.

On this basis the table below illustrates the cost effect at different success rates across the Research Councils. A success rate of 30% is taken as representing the current position and the number of proposals received at this success rate has been taken from the actual data available to the Project Board. The calculation of peer review person years saved or added has been derived using TRAC data but adjusted to 8 hour days (to maintain consistency with the DTZ methodology) and using £63/hour (inclusive of overhead). TRAC uses a basis of 44 weeks per annum and 5 days per week in its methods. The saving has been adjusted to reflect only the time of the research community.

	Success rates		
	20%	30%	40%
Number of proposals received	25146	16764	12573
Number funded (kept constant)	5029	5029	5029
Cost of number of proposals (£k) assuming average cost of £9,839/proposal.	247406	164937	123703
Cost as fraction of Research Council HEI spend and QR funding	8.7%	5.8%	4.4%
Saving (added costs) compared to 30% baseline (£k)	(82469)	0	41234
Peer review person years saved/(added)	(708)	0	354

Improving success rates to 40% would therefore represent a theoretical time and effort saving equivalent to 354 full time equivalent researchers. This does not represent a cash saving, but rather illustrates the time that could be released within the research community from an improved success rate.

Summary

The Project Board believe that, viewed as a whole, the peer review system is currently operating efficiently and effectively. However, there is evidence that certain parts of the system are under greater strain. To maintain efficiency it is necessary to ensure that success rates do not fall too much further and preferably actually improve on current levels. The Project Board therefore conclude that i) action should now be considered to mitigate the effects of falling success rates and ii) there is time to act in a way that does not unduly perturb the sensitive dynamic of the research system.

8.5 Options for Change - Overview

Before discussing the options for change in detail it is worth reflecting on the analysis so far. First, from the perspective of the research community, improving the effectiveness of peer review remains the principal priority. When developing the options, the Project Board therefore considered potential impacts on effectiveness as well as efficiency.

Secondly, the results of the cost analysis indicate that the peer review of research grant proposals is the activity which represents the largest cost to the system and that within all activities the largest cost element is the time taken by researchers themselves to prepare proposals/reports. In order to significantly reduce the overall cost of peer review, therefore, options will be needed that focus on either reducing the average time taken to develop and prepare proposals or reducing the total numbers of proposals that are developed.

The Project Board were tasked with looking at the broader picture of efficiency and effectiveness. The Board agree with the conclusion of the Boden report that those responsible for peer review (i.e. Research Councils) should work hard continually to improve the effectiveness of the process. There are established structures and practices in place by which the Research Councils can do just this (e.g. individual benchmarking activities, process improvement teams, the Je-S System group, Gershon efficiency project etc) and the Project Board commend the DTZ Pidea report to the Research Councils for further consideration. Building on the progress that Research Councils have already made, IT/IS developments will continue to offer further opportunities to improve, for example, the transparency and speed of processing. There are a number of ongoing projects that would readily contribute to this, for example the extension of the Joint electronic Submission system (Je-S) to submission of peer reviewer comments and applicant responses to these, provision of electronic meeting papers, the development of a next generation back-office grants system and harmonisation of business processes.

The options presented are not necessarily mutually exclusive and, in some cases, the option, or a variation upon it, is already being used within some Research Councils. It was clear to the Project Board that there is no simple answer to the issue of improving the effectiveness and efficiency of peer review and that a combination of methods should be considered with implementation extending over several years. Such an approach provides the most likely opportunity for improving the efficiency of the system without undermining its current strengths.

It is important to appreciate that a “psychological contract” exists between researchers and the Research Councils. Individuals participate in peer review partly because they have expectations concerning the way that the Research Councils will behave toward them and their colleagues. Managing such expectations will be an essential part of any change implementation. In considering implementation of those options that more fundamentally affect the dynamics within universities and between universities and Research Councils, the Project Board believe it is essential to fully engage with the research community. Establishing an early dialogue in this respect must be a priority.

In 1995, the Royal Society favoured demand management options that were self-generated by the research community themselves rather than imposed top-down by the Research Councils. The Project Board believes that this remains a desirable objective if it can be achieved and that it should therefore form part of the package of measures to be considered. Part of the pressure driving research application numbers upwards arises from the corporate management of the universities and if such pressures can be moderated the number of proposals received may stabilise within the acceptable range. Indeed, if Research Councils could better communicate that it is not the number of proposals submitted that leads to increased funding but rather the quality of those proposals, then a more constructive dynamic could evolve that would be to the overall benefit of the UK system. On a more negative note, the Project Board could find little evidence of self-regulation increasing since the Royal Society report - although limited examples do exist.

