AIRTO response to Treasury's Consultation
"Science and Innovation Investment Framework 2004-2014: Next Steps".

1. The Government would be interested in views about whether the existing framework for supporting science and innovation enables an appropriate level of risk-taking, and if not, suggestions of how any gap might be addressed.

AIRTO's view is that the existing framework does not enable an appropriate level of risk-taking in several respects:

1.1 The present policy for supporting science and innovation is centred almost exclusively on the universities and is heavily weighted to fundamental research. It seems to be generally acknowledged that this investment in research in the UK is not leading to the level of economic and social benefit that is desirable in order to sustain such expenditure on the university system. Most of the major risks and market failures in converting their scientific discoveries into economic and social benefit are downstream of the activities supported by government, and where they are being addressed it is being expected that the universities will learn how to tackle the problems by building the capacity for knowledge transfer and commercialisation themselves at public expense.

Whilst there is undoubted improvement arising in the university system and an encouraging level of entrepreneurialism is beginning to emerge, this policy is failing to capitalise on the skills and capacity in the intermediate, private sector organisations that, with modest support from and co-ordination with government, could deliver significant additional leverage on the public investment in university research. These organisations are extremely capable of managing the processes required to stimulate and implement the uptake of new discoveries and of translating and incubating new technologies into the marketplace.

Furthermore, if even universities do become increasingly well adapted to deal with knowledge transfer and commercialisation, responding to business needs or market opportunities requires full oversight of the best that the science base has to offer. Universities will know what they themselves can offer, but not generally what the science base as a whole can offer. The intermediate sector offers that cross-cutting oversight.

Recommendation: Government should engage with the intermediate community that specialises in supporting the adoption of new scientific discovery and technology (including AIRTO members) to develop a policy for accelerating the uptake of successful university research results. This dialogue should also include the issue of coupling market pull into the selection of research agendas.

1.2 In academia, a number of shortcomings remain in the development of a culture of risk taking and innovation. These are particularly acute in providing support for the development of younger academics in all round research skills and business awareness, in backing non-mainstream research proposals and in addressing exploitation (as noted above).

Also as noted above, there is an imbalance of support for pure research on the one hand and technology development and technology proving at an early, pre-market validation stage on the other hand. **Recommendation:** There is a need for additional support to proof of technology concept programmes to bring public sector risk-taking into balance with market and competition risk-taking by business.

There is also a need to balance breakthrough research with necessary but incremental r&d in the science base in order to ensure that what has been discovered is fully understood prior to release for exploitation by business, otherwise results are rushed out too early. **Recommendation:** A system of Technology Readiness Levels should be used, similar to those used by the MoD, the Space Agencies and other technologically advanced users, to provide indicators of technological robustness and maturity leading up to commercial exploitation.

2. The Government invites views on measures to remove any remaining bias which unfairly favours established research fields over innovative ones. The Government also invites views on how funding mechanisms can be made more responsive to new research challenges.

Academic dominance in peer review and in the strategic direction of Research Councils tends naturally to bias research towards established areas. This needs to be counterbalanced by positive initiatives to move

into new areas. Such initiatives require grant awarding budgets to attract applicants. EPSRC has made a good start with initiatives such as that on crime reduction and prevention. **Recommendation:** A 'Directing Group', including stakeholders with wide application interests as well as radically minded academics, should be established and empowered to work with the Research Councils to identify and set up managed initiatives in new areas of important market pull. Each initiative should be managed by an appropriate leader who shares the vision behind the selection of such initiatives.

Research in areas already populated by major multinational corporations in the UK will tend to attract research resources at the expense of funding and resources for radical new work in sectors which may have good market potential but as yet do not boast a mature industry base. This tendency can be counteracted by developing communities of smaller players and brigading interest in such areas. **Recommendation:** Use existing mechanisms such as Knowledge Transfer Networks more effectively to guide research in embryonic areas that are not yet populated by Large Enterprises. Use professional intermediate organisations to facilitate such networks and work hard to remove suspicion of such non-public sector involvement in Knowledge Transfer and in guidance of research agendas.

