



House of Commons
Science and Technology
Committee

**2007: A Space Policy:
Government Response
to the Committee's
Seventh Report of
Session 2006–07**

**Fifth Special Report of Session
2006–07**

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The Science and Technology Committee

The Science and Technology Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Office of Science and Innovation and its associated public bodies.

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Fifth Special Report

On 17 July 2007 the Science and Technology Committee published its Seventh Report of Session 2006–07, *2007: A Space Policy* [HC 66–I]. On 26 September 2007 the Committee received a memorandum from the Government which contained a response to the Report. The memorandum is published as an appendix to this Report.

Appendix: Government response

Preface

The Government welcomes the thorough and constructive Report of the Science and Technology Committee “2007: A Space Policy”. It appreciates the positive approach the Committee has taken in its work and its recognition of the increasing importance of space and the strengths of the UK space sector.

The Committee has given careful attention to some of the more difficult issues currently facing UK space policy. These include how to ensure that the Government makes the maximum impact from the UK space effort, how to ensure that UK capabilities remain at the forefront of international efforts and activity, and how to position the UK strategy in relation to exciting new development emerging in the space arena.

The Government also welcomes the engagement of the Committee in the development of the new UK space strategy to be published by the end of the year.

The Government has considered the Report carefully and detailed responses to the Recommendations and Conclusions are set out below.

The Government is grateful for an important and useful report.

Response

Does space matter?

1. We believe that space is a highly significant area of science policy. As other countries continue to exploit and explore space, it is crucial that the UK is also involved in this sector and it is necessary for the Government to take a more strategic approach to space. (Paragraph 14)

The Government welcomes the Committee’s endorsement on the role of space and its strategic importance. The UK remains committed to being involved in space activities that are relevant to excellent science, societal priorities and the economic prosperity of the country. The Government will continue to take a strategic approach to space funding against these criteria, and will remain open to participation in emerging opportunities.

Current UK space policy

2. Despite recommendations by the National Audit Office, the BNSC has still not developed a robust performance management system. We are disappointed that the BNSC failed to take advantage of the opportunity to establish a performance management system offered by the implementation of the UK Space Strategy 2003–2006 and beyond. The new strategy should outline how the partnership will track its performance and BNSC Headquarters should ensure that performance monitoring is undertaken. (Paragraph 25)

The Government accepts the spirit of this Recommendation. Although the BNSC has not developed a central performance management system, systems are in place in the partner organisations monitoring the programmes for which they are responsible. Nevertheless, we recognise that there would be value in reporting collectively on the performance measures implemented by the individual partners alongside the core functions of BNSC HQ. As part of the development of the new strategy and the consideration of measures to strengthen the partnership, we will survey the metrics already in use in the individual partners and assess what system and metrics would be appropriate, and which aspects of the BNSC activities should be included.

Space Strategy 2007–2010

3. The new strategy is an opportunity for BNSC to outline clearly its vision and ambition for space. The strategy should inspire and motivate the UK space sector and emphasise the UK Government's commitment to space. (Paragraph 34)

The Government supports the Committee's recommendation that all interested parties and stakeholders should understand the government approach to space and its strategy. A primary objective of the strategy will be to elucidate both the short term (up to 5 years) specific goals and a longer term vision in a way that will inspire the sector and the public.

4. We are concerned that there is a lack of co-ordinated horizon scanning within the BNSC partnership. We recommend that BNSC Headquarters assume responsibility for horizon scanning and informing partners of emerging issues. The BNSC should liaise with the Foresight programme within the Department for Innovation, Universities and Skills on approaches to horizon scanning. (Paragraph 34)

The Government broadly accepts this Recommendation. The new strategy will address this issue specifically, and in its implementation BNSC will take stock of the existing activities and will explore within the partnership and externally as appropriate how these could be enhanced. BNSC will consider the opportunities for developing mechanisms to deliver more targeted information and reports to the partnership as issues emerge, with particular emphasis on technology in the light of the outcome of the CSR bid for funding for a National Space Technology Programme.

