

COMMENTS FROM THE NATURAL ENVIRONMENT RESEARCH COUNCIL FOR THE DEPARTMENT FOR BUSINESS INNOVATION AND SKILLS CONSULTATION ON FUNDING AND MANAGEMENT OF UK CIVIL SPACE ACTIVITIES

1. These comments are submitted on behalf of the Natural Environment Research Council (NERC) and represent their independent views.
2. Details of NERC Research and Collaborative Centres and major programmes are available at www.nerc.ac.uk

Summary

3. NERC is a major funder of Earth Observation (EO), and this response focuses on that sector, but with implications for the UK approach to space in general. The following principles underpin NERC's response:
 - maintaining a user-driven approach to UK civil space activities;
 - delivering excellent, integrated environmental science and applications;
 - identifying a structure to improve the way the UK supports long term observation programmes; and
 - aligning responsibility, accountability and benefits, and ensuring that tensioning occurs first between activities with common objectives.
4. To support the response, NERC has analysed five models for organising UK civil space activities. Two of these relate to the creation of a new UK Space Agency. We distinguish between factors dependent on increased space spend as opposed to those inherent in each model. In all models, NERC would welcome a strengthened national approach to space technology development and the opportunity to realise the benefits of the new ESA facility in the UK.
5. Overall, on balance, NERC suggests that a proposed new Earth Observation Partnership has the best chance of ensuring that the nation has access to the climate/environmental observations needed: for world-class science, to respond to climate change, seize associated green economy opportunities, and maintain a healthy space technology capability.
6. NERC recognises advantages as well as disadvantages of a space agency model, and suggests herein mitigation strategies to address some of its weaknesses.
7. NERC would welcome the opportunity to contribute to a broader debate on the approach to UK civil space activities based on the points raised in this response.

Discussion

8. NERC being the main funder of EO science in the UK has a view about these matters that perforce is distinctive relative to the science and technology providers themselves. Our perspective arises from having the experience and responsibility

for orchestrating the relevant ESA subscription, for creating institutional arrangements to ensure long term delivery of national capability and nurturing the science in the academic community as well as the knowledge exchange with the public sector and industry. It is the health of this research and innovation ecosystem, rather than just one part of it, that drives our input to this consultation. It means our holistic view can differ in some respects from other consultation responses.

9. Given the nature of NERC business, our response focuses on the use of space (notably EO) for environmental science and broader environmental applications. The important role that EO plays in environmental science is well recognised and supported strongly by NERC, most notably in the creation of the National Centre for Earth Observation (NCEO, recently launched by Lord Drayson), and the major investment made by NERC in ESA EO programmes. Equally, the difficulty the nation has faced in supporting EO for operational and commercial applications (apart from in meteorology) is also well known. Given NERC's role, this response is therefore highly germane to the consideration of new models for the funding and management of UK civil space activities.
10. Much of the debate in the space sector and government has focussed around the development of a UK space agency, based on an executive agency reporting to a Minister. Whilst it is recognised that the actual consultation is not specific about particular organisational models it is felt important to provide some direct comments on this issue. The analysis in NERC's response shows advantages to the creation of an executive space agency, for example in stimulating the development of a national space technology programme. There are also disadvantages, notably in distancing major users of space from space programmes and the associated prioritisation decisions.
11. It would be particularly damaging to science and the associated economic impact if the creation of an executive space agency introduced a fracture between most environmental science research, and environmental research using EO (for example by moving NERC research programmes which exploit EO into the Agency). Environmental research is advancing through the integration of observations (space and *in situ*), models and theory, across the full Earth System. Space observations are at their most powerful when used in this way. In contrast, integration of EO with other areas of space research, would be an entirely inappropriate segmentation along technique, rather than science driven lines, and would greatly hinder the delivery of integrated, world-class environmental science and applications. It should be noted that the volume of UK environmental science outputs and citations are second only to the US, and the citation impact of UK environmental science is the highest in the G8¹.
12. Many of the potential advantages of an Agency rely on significantly increased civil space expenditure. It has been made clear that this consultation is not about increased funding, and in the current economic climate, even recognising the

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http://www.dius.gov.uk/science/science_funding/science_budget/~media/publications/I/ICPRUK09v1_4

Space Innovation and Growth Team work, it seems unlikely that significant additional public sector investment in space will be realised.