The Project Board recognise the commitment Research Councils have to collectively developing best practice in their general operations and commend this principle for use with peer review. In considering the options developed by the Board, the peer review system will often need to be considered holistically, particularly where an option may represent a fundamental change to the process or to the supporting relationships. However, in applying this principle, it will still be necessary to consider the specific needs of individual research communities as such needs may differ both between and within Research Councils. In such cases, and within a broader collective strategy or policy, local variation to reflect the needs of different research communities may be appropriate.

8.6 Detailed Options Analysis

Annex 2 provides a list of the main options for change generated and/or considered as part of the Project. The Project Board reviewed the options and identified those which seemed to have highest potential for improving the efficiency and effectiveness of peer review and where detailed cost modelling should be undertaken. In this section the results of that analysis and modelling are presented.

In considering the options, the following points should be noted:

- The savings identified are mainly associated with the time and effort of those engaged in the peer review process. These must not be considered to be cash savings, or even fully realisable time savings.
- The modelling data is largely based on the survey work reported in the results section. However, the modelling here requires a greater level of detail and some adjustments have been made where appropriate to reflect this need. For example, in earlier discussion an average cost for all proposals is given but this has assumed that all proposals follow exactly the same process e.g. all proposals go to

panel. This assumption is relaxed in some of the options with the result that differential costs have been employed for proposals undergoing different processing stages.

- The Board explicitly considered the risk in the options that peer review costs may simply be transferred to within individual universities, for example if universities respond by establishing internal peer review processes. This remains a risk and the effects and their management will need to be carefully considered but in a context which recognises that most of the pressure on researchers to apply also derives from the universities.
- No adjustment has been made in the modelling to reflect the number of recycled proposals that may exist within the system.
- The models are essentially linear.

8.6.1 Options that change the pattern of awards

Consolidation involving larger or aggregated grant awards

By consolidation, we mean the possibilities of awarding larger grants to broader research groups, either in a simple application process, or by linking standard research proposals. Such groups would then be precluded from applying in the responsive mode for some period.

Research Councils already have some experience of consolidating research funding within specific groups or departments and a number of Councils have specific funding provision for longer-term and larger-scale funding for leading research groups. Consolidation is particularly well developed within PPARC reflecting the nature of the research challenges faced by some of their communities. PPARC have estimated that, in programmes where about 50% of activity is consolidated, cost savings of around 20% can be achieved when compared to the cost of processing the equivalent individual research proposals. This takes in account the additional costs of preparing, processing and peer reviewing larger grants.

The option modelled the effect of awarding consolidated grants in responsive mode for the top 10% of departments or institutions associated with each Research Council. For some Research Councils consolidation could only be practical at group level whilst for others it would be better at department or even institution level.

No savings were recorded against PPARC as it was assumed that their existing processes provided no further opportunity in this respect. Any existing consolidation activity in other Research Councils was, however, ignored.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£40.4 million	Top 10% departments/institutions with a single consolidated grant; no responsive mode applications allowed apart from the consolidated grant itself. The consolidated grants themselves assumed to be complex.
Model 2	£18.5 million	Top 10% departments/institutions with a single consolidated grant; 50% of existing responsive mode applications allowed from these groups assuming standard distribution of complexity. The consolidated grants themselves assumed to be complex.

Consolidation involving Longer Awards

Consolidation can also be achieved by increasing the duration of a research grant – for instance the Medical Research Council provides a large proportion of its grant funding in the form of five-year awards, often 2 to 3 times larger than average three year awards. Providing longer grants should reduce the number of proposals received from groups that win funding and may also have wider influences on applicant behaviour. Procedures could be put in place to ensure proposal numbers are so controlled.

The following table shows the cost savings at three different levels but it should be noted that the effect is not linear and savings are proportionately greater for lower increases of duration.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£4.5 million	Assumes a 10% increase in average grant duration with success rates at 30%.
Model 2	£8.2 million	Assumes a 20% increase in average grant duration with success rates at 30%.
Model 3	£11.4 million	Assumes a 30% increase in average grant duration with success rates at 30%.

