Funding and Management of UK Civil Space Activities

Institute of Physics submission to a Department for Business, Innovation and Skills Consultation

A full list of the Institute’s responses and submissions to consultations can be found at www.iop.org

14 October 2009
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UK Space Consultation
c/o Emma Lord
Assistant Director for Finance and Communications
British National Space Centre
C204 Polaris House
North Star Avenue
Swindon SN2 1SZ

Dear Sir/Madam

The Institute of Physics is a scientific membership organisation devoted to increasing the understanding and application of physics. It has an extensive worldwide membership and is a leading communicator of physics with all audiences from specialists through government to the general public. Its publishing company, IOP Publishing, is a world leader in scientific publishing and the electronic dissemination of physics.

The Institute welcomes the opportunity to contribute to the Department for Business, Innovation and Skills consultation on the funding and management of UK civil space activities.

The attached annex highlights the Institute’s response to the questions listed in the call for submissions.

If you need any further information on the points raised, please do not hesitate to contact me.

Yours faithfully,

John Brindley
Director, Membership and Business
The funding and management of UK civil space activities

Question 1 What are the major issues - if any - that in your view limit the ability of BNSC to deliver a successful UK Space Programme? Conversely, what aspects of the current BNSC structure work effectively? It would be helpful for responses to give evidence based on direct experience of working with BNSC.

The UK currently has a very successful space science and technology sector. The sector employs more than 19,000 people in high-skilled jobs and contributes more than £6.5 billion to the UK economy\(^1\). The UK is also a world leader in technologies for small satellites and space robotics and is home to leading companies and subsidiaries such as Astrium and SSTL. The strength of UK space science research, funded predominantly through the Science and Technologies Facilities Council (STFC), is evidenced both by this industrial strength but also by the size and breadth of the field\(^2\). The 2005 International review of Physics\(^3\) noted the UK’s “exceptionally strong standing in solar physics as well as space-based and ground-based space physics”. This has been built in the current model, with the British National Space Centre coordinating the constituent UK agencies and bodies. As such, the question must be: ‘how can this success be built upon?’

In answer to this, there are some areas where the UK could work to improve its standing, for example, in terms of industrial application and the position of the UK space industry within Europe. There have been suggestions from overseas companies and agencies that they find it difficult to identify the ‘front door’ to UK space science. The fragmented nature of the funding mechanisms, across two research councils and five government departments, has meant that other, more coherent, agencies such as those run by Italy and Germany often take the lead in European space activity/research.

Domestically, there is pressure being placed on public investment in UK space science research. A large part of the UK’s European Space Agency (ESA) subscription is the responsibility of the STFC, and this commitment is limiting the council’s ability to fund research in the fields of space science, together with the rest of its portfolio. The STFC contribution to the ESA subscription has increased by 40% over the last three years, partly due to fluctuations in the British Pound-Euro exchange rate which has increased the effective cost of the ESA subscription, and also a recent renegotiation of the agreement between the UK and ESA which has expanded the UK’s operational commitments. The finite budget allocated to the STFC has resulted in this increase needing to be absorbed by reducing research funding accounts, damaging research in space science and related fields.

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\(^1\) Case4Space Summary Report, October 2006
\(^2\) One in five FTE in UK physics departments works in the combined field of ‘Astronomy, Astrophysics, Cosmology & Space Physics’. Source: Survey of Academic Appointments in Physics 1999-2004, Institute of Physics, 2005
\(^3\) 2005 International Review of UK Research in Physics and Astronomy
Question 2 Compared to the current partnership, is there a case for considering different institutional arrangements for funding and managing UK civil space activities? What possible alternative models might the Government consider, and what are the potential benefits and disadvantages of these models?

The consultation document hints at an alternative structure which might be described as a UK Space Agency, an umbrella body with overarching responsibility for and leadership of the broad space science and technology landscape; this was also suggested by the Science and Innovation Minister at a subsequent speech and it is this proposal which will be addressed in the remainder of this submission.