13. NERC has sought to identify other organisational models which maintain the user-focus, but also address the challenges of supporting long-term monitoring. It is important to recognise that the problems the UK has faced in operational EO are a symptom of a broader national disconnect in the support of long-term observations of the environment, be they terrestrial, marine, atmospheric or from space. To make any sense to user requirements, the issue of support for long-term observations of the environment must be tackled holistically, not just by tackling one – the space - sector.
14. Getting this right is important – the nation needs to respond effectively to climate and environmental change, and seize new market opportunities, for example in the provision of climate services. These rely in part on global, consistent and timely observations of the environment. The new facility at Harwell will have a key role to play in this domain.
15. With these points in mind, NERC has identified a model based around a much strengthened partnership between the public sector funders of EO – working with the space industry. This would operate using defined prioritisation criteria and a clear governance structure, preferably led by a Minister. There is a good opportunity to learn from the new approach taken to marine science coordination across government following the recent Marine Bill and the establishment of the Marine Science Co-ordination Committee (MSCC).
16. There are excellent platforms from which to build this partnership – most notably the multi-agency Living With Environmental Change programme (LWEC)² and the UK Environmental Observation Framework (EOF)³. EOF is already developing the necessary criteria and governance structure for environmental observations in general.
17. Whilst fully recognising the importance of maintaining and strengthening our domestic industrial and academic space capability, the UK must not fall into the trap of ‘putting the cart before the horse’. Some other nations have fallen into this trap – leading to examples where there is a major disconnect between space funding and research funding, and between observational capability and provision of environmental services. This greatly harms the scientific and environmental service ‘pipeline’ and limits economic impact.
18. Recent, highly respected reviews such as the Stern Review⁴ and Millennium Ecosystem Assessment⁵ indicate the enormous economic implications of environmental change. It is therefore essential that we continue to put user requirements, be they scientific or operational, as the primary drive and direction for UK civil investments in space. It is fully recognised that this must go with a strengthened partnership between users and providers of space technology. This

² <http://www.lwec.org.uk/>

³ <http://www.erff.org.uk/activities/uk-eof.aspx>

⁴ <http://www.occ.gov.uk/activities/stern.htm>

⁵ <http://www.millenniumassessment.org/en/index.aspx>

overall approach will also be crucial if the new ESA Harwell facility is to be successful.

19. NERC fully recognises the importance of reinvigorating national investments in space technology. Whilst NERC has fought hard in ESA to ensure missions are selected by peer review according to scientific excellence, we fully accept the importance of preparing technology and concept studies nationally – so that proposals from UK scientists go into competition from a strong position. NERC, with the Department of Business Innovation and Skills (BIS) (now through the Technology Strategy Board (TSB)) has fostered a pioneering partnership with industry in the Centre for Earth Observation Instrumentation (CEOI). Furthermore, technology is a key strategic theme for NERC, and we are targeting increased funding on environmental technology in general. We would therefore welcome a national approach to space technology development.
20. NERC recognises that the Government may decide to support an executive space agency model. NERC would of course work closely with the Government to develop a structure which would ensure that we can continue to deliver excellent environmental science, try to ensure that the Haldane principle is maintained and that excellence continues to play the key role in environmental science mission selection. To support the Government, the attached analysis indicates some mitigation strategies which could help to address some of the weaknesses of an Agency model, whilst benefiting from its advantages.
21. NERC has suggested an alternative option for consideration - a strengthened partnership model. On balance, NERC suggests that this proposed Earth Observation Partnership has the best chance of ensuring that the nation has access to the climate observations needed to respond to climate change, seize associated green economy opportunities, and maintain a healthy space technology capability.

Specific Comments

<p>Q1. 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.</p>

What aspects of the current BNSC structure work effectively?

User-led approach

22. BNSC follows a user-led approach, which has helped the UK to ensure that the ESA programmes deliver what users need, rather than being driven by other interests. An excellent example of this was the creation of the Earth Observation Envelope Programme (EOEP), which put environmental science need at the heart of decision making of an environmental science programme – for example, through the introduction of peer review. The UK led the development of EOEP. The Department of Trade and Industry (DTI), then the BNSC lead department,

worked closely with NERC, academia and industry to influence other member states, and transform the ESA approach to EO programmes.