The main risks identified with consolidation approaches are as follows:

- May discourage links between universities, collaborative projects and disproportionately disadvantage early career stage researchers, new or emerging research fields or inter-disciplinary research.
- Researchers within the consolidated groupings could become complacent and/or research programmes could experience greater inertia.
- Internal peer review and management costs may mean net savings are reduced.
- Large scale awards, especially those covering more diverse areas, may lead to a more “broad brush” and less rigorous peer review.

The main additional benefits identified with these approaches are:

- The benefits would be particularly focused on arguably some of the most productive UK groups.
- If designed carefully, consolidated awards may promote collaborative research and long-term high risk research as well as stimulating more strategic approaches within the research groups themselves.

Based on this analysis, consolidation approaches could provide an opportunity for improving efficiency and/or effectiveness and it would therefore be appropriate to engage with the research community to consider how these could best be implemented to maximise the benefits whilst reducing the risks. The risks identified could be managed, for example by operating other schemes (e.g. new researcher schemes) or ensuring appropriate grant conditions and policies were in place, although at greater complexity and lower savings.

Research Councils would not have to adopt the same approach to consolidation and indeed there is a strong case for ensuring that methods are tailored to meet the specific needs of the target research community.

8.6.2 Options for reducing the numbers of applications

Develop and Disseminate Best Practice

As a result of its work, the Project Board believe that there is potential to work at both a strategic and an operational level with universities to improve peer review efficiency and effectiveness. The aim would be both to influence the applications received, and to create a climate and communications links which would support effective and constructive action on other options.

At the strategic level, Research Councils have already begun publishing HEI success rates and there is scope to follow this up with dialogue with the universities. This could explore the reasons for low success rates, and also identify how research strategies and culture contribute to higher success rates in other HEIs.

At the operational level, Research Councils could aim to identify best practice in the processes for managing research applications within universities and in joint working between Research Councils and universities. One specific possibility explored by the Board was for Research Councils to go further in disseminating success rates, for example, by publishing departmental, rather than institutional, success rates and ensuring these are given a high profile in relevant corporate communications. Such transparency could serve to foster a climate of greater self-regulation with respect to proposal demand.

These actions could be introduced relatively quickly. There would be additional internal Research Council costs associated with developing and disseminating best practice and in building deeper relationships with some universities. However, the association between

Research Council costs and external peer review costs is such that, if success rates did improve, the benefits would far outweigh any additional costs.

Individual-level Quotas

In this option, the effect of applying a quota of responsive mode applications on individuals was assessed.

The Board recognised that there were many ways in which individual quotas could be introduced but the model used assumed that only one responsive mode proposal per year would be accepted. In addition, the Project Board analysed the numbers of individuals who had applied for responsive mode funding in a typical year and compared this with the community who had applied over 5 years to gain an indication as to how many individuals may apply when faced with this quota. It was instructive to note that the number of investigators applying each year as a proportion of the 5 year community was highest in NERC where numbers of proposals that can be submitted by individual researchers to each scheme or grant round is already limited.

	Potential cash equivalent savings / (cost)	Notes and Assumption
Model 1	£18.8 million	Assume one proposal per person per year but with no increase in numbers applying and no added complexity.
Model 2	(£0.1 million)	As model 1 but assume 20% increase in numbers of people applying over current baseline for all Councils

The option can be seen to be sensitive to the numbers of individuals who may apply. The Project Board believe that an increase of 20% in numbers of individuals who apply would not be an unreasonable expectation.

The Project Board also modelled the impact of increased proposal complexity on the assumption that individuals who may usually submit multiple proposals could respond by submitting fewer, more complex proposals. A 10% increase in complex proposals would reduce the potential savings by £1.5 million and a 20% increase by £3 million.

The Board also considered placing additional restrictions on the individuals who are eligible to apply for research grants but were concerned about the effect this would have on the health and dynamic of the research base.

The discussion above suggests this option is unlikely to provide any advantage with respect to gains in either efficiency or in effectiveness, and may even increase costs. The Board did not consider this a priority for further analysis or consultation.

Institutional-level Quotas

The Project Board modelled the effect of introducing responsive mode quotas at the institutional level. In undertaking this modelling the assumption would be that the Research Council would establish a target overall success rate or target number of applications and that these would be distributed to eligible institutions based on some form of algorithm. The Board did not consider the details of such an algorithm or how it may be applied. The Board did note that some Research Councils apply such quotas within their studentship or fellowship activities. It was also noted that one variation of this option would be to selectively apply the quota e.g. to those institutions with large volumes of applications and low success rates.