Responsiveness to new research challenges requires incentives to switch into new areas and some certainty of sufficient continuity of support to ensure that a reputation and critical mass can be achieved. It also requires promotion of the challenges and management of communication and enquiries received from potential applicants. **Recommendation:** Establish good, properly funded and professional PR, communication plans and management for research challenges in order to address the cynicism and concerns amongst researchers about change and about the bureaucratic processes that are frequently associated with such initiatives. Use external professionals to achieve this. Also, support discipline hopping career development and industrial secondments for key academics.

3. The Government would welcome views on the barriers limiting greater business innovation and business-university collaboration in the regions, and on what more could be done on a national and regional level to tackle these barriers effectively.

Barriers to business innovation include:
- uncertainty and instability in the market
- lack of market knowledge in new areas
- difficulty in accessing appropriate skills and experience
- inadequate margins in existing business to fund new risk taking

Barriers to business/university collaboration include:
- lack of co-incidence of business and university interests/excellence
- immaturity, lack of experience and lack of credibility on the part some universities in handling the commercial interface (although this improving)
- time and cost required from an industry standpoint to manage the university interfaces coupled with lack of understanding of the academic world.
- academic research, agendas and incentives that are still not sufficiently aligned with business priorities

These problems are more acute when considered on a regional basis and in relation to smaller companies. In many instances the centre of excellence for a technology of interest to a particular company will be in a different region. It does not make sense to treat technology-based collaboration between universities and industry on a self-contained regional basis.

Recommendation:

1. Use professional intermediaries who understand both academic and business standpoints and who can translate, mediate between and train parties on both sides of the interface. There is an existing network of practitioners (in AIRTO, see Annex) capable of doing this.
2. Avoid capacity building internal to the universities with insufficiently skilled/experienced resources.
3. Halt the duplication of resources and capabilities that already exist in the private sector and concentrate funding on areas of proof of concept etc not adequately provided for.
4. Increase national co-ordination of best practice at the university/business interface using a competent business-based and experienced body
5. Increase support for cross sector, cross discipline networks run by competent KT professional, as these interactions stimulate innovation and cross fertilise awareness and experience

4. The Government would welcome views – in particular from outside Higher Education - which can be taken into account in developing best practice models for business/university collaboration. In addition, the Government would welcome views on how to encourage businesses to work with universities for the first time, perhaps by introducing short-term, low-cost mechanisms for business-university interaction.

Costs paid to universities by businesses using them for the first time are not really the main problem. It is the time taken to search out the contacts and resources and to learn how to use and manage them that present the greatest difficulty for business. For those unfamiliar with the academic system it is also highly likely that early expectations will not be met, unless there is a degree of hand holding by those who do have the appropriate experience. This is compounded by the fact that universities don't usually manage their clients in the way businesses would and therefore the management burden tends to fall more heavily on the business side. This can be a major deterrent. **Recommendation:** Intermediaries should be encouraged and supported to take on some of the challenge of interacting with the university research base, particular for smaller companies, but this needs an element of public sector underpinning for these costs (which are hopefully non-recurring) through schemes such as Knowledge Transfer Networks (which have followed on from the Faraday Partnerships in tackling this challenge).

5. The Government would welcome views on whether all large facilities operations should be integrated under a new Large Facilities Council, or whether there is a case for some facilities to remain under the management of other Research Councils.

There is probably a case for some facilities to be integrated into the proposed large facilities Council but for some to remain with individual Research Councils. This would depend on the degree of the synergy (or lack of it) in relation to the other facilities going into the new Council and on the strength of the relationship to grants awarded by the existing owning Council. **Recommendation:** Facilities should be transferred to the new Council on a case by case basis, depending on the strength of the ties between them and with the relevant grant body or bodies.