23. Since the introduction of EOEP, NERC-funded scientists driven by the excellence of their proposals have achieved a very high level of success in securing new Earth Explorer satellite missions. Most notably, this includes scientific leadership of Cryosat (the first Opportunity class mission), EarthCare, and potentially Biomass and Premier, together with key scientific roles on every other Explorer mission. Whilst previous missions such as Envisat have provided an excellent scientific return, there is now a much greater focus on scientific requirements. This helps to ensure that ESA deliver the required observations and avoid over-complex instrumentation.
24. Following a user-led approach ensures that the user agency is directly involved from the preparatory phase of a new mission, through development and exploitation. This strongly increases the potential for the fullest exploitation scientifically as funding and communities are aligned, and for pull-through into public sector and commercial applications – because of the strong ‘pipeline’ between basic science, applications and benefits operating in the environment sector (e.g. through NCEO, Joint Climate Research Programme and LWEC).
25. The user-led approach also ensures that, in the environmental sector, space technologies are considered an integral tool – together with other methods of observation, modelling, theory and practice – and are properly tensioned against other environment investments. This integrated approach in environmental science (fundamentally because the Earth’s environment is accessible) is quite different from the use of space for planetary science, astronomy or fundamental physics.
26. The importance of a user-led approach, and relevant tensioning, was noted by the Government when NERC become responsible for the ESA EO Science budget in 2003⁶:

“The changes I am announcing today will improve our ability to choose in future between competing priorities. This can only be good for the space community at large.”

"The transfer of funds to the Research Councils ensures that those with the appropriate expertise and policy responsibility will have a closer influence over future space programmes in their areas of scientific expertise."

Representation at ESA Boards and liaison with the space industry

27. BNSC provides good representation at ESA Board meetings. The range of partners interested in space could easily give rise to confusion, e.g. how to staff the range of ESA Boards covering ESA Council, Administration, Industrial Policy etc as well as the Programme Boards. Working together as BNSC, the partners have been able to present a single ‘face’ to ESA and the other member states – and

⁶ <http://www.bnsc.gov.uk/10111.aspx>

clearly set out our priorities. Similarly, BNSC fosters the liaison between public sector funders of space and the space industry.

National partnership

28. Focussing particularly on the EO sector, the partnership approach has also encouraged joint working between NERC, Met Office, Department for Environment, Food and Rural Affairs (Defra) and BIS staff, in common teams – and this joint working has been welcomed.
29. At its senior level, the UK Space Board has also ensured the opportunity for the main public sector funders of space to work together, to direct the overall BNSC effort.

What limits the ability of BNSC to deliver a successful UK Space Programme?

30. BNSC needs a strong hub if the partnership approach is to be most effective. Whilst for many years DTI (now BIS) played this role very effectively, the human and financial resources available centrally have reduced markedly. This has had a catastrophic effect on the national space technology programme, which has all but disappeared, weakened the potential to stimulate new space applications (where a primary customer has not yet been identified), and resulted in reduced experience and capabilities of HQ staffing.
31. Secondly, the UK has failed to address the problems associated with its current approach to long-term environmental monitoring on both a national and an international basis. There is clear evidence for this failure in the extreme difficulties faced in preparing a UK subscription for the ESA Global Monitoring for Environment and Security (GMES) and Jason programmes. However, it is not a space issue *per se*, as it affects all environmental observations – *in situ* marine, terrestrial, atmospheric as well as those made from space, and it will only be resolved effectively by tackling the whole problem.

Q2. 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?

32. Recognising the weaknesses in the BNSC model, it is appropriate to consider different arrangements for funding and managing UK civil space activities. In looking at the pros and cons of different arrangements, it is important to distinguish between fundamental changes arising from a new structure, and those associated with increasing civil spend on space. Whilst one could argue that additional investment might be identified by improved prioritisation or efficiency savings within existing spend, it is our view that this approach will either damage existing important areas or not provide anywhere near the level of additional funding needed.