It was recognised that quotas could be applied at other organisational levels (e.g. department) but that this would be more complex to administer and, in proposal cost-saving terms, would have the same effect as an institutional level quota. The effect of increasing proposal complexity as a result of quotas was also considered with the assumption again being that some individuals when faced with more limited opportunities to submit proposals will respond by producing more complex proposals.

	Potential cash equivalent savings	Notes and Assumption
Model 1	£22.6 million	Assumes 20% fewer proposals and no increase in proposal complexity.
Model 2	£33.9 million	Assumes 30% fewer proposals and no increase in proposal complexity.
Model 3	£14.8 million	As Model 1 but assume 20% increase in numbers of complex proposals
Model 4	£22.3 million	As Model 2 but assume 30% increase in numbers of complex proposals

Assuming that the 28% overall Research Council success rate can be extrapolated to responsive mode and that numbers of funded proposals are kept constant, a 20% reduction in proposal numbers would result in a 35% success rate and a 30% cut in proposals would result in a 40% success rate. These would be within the range deemed acceptable.

The main risks identified with the approach are:

- The savings identified here could be offset by a simple transfer of peer review effort into universities i.e. internal HEI peer review processes are established.
- Formulae for applying the quota would probably reflect past excellence rather than future potential.
- May lead to greater conservatism in proposal submission behaviour and disproportionately affect high risk research, early stage career researchers or collaborative work.

- In some forms of implementation, not consistent with the principle of enabling the best research to be funded wherever it originates.

The main additional benefits identified with the approach are:

- May encourage a more strategic approach within research organisations.

Institutional quotas offer high potential for reducing the cost of peer review provided steps could be taken to ensure the peer review burden is not simply recreated within universities. This issue should be addressed during a consultation process with the community. However, moving more of the burden to within research organisations may in itself serve to mitigate the organisational pressures that currently exist on individuals to apply for funding.

The view of the Project Board was that none of the risks above were sufficient to preclude this option, or its variations, from consideration but clearly the balance between efficiency and effectiveness would need to be carefully assessed. The first step should be to consult with HEIs and other stakeholders to test feasibility and to clarify the risks and benefits.

Within this option, it is worth noting that the Project Board explicitly considered a significant further restriction on the range of organisations or departments that could apply to responsive mode. This had been considered and rejected by the Royal Society in its report and the Project Board likewise rejected it. The ability to fund high quality individuals and projects within the wider research base is a strength of the current UK system that should not be readily compromised.

Disincentives/Sanctions

There are a range of disincentives or sanctions that could be employed to influence application behaviour within the research community. However, many of these are difficult to model given the uncertainty associated with their outcomes. The Project Board looked at options that identified individuals who had been unsuccessful in responsive mode within a certain period and then modelled the effects of excluding them from applying for a specified further period.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£34 million	Individuals who have been unsuccessful with one or more proposal within a year, barred from applying for a further 12 months
Model 2	£8.5 million	Individuals who have been unsuccessful with two or more proposal within a year, barred from applying for a further 12 months
Model 3	£1.7 million	Individuals who have been unsuccessful with three or more proposal within a year, barred from applying for a further 12 months

Savings were significant within Model 1 and moderate in Model 2. However, with overall success rates at current levels (i.e. around 28%) and with many worthy proposals unable to be funded, the introduction of Model 1 could compromise the ability to fund novel and timely research projects. For example, further research within one Council (ESRC) indicated that the success rate for applicants who had previously submitted one previous unsuccessful application was not significantly below the average success rate. With timeliness one of the key dimensions of research quality this could be particularly damaging. The Board believed the risks to outweigh the benefit even for Model 2.

One possibility for mitigating these risks would be to restrict the proposals considered to those which fell below a certain quality threshold but by so doing the costs savings identified above would be dramatically reduced.

The Board did not recommend that this option be considered further as part of the Project. The risks associated with its introduction and the lack of fairness (at least in Model 1) was deemed to outweigh any cost benefits.

However, the Project Board noted that individually the Research Councils may wish to consider whether any action should be taken to deter the small number of individuals who place a disproportionate burden on the peer review system by submitting relatively large numbers of unsuccessful proposals.

The Project Board also noted that it may be possible to include success rates as one of the criteria for supporting other funding decisions. For example, many Research Councils use algorithmic methods to distribute PhD funding. Success rates could be included within these algorithms. The Project Board believed that this should be a decision for Research Councils to consider as part of their standard operations and continuous improvement programmes. It was recognised that the desirability of including success rates in this way would depend upon the overall objectives being sought when using the algorithm.