An important point to consider about the current partnership model is its low cost, demonstrating good value for money, and also its associated low level of bureaucracy. Any changes to the governance of space science and technology should not disrupt this. In fact, it could be argued that for any changes in management structure to be justified, a greater funding commitment to space science and technology will be needed to avoid creating a ‘white elephant’ agency, adding bureaucracy at the expense of research and technology.

Advantages of an agency would be an outwardly coherent structure for inward investment and collaboration. Currently within Europe, the three main space ‘power houses’ below ESA level are: CNES (France), DLR (Germany) and ASI (Italy). An important factor to their success is having a co-ordinated national agency approach which enables both companies and international agencies to interact at a strategic level. For the UK to be able to replicate these successes, a new agency should be above small bureaucratic fiefdoms and allow cross-fertilisation of ideas and technologies across the space services, research and technology communities. Another advantage of an agency would be greater clarity in how and where space science and technology is funded.

An area where attention must be paid in an agency structure is the means by which research funding on space science is allocated. The directed nature of much of space research and development must not mean that curiosity-driven space science research is diminished. It is this, an area that is unlikely to be funded by industry alone, which is the foundation for the success of the UK in space science and technology, and a larger more directed agency must not be to the detriment of scientific freedom.

Additional Questions: To strengthen the analysis, your views on the pros and cons of the potential alternative structures versus the current partnership would be welcomed on any or all of the following issues:

Question 3 Maintaining and developing a UK space capability in industry and academia to meet UK needs, including our international commitments.

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5 The United Kingdom’s Civil Space Activities, The National Audit Office, 2004
The UK’s involvement with ESA has been hugely beneficial, both in terms of the economic benefits to UK industries, and also through the opportunities for UK scientists to work with colleagues in Europe on large-scale projects. The ESA subscription commitment is different from other overseas scientific subscriptions, not only because it is in Euros (with the associated exchange rate problems described in the answer to question 2), but also because there is a direct financial benefit through the juste retour procurement process\(^6\). In this way, money spent on the ESA subscription returns to UK as direct industrial subsidy, and this investment creates significant multiplier effects. The space industry generates £6.5 billion of UK GDP and directly supports over 19,000 jobs (up to 68,000 jobs when further multiplier effects are taken into account)\(^1\). This direct economic impact should be preserved and promoted through retaining the ESA subscription. However, this should not be tensioned against direct public funding for space science research: it is the UK’s research capability that enables these multiplier effects. Investment in UK space, including the annual subscription to ESA, has increasingly been shouldered by the research councils, specifically STFC: the share of space funding allocated from STFC (PPARC/CCLRC) has increased from 23% in 2000/1 to 44% today, while the contribution from the lead government department (DIUS/BIS) has decreased from 51% in 2000/1 to 28% today. Over the same period the overall ‘space budget’ has increased by £90 million\(^7\).

For the ESA commitment to be maintained without damaging research in physics and astronomy, the subscription and the financial risks associated with fluctuations in the currency markets should be taken outside the limited STFC budget. This subscription could even be taken outside the ring-fenced Science Budget, and instead reside with the government department with overall responsibility (as per the current Treasury rules), in this case, the Department for Business, Innovation and Skills. Space science does not exist in isolation, and the UK’s successes would not be possible without a broad base of physics and astronomy research. This is true both in terms of knowledge transfer from other areas, but also the UK’s international scientific reputation as a whole and its ability to attract the best scientists from around the world, boosting the UK’s research capability.

An important role for any new agency would be to protect and enhance the UK’s industrial space technology and services capability. This should not focus solely on the current market leaders, but should also include opportunities for innovative SMEs. Through adding new areas of funding for SMEs and working with them to enable them to bid for ESA contracts, a broader industrial base can be supported and overall capability enhanced. Additionally, a new agency could also work to promote new markets such as space tourism within the UK.

**Question 4 Playing an effective role in defining future European and global projects**

A clear benefit of an agency would be its ability to provide a coherent voice for UK space science and technology with which the UK can communicate with both national and international agencies. This would enable the UK to have an even greater say in the

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\(^6\) Article VII of the Convention of the European Space Agency
\(^7\) http://www.bnscc.gov.uk/About%20BNSC/How%20we%20are%20funded/8012.aspx
directions that ESA takes and would have the associated benefit of directing programmes toward areas where the UK has a strong industrial and scientific base.