33. NERC has analysed five models, with an overall summary provided at Table 1, on page 15. The models considered are:
- a. Status quo
 - b. Maintain partnership structure, but with ESA funding held centrally
 - c. Executive space agency for technology and missions, reporting to a government Minister
 - d. Executive space agency for technology, missions and exploitation, reporting to a government Minister
 - e. The NERC proposed Environmental Observation Partnership (see para 35 - 36).
34. Models a. and b. are self-explanatory. Models c. and d. see the formation of an Executive agency responsible for civil space, reporting to a Minister. In c., the scope of the agency covers technology and mission development. In d., the agency is also responsible for the scientific and application orientated exploitation of space data.
35. In model e., it is proposed that the main UK funders of environmental observations (e.g. NERC, Met Office, Defra, Environment Agency and Scottish Executive) agree on requirements, criteria for prioritisation and joint funding bids for supporting long-term environmental observations. Such planning is already underway as part of the UK Environmental Observation Framework project³. This approach would provide a platform for strong engagement with the space industry and academia, and other funders of space technology in an integrated approach to environmental observation.
36. The commitment and ability of these environmental partners to work together has already been demonstrated by the LWEC programme. Furthermore, the example of the new Marine Science Co-ordination Committee has shown how strong co-ordination with Ministerial leadership can transform a previously weak co-ordinating body in the environment sector, so there are good models to learn from.
37. These models are referenced in responding to Q3-13 of the consultation. Additionally, the following factors have also been considered as part of the cover note to this analysis:
- Maintaining user focus
 - Delivery of environmental science priorities and associated impact
 - Addressing long-term environmental observations

In some cases, steps which could be taken to mitigate any identified weaknesses are also identified, particularly in regard to the Executive agency models.

Models

- a. Status quo
- b. Maintain partnership structure, but with ESA funding held centrally.
- c. Executive space agency, reporting to a government minister (technology, missions)
- d. Executive space agency, reporting to a government minister (technology, missions, exploitation)
- e. Environmental Observation partnership

Q3. Maintaining and developing a UK space capability in industry and academia to meet UK needs, including our international commitments.

- a. Over the last 15 years, NERC has been implementing strategies to build Earth Observation capability within the environmental science community, and in partnership with industry. Most recently, this been through the creation of the National Centre for Earth Observation (NCEO), the Centre for Earth Observation Instrumentation (CEOI) with TSB, and major subscriptions to the ESA Earth Observation Envelope (and other) programmes. These together with other related research and infrastructure funding represent a very strong commitment to strengthening national capability in EO.

It should be noted that NCEO has recently been accorded ‘established’ status within NERC, recognising that it is providing national capability and represents an enduring requirement for environmental science.

- b. **Weakened**, because of separation of funding decisions from user-base without any additional benefits in supporting national capability, for example in basic space technology and instrumentation.
- c. **Potentially Strengthened**, if the new structure secures additional funding to support a national space technology programme, whilst recognising that the link to users is weakened.
- d. **Weakened**, whilst recognising the potential benefits of a stronger national space technology programme, separating the exploitation of EO in environmental science, from the rest of environmental science research will have a significant detrimental effect on the delivery of UK environmental science priorities and translational research meeting user requirements.
- e. **Potentially Strengthened**, as requirements and partnership funding structure will be more clearly set out. This will ensure the UK can develop its capability along better defined lines.

Q4. Playing an effective role in defining future European and global projects.

- a. NERC, working with its partners in BNSC, has played a strong role in influencing European projects, most notably in the creation of the ESA Earth Observation Envelope Programme (currently around €300M pa) – a paradigm shifting approach to EO for environmental science in Europe. The BNSC partners have also taken an active role in the definition of the GEO initiative and are funding a UK GEO Co-ordinator post, based at the NCEO.

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The UK role on long-term monitoring using EO to support environmental policy and applications has been far less good – notably leading to limited opportunities for the UK to influence the GMES programme.

- b. **Weakened** – as less engagement nationally with the core of user organisation business will reduce our credibility and influence internationally.
- c. **Potentially strengthened** – if through additional investment in a national space technology programme, the UK can pre-position technologies and instrumentation to lever European and global projects.
- d. **Potentially strengthened** – as c., whilst recognising the disadvantages identified elsewhere to the inclusion of exploitation within the agency.
- e. **Potentially strengthened** – clear views of UK requirements emerging from this model would help the UK to identify its European and global requirements.

Q5. 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. One of the fundamental roles for NERC (as with any other Research Council) is to consult with its scientific and stakeholder community regarding priorities for new programmes. NERC does this in a number of ways: formal consultation on strategy documents; development of action plans to respond to our strategy by community-based Theme Leaders; and community and stakeholder based advisory and decision making boards. In particular: Space industry and academic leaders have been members of NERC's decision making Council, and Science and Innovation Strategy Board, as well as our peer review committees; NCEO is playing a key role in drawing in the views of the EO community; and NERC funds a dedicated team at BNSC who work with industry to help secure key roles for UK industry on ESA EO missions.

NERC also has a very active relationship with public sector users of environmental science, mediated through the involvement of relevant Chief Scientific Advisors on NERC Council, regular bilateral meetings, and co-design and development of the major LWEC programme.