Incentives

The Board considered the effect of allocating small research grants to universities on the basis of an algorithm. The modelling assumed that grants under a certain value would no longer be accepted by Research Councils but with Councils individually selecting an appropriate threshold value.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£12 million	Assumes small grants (those below a threshold value) all distributed by algorithm and not by peer review

The main concern with the algorithmic method of distribution would be that it would not reduce the number of grants as individuals would simply expand the scope or scale of the proposed research so that the proposal value exceeded the threshold.

The Project Board did not consider that this option warranted further analysis or consultation.

The Board also modelled the possibility of awarding a cash incentive to some departments provided they control application numbers. For simplicity, the modelling took the same top 10% of departments/institutions that had been modelled for the consolidation option and derived a cash payment based on the annual expenditure of the Research Councils within those departments/institutions.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£3.7 million	Assumes 10% reduction in proposals and an annual cash incentive of 5%
Model 2	£2.8 million	Assumes 10% reduction in proposals and an annual cash incentive of 10%

The cash incentives calculated for the departments selected varied considerably across Research Councils being highest in MRC and lowest in ESRC. For some Research Councils the value of the cash incentive was unlikely to be sufficient to reduce demand.

The Board also noted that the departments/institutions selected may simply respond by submitting fewer proposals but of higher value and greater complexity thus offsetting any savings. Other risks noted with the approach were the complexity in internal Research Council administration required to operate the scheme, the effect it may have on early career researchers and on collaborative research and the reduced transparency of process.

Given the limited savings identified and the risks associated with them, the Board did not consider that this option warranted further analysis or consultation as part of the Project.

Charging for Proposal Processing

The merits of a number of possible models for charging for the processing of research grants were considered. For example, such charges could be levied at an individual level or at organisational level, could be refundable for those successful, could be charged in advance or arrears etc. The Board noted, however, that none of the benchmark organisations had adopted such an approach and it was unaware of any such scheme employed elsewhere.

Following its analysis the Board was not convinced that charging would advance the development of either a more effective or a more efficient system. Its introduction would significantly change the relationship between Research Councils and universities and between Research Councils and individual members of the research community. Whilst

charges could be set at a level that would limit numbers it was likely that universities would not respond in a homogeneous way to price changes and the overall effect may be to price some out of the market. This would run contrary to the objective of being able to fund the best research wherever it may be found in the research base.

The extent to which time would still be spent by researchers within institutions in developing research proposals which institutions subsequently decide not to submit due to the charges involved, and the costs and impacts of any institutional procedures needed to make a decision on which proposals merit payment of a charge, are also uncertain.

The other main concern of the Board associated with charging related to the UK's funding regime. Universities and Research Councils are both funded from government and have the shared aim of ensuring that research is funded on a full economic cost basis. If a charge were levied by Research Councils then universities would respond by ensuring such payments were recovered as part of the overhead, in which case any impact on proposal submissions would be limited. Even if, in principle, recovery of such costs could be prevented, government funds would be being passed to- and fro- between organisations in a manner that many participants in peer review would perceive as having no benefit to research. The risk could be a less credible system and a reluctance to participate.

The Board concluded that charging for proposals did not represent a method that would improve the efficiency and effectiveness of peer review. No further modelling was undertaken and no further consultation on this option would be necessary.

Control of resubmissions/recycled proposals

Although the Board did not determine the actual number of proposals that are resubmitted to the peer review system, the number will not be insignificant. Given the improvements to ideas than do occur as a result of peer review advice, such resubmission should not in itself be considered inefficient. Indeed, one approach would be to allow only invited resubmissions. However, for simplicity the modelling here has assumed no resubmissions are accepted.

The Board noted that some Research Councils (most notably ESRC) do have experience in controlling resubmissions. Data have not been sought concerning the time taken to prepare and process resubmitted proposals but potential savings can be extrapolated from the existing data set. The main assumptions are: i) all resubmission is stopped; ii) no additional demand is generated and iii) no further savings are possible in ESRC.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£29.4 million	Assumes 30% recycled proposals and that such proposals take 50% less time to prepare
Model 2	£9.8 million	Assumes 10% recycled proposals and that such proposals take 50% less time to prepare
Model 3	£17.7 million	Assumes 25% recycled proposals and that such proposals take 25% less time to prepare

Potential savings are large but are sensitive to the assumptions made e.g. the effect on demand. One difficulty in the approach is in identifying the resubmissions. When does a submitted proposal stop being a recycled idea and become a genuinely new proposal? ESRC have a process for managing this aspect which involves provision of clear guidance to applicants and consideration of marginal cases by panel members. The ESRC method also avoids invited resubmissions through the selective use of conditional awards.