6. Furthermore, in the event of a merger, should the grant-giving functions of PPARC be moved to EPSRC?

We would be opposed to the transfer of PPARC's grant-giving functions to EPSRC. It would fragment cohesiveness in PPARCs areas of research and undermine the acknowledged best practice in areas such as Knowledge Transfer, where PPARC has been judged to have achieved a leading position amongst the Research Councils (see the outcome of the recent RCUK External Challenge on Knowledge Transfer). It may be appropriate for some areas of EPSRC grant-giving that are closely associated with the facilities in question to go to the new Council or to be jointly assessed.

It would further be regrettable if PPARC's branding and leadership in its areas of science were to be lost. Our preference would therefore be to see PPARC managing large facilities to support their own and other key areas of science, rather than have the new Council focus primarily on the facilities themselves and their promotion.

Recommendation; PPARC's grant giving function should remain with the new Council. Also, PPARC should retain a high public profile in the presentation of the new Council and a leading role in its management.

7. The Government would welcome views on what further measures could be taken by the Research Councils to improve their effectiveness

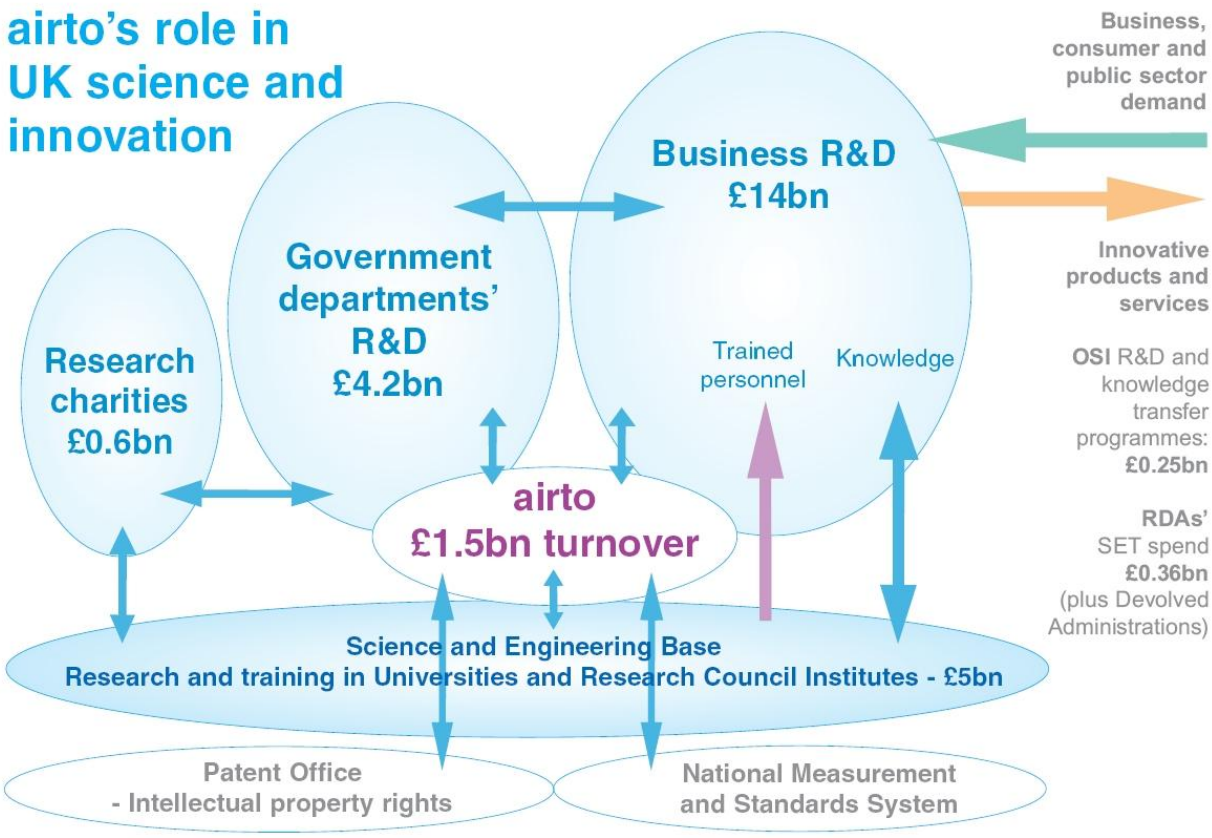
Accepting that the Research Councils are, by and large, doing a good job and that they are continually raising their game, the AIRTO community would, from its very considerable experience of working with a number of Councils across many areas of interest, wish to offer a number of recommendations.