- b-d. **Weakened** – as described above, a key role for Research Councils is to engage with their research communities and stakeholders. NERC doubts that in the field of environmental science the levels of engagement and knowledge covering the full needs of environmental science could be developed by another agency, without enormous duplication.

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Mitigation – the risk identified above could be mitigated by asking NERC, based on its engagement with the environmental science community, to advise the Minister on these issues.

- e. **Potentially strengthened** – because a more formal structure for engagement around all EO requirements including environmental science priorities would be introduced.

Q6. Maintaining the Haldane principle in determining decisions on Space and Environmental science opportunities.

- a. The current structure clearly adheres to the Haldane principle. Decisions on Environmental science are taken by a Research Council, which is independent of Government.
- b.-d. **Weakened**, and in the case of **d. Seriously Weakened** – in these models we move from a situation where decisions on a science programme which have previously been taken at arms-length from Government will be under direct Ministerial control.

Mitigation – apply a similar model used for the Large Facilities Capital Fund where scientific prioritisation is carried out by NERC (or Science and Technology Facilities Council (STFC) for space science) and NERC advises the Minister on allocation of space-related funding in EO science programmes.

- e. **Unchanged** - the current structure, which clearly adheres to the Haldane principle, is maintained

Q7. 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. Achieving overall balance, or tensioning, across any area of public expenditure is challenging. In NERC's view, the key issue is to tension first between areas of expenditure with common objectives. Considering the Science Budget, this is tensioned against other areas of public expenditure by the Treasury; then once set, the part for each Research Council is set by BIS, and then within NERC, we tension our five major funding streams.

When NERC became responsible for the EOEP subscriptions in 2003, the Government recognised that⁶ *'The transfer of funds to the Research Councils ensures that those with the appropriate expertise and policy responsibility will have a closer influence over future space programmes in their areas of scientific expertise.'* It makes little sense to tension a scientific mission to measure sea ice against pre-commercial

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communications satellite development. It makes more sense to tension a scientific mission to measure sea ice against other environmental science expenditure – like access to an ice-breaking ship or polar bases, and then to tension overall science expenditure against other Government priorities. This (user-driven) approach places the focus on the need for the space (and non-space) activity.

- b-d. **Weakened** – as these models infer tensioning of unlike uses of space, when they could be better tensioned against more relevant non-space investments.

Mitigation – scientific prioritisation is carried out by NERC (or STFC for space science) and NERC advises the Minister on allocation of space-related funding in ring-fenced EO science programmes.

- e. **Unchanged** – whilst the partnership would encourage clearer identification of operational and research needs, fundamentally the tensioning would still be the responsibility of each user in their sector.

Q8. Developing the proposed ESA facility and a coherent and complementary national space centre capability.

32. NERC considers that a major focus for the new ESA facility and associated national activity should be on the downstream data exploitation for applications and services, drawing on NERC-funded environmental science but making the Knowledge Exchange (KE) bridge to the policy and commercial interests. This would be a unique characteristic amongst the ESA Member States and would fill a major gap at international level.
33. This aspiration aligns well with the anticipated focus for the Harwell Facility, which includes basic data processing, visualization and dissemination for science and applications as its prime foci.
34. Significant amounts of (non geo-returned) funding will be invested by the European Commission in EO-related products and services during the coming years. The activities proposed above would lead the UK's strategy to influence the agenda and organize the national response to this opportunity.
- a. The NERC investment in environmental science, EO and KE position the UK well to achieve the vision for the Harwell facility set out above.
 - b. **Weakened** – as this represents a structure which distances users of the ESA programme from the investments, without a strengthened national programme.
 - c. **Potentially Strengthened** – if the new structure secures additional funding to support a national space technology and applications programme, whilst recognising that the link to users is weakened.

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- d. **Weakened** - whilst recognising the potential benefits of a stronger national space technology and applications programme, separating the exploitation of EO in environmental science from the rest of environmental science research will have a detrimental effect on the delivery of UK environmental science priorities and translational research meeting user requirements.
- e. **Potentially strengthened** – better identified national EO requirements will help to shape the work of the Harwell facility.

Q9. Advising government on space funding in the context of future spending reviews, and tensioning this against other spending priorities.

See response to Q7.

Q10. Negotiating with government departments and industry to deliver their engagement in space activities.