5. We recommend that alongside the Strategy 2007–2010 the BNSC develop a long-term roadmap from 2010–2050. This roadmap should complement the short-term strategy by providing a flexible indication of where the space community is heading. The roadmap should be seen as an active document to be displayed on the BNSC

website and updated at regular intervals incorporating policy changes or the results of horizon scanning activities. (Paragraph 34)

As noted in the response to recommendation 3 the strategy will set out both the short term goals and a longer term vision. In line with the overall government policy, the BNSC will continue to make maximum use of the internet and will continue to place all publicly available documentation, including the strategy, on its site.

The partnership model

6. We support the UK's user-driven approach to space but are concerned that user Departments might start leading programmes without sufficient expertise or skills. We recommend that in the early stages of programmes BNSC headquarters provide the skills and expertise to enable user departments to engage with space solutions and that BNSC headquarters be responsible for building up understanding of space within Departments. BNSC headquarters should be perceived as leading projects in conjunction with primary and secondary user partners. The BNSC should explain in its forthcoming strategy how funding models in the future will work for projects involving many partners. (Paragraph 46)

Within the constraint of available resources, BNSC will continue to lead on developing and fostering interaction across government departments. Activities such as Government Information from the Space Sector (GIFTSS) and Knowledge Transfer networks are critical elements in this and will be supported by all partners active in a particular programme. The aim is not to be too prescriptive in the approach to be used. The specific balance between partners and the funding model for any future multi partner programmes will be determined on a case by case basis taking into account the level of understanding of each partner and their relevance to the programme.

7. If current levels of expenditure in space persist, the Government should not establish a space agency but should continue to pursue the partnership approach to space. If expenditure is substantially increased, the question of an agency should be reviewed. However, we believe that there are problems with the current partnership arrangement and that it should be strengthened appropriately. (Paragraph 53)

The Government agree that now is not the time to establish an agency, but also recognise that the current BNSC structure is not perfect, and will in the coming months review the options to see how the partnership can be strengthened. This will specifically include consideration of mechanisms that set out the relationship and expectations between the BNSC headquarters group and its partners.

Strengthening the partnership

8. We recommend that the BNSC partners work towards strengthening the status and profile of BNSC Headquarters. As part of this, the BNSC should review the effectiveness of its brand internationally and nationally, including the possible impact of a change of name. Projects should be associated firstly with BNSC and secondly with the partner involved. The relationship between the BNSC partners and BNSC Headquarters should be clearly outlined in the forthcoming strategy. The recent

machinery of Government changes provide BNSC with an ideal opportunity to establish a clear separation from DIUS. The BNSC should emphasise its independence from DIUS by splitting the costs of its administration between its partners or covering its own costs in order to become a clearly defined entity. (Paragraph 60)

The Government believes that the BNSC is well known internationally, and this reflects the role of BNSC in being the “international” voice of UK space – a position recognised by the DG of ESA in the inquiry.

Within the UK the situation is more complex, because within the context of a partnership each partner also wishes to be associated with work it funds. BNSC will continue to have an outreach and awareness programme, but remains to be convinced of the need for a name change. Recommendations 7, 10 and 13 cover the specific partnership issues.

9. We welcome the Government Information from the Space Sector (GIFTSS) initiative. We believe that there is further scope for BNSC Headquarters to provide leadership in the space sector and to promote the use of space within Government through initiatives such as GIFTSS. We believe that BNSC Headquarters would be well-placed to provide leadership for the space community, if empowered to do so. (Paragraph 62)

The Government agrees on the value of the GIFTSS Initiative. Progress within each GIFTSS project is dependent on the level of end-user interaction and the capacity of the GIFTSS initiative overall. GIFTSS has to date been largely concerned with Earth Observation applications and given wider opportunities, BNSC intends to develop engagement with other space disciplines for instance in relation to navigation. Further development of GIFTSS will depend on the outcome of the CSR settlement.

In addition BNSC will be looking for further opportunities to encourage broader cross-government engagement in space and to assist other government departments to recognise the value which space derived data and services can bring to policy making and delivery. (see also responses 17,18,45.)

10. We recommend that the BNSC use the new strategy to set firm, specific goals agreed with the BNSC partners, as well as providing a general overview of aspirations in different areas. BNSC partners should prepare and publish an implementation plan for their part in delivering the strategy. (Paragraph 64)

The Government welcomes and supports the thrust of this Recommendation. This question is linked to the issue of strengthening the BNSC partnership (questions 7, 8 and 13). Establishing a more formal interface between the BNSC and partners will be a significant step, and should enable an overall implementation plan across all partners to be developed.