The Board could not provide any guidance that could be definitively used for identifying a resubmission and which would be robust enough to limit the number of appeals. However, in the light of both the potential savings and the many ways in which the option could be implemented, the Board suggested the Research Councils undertake further analysis concerning the numbers of recycled proposals and in reviewing the possible controls that could be introduced together with their impact. This could form part of a consultation.

8.6.3 Options for reducing the time invested in peer review

Proposal Outlines

Extending the use of outlines in both managed and responsive mode could, in theory, have a significant impact on the cost of the system given the apparent difference in effort of preparing outline and full proposals. With outlines, a limited set of information is submitted for peer review (typically to a panel) with the panel selecting those that should proceed to more conventional peer review. This process is often termed “trriage” or “sifting”. The model assumes that an accepted outline will develop into a full proposal and that this proposal is subject to standard peer review (i.e. both a refereeing and a panel stage).

Although the Research Councils do employ outlines (around 1200 in the benchmarked year), the models were based on all received proposals (managed and responsive) and assumed that none of the current full research proposals had been outline related. This overstates savings but not by a significant amount. A number of variables were explored to assess their overall impact on costs: sift rates, increases in level of demand and increases at time taken to prepare an outline.

Model 1 - Assumes 2 days to prepare an outline. Values (£ million) are cash equivalent.

		Sift Rates			
		40%	50%	60%	70%
Demand level	100%	41.5	56.3	71.1	85.9
	120%	16.9	34.6	52.4	70.1
	140%	-7.8	12.9	33.6	54.3
	160%	-32.	-8.8	14.9	38.6
	180%	-57.1	-30.4	-3.8	22.8
	200%	-81.7	-52.1	-22.6	7.0

Model 2 - Assumes 4 days to prepare an outline. Values (£ million) are cash equivalent.

		Sift Rates			
		40%	50%	60%	70%
Demand level	100%	34.8	47.9	61	74.1
	120%	8.8	24.5	40.2	55.9
	140%	-17.2	1.1	19.5	37.8
	160%	-43.2	-22.2	-1.3	19.7
	180%	-69.2	-45.6	-22	1.5
	200%	-95.2	-69	-42.8	-16.6

The modelling confirms that the use of outlines provides the potential for significant savings but that such savings are very sensitive to the underpinning variables. The most important variable relates to the time it takes to prepare an outline and in this respect the DTZ survey showed such wide variation in response that it recommended using the median rather than mean value. The preparation time of 2 days used in the modelling therefore needs to be regarded with some caution.

The level of sifting also has an impact with more savings obtained at higher sift levels. Research Councils use outlines currently for some managed programmes and sift rates of 50% are readily achievable in that context. Higher levels could potentially be achieved but the Project Board recognised that as sifting rates increased the chance of erroneously rejecting high quality proposals also increases. One aspect to consider is whether high sift rates are so easily achievable in responsive mode. In managed programmes, an important sifting criteria is the degree of fit with the strategic objectives of the programme and these are carefully defined. In responsive mode, the principal criterion is the intrinsic research merit of the proposal.

One of the risks in a system employing outlines is that it could actually stimulate demand from the research community. The modelling shows the cost effect of such increases using the existing volume of proposals and existing costs of peer review as a baseline. The results suggest that at sift rates of 50%+, the system could tolerate demand increases up to 140% of current levels whilst still offering the potential for significant savings. If it was found that sift rates of only 40% or lower were possible then demand increases at 20% or 30% would be sufficient to negate savings.

The main risks identified with the approach are:

- Using outlines stimulates demand.
- Potential of erroneously sifting out a strong proposal is greater than with standard peer review as less information would be available to the reviewers of outlines.
- Increased time for a decision to be made as a result of introducing an additional process step.
- Less feedback to investigators which may undermine one of strengths of the current system.

- May lead to greater conservatism given the limited information available to reviewers (but see below).

The main additional benefits identified with the approach are:

- May encourage individuals to submit more risky ideas.
- Reduces the possibility of funding poor research as any funded proposal would be subject to an additional stage of peer review.