- a. Over the last few years, BNSC has led negotiations with other government departments regarding engagement in space activities, to mixed effect. Whilst these have resulted in UK engagement in the Galileo Programme, participation in GMES has been far harder to secure. Furthermore, the reduction in size of the core of BNSC and the loss of staff with expertise in space has weakened its ability to negotiate with ESA and industry.
- b-e. **Potentially strengthened** – but in each case the key issue is whether additional investment is made available to provide the required human resource to BNSC or a new agency. In cases c. and d., there is a risk that an Agency which only concentrates on space is more easily ignored by other government departments, as its channels of engagement with that department are limited to a single area (space).

Q11. Promoting UK wealth creation through the effective exploration by UK business of upstream and downstream market opportunities.

- a. There are different ‘pipelines’ to market opportunities and economic impact at work in this sector. From an environmental goods and services perspective, these include: a space focussed pipeline (EO research – EO missions – EO exploitation – space-based environmental services); and a more holistic environmental research-focussed pipeline (environmental research – knowledge exchange and partnerships with public and private sector organisations (e.g. Met Office, Re-insurance brokers, Energy companies etc) – environmental services). The holistic approach reflects the need to take a fully integrated approach to environmental science, if new climate and environmental services are to be delivered.

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A recent study has demonstrated the major contribution made by space to the UK economy⁷. However, other national and international studies^{8,9} have indicated the very large impact that environmental change in general could have on national and international economies. NERC therefore argues that it is essential that the environmental pipeline (rather than just the space-based part) is emphasised, if the UK is to benefit fully from a new 'green economy'.

- b-d. **Weakened**, and in the case of d. **Seriously Weakened** – as these all disrupt the pipeline between environmental research and services by separating off one part of the chain, which could then be isolated from other key parts of environmental science. The effect is particularly strong in model d, where the UK approach to environmental research becomes fragmented.

Mitigation – clearly position the EO space activities as part on an overall environmental 'pipeline'.

- e. **Potentially strengthened** – as this further encourages translational research in the environmental sector.

Q12. Ensuring proper tensioning between expenditure on civil space activities and other priorities across Government.

See response to Q7.

Q13. Ensuring proper accountability for expenditure, including - if new budgetary arrangements are proposed - which department is best placed to oversee this expenditure.

- a. The current arrangements align responsibility, accountability and benefits, and should be considered an appropriate budgetary structure.
- b-d. **Weakened**, and in the case of d. **Seriously Weakened** – as these models all separate responsibility and accountability from the sectors where benefits accrue. This is particularly so in model d. because of the split responsibilities for academic environmental research between NERC and the new agency.

⁷ Oxford Economics Report - The Case for Space – The Impact of Space-Derived Services and Data. Available from: http://www.seeda.co.uk/Publications/docs/case_for_space.pdf

⁸ The Stern Review on the Economics of Climate Change: <http://www.occ.gov.uk/activities/stern.htm>

⁹ Economics of Adaptation to Climate Change Study, World Bank 2009: <http://beta.worldbank.org/climatechange/content/economics-adaptation-climate-change-study-homepage>

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Notwithstanding the above, if these models are pursued, then it is proposed that BIS (Science and Research) should hold the budget, recognising that much of the investment is focussed on research, with close links to innovation.

- e. **Unchanged** - the current budgetary structure is maintained.

<p>Q14. 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?</p>
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See comments in cover note on:

- Maintaining user focus
- Delivery of environmental science priorities and associated impact
- Addressing long-term environmental observations

Table 1. Summary of Analysis of Models					
	Status quo	Maintain partnership structure, but with ESA funding held centrally.	Executive space agency, reporting to a government minister (technology, missions)	Executive space agency, reporting to a government minister (technology, missions, exploitation)	Environmental Observation partnership
Q3. UK Space Capability		-	+	-	+
Q4. Defining future projects		-	+	+	+
Q5. Views of communities in decision making		-	-	-	+
Q6. Haldane Principle		-	-	--	=
Q7. Achieving balance		-	-	-	=
Q8. ESA Facility		-	+	-	+
Q9. Spending reviews and tensioning		See Q7.			
Q10. Engaging other government departments		+	+	+	+
Q11. Promoting wealth creation		-	-	--	+
Q12. Tensioning and other priorities		See Q7.			
Q13. Budget structure		-	-	--	=

Q14.					
User focus		-	-	-	=
Environmental science and impact		=	=	-	=
Long-term environmental observations		=	=	=	+

Key

+ Strengthened

= Unchanged

- Weakened

-- Seriously weakened