Recommendations:

1. Research Councils should take a hard look at their Knowledge Transfer operations to follow the recommendations of the RCUK External Challenge.

2. They should encourage more of a two way dialogue with business with the objective demonstrating that the views of business stakeholders are being used to underpin strategy and prioritisation.
3. They should employ more people with experience in business and industry in order to increase understanding of business perspectives and the ability to talk businesses' language at the knowledge transfer interface.
4. They should undertake a PR programme to set up the most favourable conditions and expectations for successful knowledge transfer and to ensure that business and other stakeholders perceive them in the correct light.
5. They could very usefully involve more high quality business-based but appropriately qualified and experienced peer reviewers.
6. They should consider screening grant applications first for 'relevance', using business-based reviewers, and then for scientific quality, using academic reviewers. This follows a successful pattern used in some EPSRC application focused programmes.
7. They could very usefully take more responsibility for and become more involved with proof of concept follow on measures (in conjunction with HEIF etc) rather than taking the view that this is primarily the responsibility of other parties.
8. They should strengthen the role of RCUK in order to achieve really effective co-ordination.

ANNEX – AIRTO positioning in the UK Science and Innovation System



The AIRTO Network – connecting you to science and technology.

AIRTO is a network of organisations connecting public and private sector end users to fundamental research and the science base. AIRTO companies help their clients (which include government departments) to understand, direct, adopt, apply and commercialise science and new technology. They also develop new

technology and, by their understanding of industry, help end users to implement the most appropriate technical solutions.

AIRTO companies add value for their clients by building, maintaining and supplying professional resources, networks and capability for:

- applied research, development, implementation and commercialisation of technology
- independent advice, consultancy and training
- knowledge transfer and professional networking to global markets
- independent product and process validation.

Clients are often those who do not maintain full in-house capabilities for reasons of cost and flexibility or their need to access higher quality and more widely experienced professional expertise than could be profitably maintained as an internal resource. AIRTO members also serve clients seeking independent opinions, advice and validation concerning scientific and technical matters, including strategic direction and policy.

These services are usually commissioned on a fully commercial, competitive basis or, where there are market failures, at rates underpinned by competitively awarded government contracts or grants.

AIRTO's membership comprises a mix of private companies, non-profit distributing companies limited by guarantee and publicly owned bodies, including university industrial enterprise offices. The combined business base Of AIRTO members is in excess of £1.5Bn in r&d, professional networking and other services. AIRTO members employ more than 20,000 scientists, technical and business staff.

Members' clients include companies and organisations of all sizes, ranging from blue chip multinationals to small start-ups, from the UK and Europe to the US and China.

Working with individual clients or groups of companies, many AIRTO members assist in matching public sector support for collaborative r&d with industry need and resources. This is frequently in the context of formal schemes such as Knowledge Transfer Networks. These services are particularly valued by technology based SMEs.

The broad, multi-sectoral client networks and value adding services of AIRTO members leverage a significant impact from the knowledge and expertise which they bring to bear, particularly for knowledge and technology originating from public sector investment.

Quality of work is evidenced by professional accreditation, client experience, levels of repeat business and financial performance.