The above analysis indicates that there are a number of uncertainties and risks associated with the use of outlines but that the potential savings are high. The option therefore warrants further work and should be subject to consultation with the research community. In particular, further information should be sought concerning the time it takes to prepare an outline proposal.

Improved Sifting Processes

Many of the Research Councils already undertake some form of sifting process when peer reviewing applications. This typically involves an internal office process based on written assessments provided by referees. Proposals that pass the sifting stage are then subject to some form of additional peer review (further referees and/or panel assessments) prior to a funding decision being made.

The Project Board note that NERC achieves the highest rate of sifting with some 40% of conventional responsive mode proposals being filtered out at the sift stage. The Board modelled the effect of all Research Councils adopting the NERC process and achieving a sift rate of 40%.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£5.3 million	All Research Councils adopt the NERC method of sifting and achieve a 40% sift rate.

The option produces modest savings and these are not at a level that warrants further analysis within the Project. However, individually or collectively the Research Councils may wish to consider further the efficiency possibilities that improved sifting processes may bring.

Tailoring Peer Review

The scope to adapt peer review processes to better reflect the risks and complexities associated with different proposals or types of proposal was considered within this option. Such tailoring is already practiced within some Research Councils.

The Project Board modelled this by considering the proposals that had been classified as simple within the overall portfolio and then assessing the impact of funding them either without a refereeing stage or without a panel stage.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£1.9 million	For simple proposals assume decisions made by refereeing only and without a panel
Model 2	£3.1 million	For simple proposals assume decisions made by panel only and without a separate refereeing step

Based on its analysis the Board does not consider that this option need be considered any further within the context of this Project. The savings are not significant and to some extent Research Councils already operate in this way. The Board would, however, suggest that Research Councils continue to review the possibilities of using more tailored peer review as part of their standard continuous improvement activities.

New or Modified Final Report Review Process

In this option the current requirement for universities to submit final reports for individual grants would be replaced with a reporting system that more effectively captures research outputs or outcomes over time and recognises that individual research grants often combine to form programmes of activity within the research system. Where it currently occurs, peer review of individual final reports to Councils would also be discontinued, except possibly where directly linked to a decision on continued or renewed funding. This option did not extend to cover the financial reconciliation or reporting associated with each grant which the Project Board accepted would still be necessary.

A system to ensure the accountability for research performance and for research output tracking remains essential but the Board believed that alternative systems leveraging the opportunities of IT and existing information depositories offered a more constructive way forward. Such reporting could be supplemented by dipstick audits reflecting the risk and complexity of Research Council investments within universities. The Board also accepted that improvements were occurring with, for example, the extension of Je-S to final reports and that the current system could not be abandoned until a new reporting mechanism is in place.

In reaching its conclusions, the Project Board noted the wide variation that exists between the Research Councils themselves, the fact that some of the benchmark organisations (in particular NSF) have a different evaluation approach and the widely held reservations within the research community about the utility of the current final reports process.

The Project Board modelled this option by making the assumption that the internal and external cost of participating in the system would be an explicit part of the design criteria. This is shown in the following table:

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£5.5 million	Assume new reporting process is operated at 50% of cost of existing system
Model 2	£7.6 million	Assume new reporting process is operated at 25% of cost of existing system

Although these figures are small in comparison to proposal processing, the opportunities to be gained from improving the efficiency of the process are still worthwhile. At the 50% level, this equates to 46 FTE years saved within the academic community.

Furthermore, the Board believe that it is with respect to effectiveness that this option could have significant potential. A system that more effectively captures the outputs and outcomes of research and that can be used to help demonstrate the contribution the research base makes to the UK would be a valuable development.

The Project Board believed that this option could be further developed by the Research Councils. The Board did not see the need for any immediate consultation but noted the advantages of engaging the research community in the design of a new process should Research Councils agree to such a change.

Decision-making by Programme Manager with more limited peer review

The Project Board modelled this option by considering the effect of having an expert Programme Manager make a decision based on advice from either just referees or just panels and with the freedom to moderate the advice given and/or adjust decisions. It was assumed the effect on internal Research Councils costs would be negligible given that any saving in effort would need to be compensated for by paying for a larger number of more specialist Programme Managers.

	Potential cash equivalent savings	Notes and Assumptions
Model 1	£10 million	Programme Manager basis the funding decision solely on referees reports i.e. no panel
Model 2	£25 million	Programme Manager basis the funding decision solely on panel views i.e. no refereeing

In considering the broader effects of the option, the Board noted the views from the research community in the DTZ Pieda report that emphasised the importance of making the right peer review decisions based on the judgement of reviewers that have the right expertise.