**Question 5** Enabling the views of the research communities in Environmental and Space Science, and the wider user communities, to be taken into account in decision making on new projects/programmes, thus maintaining a user driven approach.

A user-driven approach, or at the very least, a governing agency which is responsive to the strengths and needs of its communities will be essential if the strength of UK space science and technology is to be preserved and built upon under a new arrangement. The UK has strength in specific industrial sectors and, while these must be supported, there should also be a continued focus on opening up new areas of technology and promoting innovative SMEs. The Technology Strategy Board’s expertise means it is well placed to inform such an exercise.

**Question 6** Maintaining the Haldane principle in determining decisions on Space and Environmental science opportunities.

Under an agency structure it is clear that there will be a need to focus directed programmes of research on priority areas. However, the need for this directed research should not ignore the need to also conduct curiosity-driven research, where decisions to fund are driven by excellence and based on peer review – this is the Haldane principle as we understand it. In some senses, it might be that a new management structure will not greatly affect the existing tensions between directed and curiosity-driven research which are being felt by the physics community, however the Institute is of the view that the Haldane Principle should be restated along the lines recommended by the RCUK Review of UK Physics\(^8\).

**Question 7** Achieving an overall balance across the science, innovation, exploration and operational opportunities for space, and ensure the exploitation of space assets across academia, industry and government.

A new agency should work to ensure that there is a cross-body approach to decision making regarding funding and exploitation of space. The UK currently participates in a number of optional programmes within ESA, such as Aurora\(^9\), and while these additional direct commitments have been accounted for in the government funding allocations, the resources available for grants to academic research groups have not kept pace, so limiting the ability of the UK to fully exploit the investments made in joining such programmes.

**Question 8** Developing the proposed ESA facility and a coherent and complementary national space centre capability.

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\(^8\) RCUK Review of Physics 2008

\(^9\) http://www.esa.int/esaMI/Aurora/
The ESA facility that will be constructed at Harwell has the potential to be a catalyst for a stronger ‘Space Cluster’, building on the existing high-technology industries in the area. In keeping with wider strategies to promote clusters across the science and innovation landscape, a space agency should focus on removing potential barriers for interactions between companies and researchers, creating an environment where collaborative work can flourish. An overarching agency may have more success in this area than the current partnership.

Question 9 Advising government on space funding in the context of future spending reviews, and tensioning this against other spending priorities

No comment.

Question 10 Negotiating with government departments and industry to deliver their engagement in space activities

The ability to bring departmental budgets together in common aims is a key argument for the creation of a space agency. The current funding of the BNSC and UK space science and technology is split between the research councils (which carry the bulk of the costs) and five government departments, each with their own objectives and programmes. One issue is the lack of visibility of current departmental R&D investment, and a new agency will need to gain high-level access to departmental R&D strategies. To enable this, consideration should be given to representing the departmental Chief Scientific Advisers of lead departments on the governing board of a new agency, together with the GCSA.

Within industry, there is a need to consult widely on current and future technological and market opportunities, promoting a business-led ethos. The Technology Strategy Board is well placed to conduct such consultations. It is essential that the ability of UK-based industry to bid for overseas contacts is enhanced by the new arrangements.

Question 11 Promoting UK wealth creation through the effective exploration by UK business of upstream and downstream market opportunities

No comment.

Question 12 Ensuring proper tensioning between expenditure on civil space activities and other priorities across Government

No comment.

Question 13 Ensuring proper accountability for expenditure, including - if new budgetary arrangements are proposed - which department is best placed to oversee this expenditure

The nature of the research and the close relationship between space science research and basic research in astronomy and particle physics suggests that the overseeing department should be that which also contains the Science Budget, currently BIS. The key point however should be to ensure strong linkages across the other contributory
departments: DECC, MoD, DfT and DEFRA. There are opportunities for savings to be made through collaborative programmes; to facilitate this departmental Chief Scientific Advisors should play a key role together with the GCSA.

**Question 14 In addition are there any other issues that need to be taken into account that would help the UK maintain its excellence in any aspect of space activity?**

No comment.
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