In this context, the Board agreed that the option failed to meet at least some of the characteristics it had identified for an efficient and effective peer review system. In particular, the Board noted that the two stage peer review system normally operated by the Research Councils provided valuable checks and balances that served to improve

effectiveness. For example, it helped to ensure that expert opinion was always available on any given proposal, a situation that was less likely to be possible in panel-only assessment given the limited attendees. In addition, the two stage process with its more collective decision-making focus served to strengthen the perceptions of fairness, transparency and impartiality – all key to ensuring the confidence of the community.

The Board did not see merit in undertaking any further work to develop this option or to engage in any further consultation.

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10. ANNEX 1: MEMBERSHIP OF THE PROJECT BOARD

Members

Atti Emecz, EPSRC (Project Leader)

Chris Millward, AHRC

Gerald Owenson, BBSRC

Gary Grubb, ESRC

Tony Peatfield, MRC

Judy Parker, NERC

Andrew LeMasurier, PPARC

Deborah Miller, PPARC (Project Manager)

In attendance

Prue Backway, OSI

11. ANNEX 2: LIST OF OPTIONS CONSIDERED

Option	Summary of discussion
Consolidation of research funding	Potential for cost savings considered high, could build on existing practice of some Research Councils. Detailed cost modelling as part of the Project supported.
Quota of proposals – organisational level	Potential for cost savings considered high, detailed cost modelling as part of the Project supported.
Quota of proposals – department/group level	More complex to administer than organisational level quota, more scope for unintended behaviours, no greater cost savings. Option not modelled further as part of the Project.
Quota of proposals - individual level	A different dynamic to that associated with organisational quotas, detailed cost modelling considered as part of the Project supported.
Modify final reports process	Potential to improve efficiency and effectiveness although more limited cost savings likely to result compared to some options. Detailed cost modelling supported as part of the Project.
Improve sifting process	Building on existing practice, option could improve efficiency. Detailed cost modelling supported as part of the Project.
More tailored peer review	Building on existing practice, option could improve efficiency. Detailed cost modelling supported as part of the Project.
Outline bids	A number of significant risks and uncertainties identified but potential for savings likely to be significant if option could be applied across the portfolio. Detailed cost modelling supported as part of the Project.
Disincentives or sanctions for low success	Various methods possible. Hard to model some of these. However, selected options to be subject to detailed cost modelling as part of the Project.
Incentives for high success	Various methods possible. Hard to model some of these. However, selected options to be subject to detailed cost modelling as part of the Project.
Charging for processing proposals	Difficult to implement to guarantee any reduction in proposal numbers. Different price elasticities would exist. Change dynamic of research system considerably. Option not modelled in detail as part of project.
Control resubmissions	Difficult to definitively define what constitutes a resubmission. Option modelled as part of the project by extrapolation from broader data set.
Publicise departmental success rates	Considered to be part of best practice development. Discuss in report but need not be subject to cost

	modelling.
Programme Manager decision making	Include in report as option but serious concerns about the effectiveness (actual and perceived) of peer review with this model.
Remove investigator response step	Option not taken further. Very little effect on cost and significant negative impact on effectiveness and transparency of peer review.
Identify, develop and communicate best practice	Discuss in report but no detailed cost modelling necessary.
Award research credits for successful proposals	Option similar to that for incentivisation. It would reward those who are successful but no guarantee this would lead to any reduction in proposal numbers.
Commission research projects	By definition possible only in managed modes (some 30% of portfolio), would require detailed specification of the research outcome which could hinder creativity and innovation in research base, would need to restrict eligibility to ensure effect on costs. Option not developed further.
Limit peer review panel meeting time	Should be a consequence of other methods rather than means of improving efficiency itself. Option not developed further.
Award grants at pre-determined fixed level	No obvious advantage in this option, unlikely to improve efficiency and could constrain effectiveness. Option not developed further.
Fund people not projects	Could ossify research base with the system becoming self-perpetuating. Main positive elements captured in consolidation option. Option not developed further.
Different funding streams with different success rates associated	Option suggested one funding stream that would be funded to provide a high success rate where individuals could only apply in limited manner. Other funding stream would be open and highly competitive with lower success rates. Option unlikely to reduce cost of peer review and could even stimulate demand. Option may lead to lower quality research as best individuals have access to more limited funding than is currently the case. Option not developed further.