11. We recommend that BNSC Headquarters produce an annual report and accounts, with a breakdown of funding by partners into national programme, subscription to individual ESA programmes and administration costs. BNSC Headquarters could then use this report to highlight positive or negative trends. The report should also report on performance linked to the space strategy. Such a report would give a clear focus to UK space activities and act as a branding exercise for BNSC. The report would also be a

source of information for the space community and enhance scrutiny of UK space policy across the board. (Paragraph 66)

BNSC's 2007 issue of "Space Activities" provides a more detailed financial analysis than in the past. Nevertheless, the BNSC partners will consider how the level of detail on their contributions to ESA, EUMETSAT and international programmes, and to national space activities can be improved, both within their own accounts and in the annual report produced by BNSC on "Space Activities". We will also consider in the context of the planned discussions on strengthening the partnership and the creation of a BNSC Headquarters budget whether the production of annual accounts would address the issues raised. The reporting of performance will be considered in light of the development of performance management (see Recommendation 2).

12. We are concerned that there is insufficient co-ordination across the BNSC partnership. We recommend that the BNSC include in the response to this Report the steps that they will take to address this shortcoming. (Paragraph 69)

Over the last 3 years the BNSC has set in place a number of mechanisms that address this issue. The new high-level arrangements that BNSC have implemented in the form of the UK Space Board for strategic decision making and the BNSC Operations Board for implementing decisions are proving very effective. On financial aspects, the BNSC Finance Team and UK AFC Delegation work closely with partners on their contributions to ESA programmes and the preparation of ESA budgets, providing a single interface with ESA. However we accept that co-ordination across the broader partnership is vital and will continue to seek ways of improving this, particularly where there are gaps. The strategy will set out our approach to improving co-ordination for example on our approach to programmes with cross Partner interest.

13. We are concerned that BNSC Headquarters currently works under several constraints including limited resources and dependency upon its partners for funds. We recommend that BNSC Headquarters be provided with a small budget of its own, following the necessary changes to its legal status. BNSC Headquarters should use this budget to cover its own overheads and to run the National Space Technology Programme. We recommend that BNSC Headquarters review its staffing and skills needs and that additional resources are provided where necessary. (Paragraph 74)

The Government believes that establishing agreements between BNSC headquarters and the partners (response to Recommendation 7) provides a basis for considering mechanisms for delivering the BNSC programme. The Government will look at the options. These range from maintaining the current mechanism to establishing a separate legal entity to take in and deploy the collective resources of partners to the headquarters functions. Existing and any new national activities will be part of this analysis, as will the accounting officer role for the ESA Mandatory General Budget, and staffing and resource needs.

14. We were very concerned about the attitude of DfES towards the partnership and hope that the new Department for Children, Schools and Families engages positively with the BNSC partnership. We strongly recommend that the Department for Children, Schools and Families joins the BNSC partnership. (Paragraph 77)

The Government notes this concern, and accepts the Recommendation. DfES and BNSC staff previously worked closely together on specific initiatives within available resources. The Department for Children Schools and Families (DCSF) will become a partner of BNSC following the restructuring of DfES. As a partnership we will continue to explore new ways of building on the existing relationship to develop fully the potential space has in promoting interest among children and young people in science more generally, enhancing and enriching their learning, and so that more of them think about studying science post-16 yrs.

DCSF officials met BNSC colleagues in August 2007 and agreed to a number of measures to increase the DCSF's involvement in this field. As part of this, they agreed to meet on a more regular basis both within and outside of forums such as the Space Advisory Committee Meetings, and to consider setting up a BNSC education group comprising education representatives from the main BNSC partner organisations, possibly chaired by DCSF, and look to work more closely together such as on potential space education projects.

15. We can see significant value in greater contact between BNSC and MoD at ministerial and official level. We recommend that the BNSC and MoD evaluate how dual use technologies might be of benefit across the BNSC partnership and include dual use technologies in the forthcoming BNSC strategy. (Paragraph 80)

The Government agrees that there is value in Ministerial and official contact between BNSC and MOD to explore commonality between defence and space technologies. A series of regular Ministerial meetings was in place prior to Machinery of Government changes, and has recently been re-established with DIUS replacing DTI. MOD provide two staff on secondment to BNSC. An MOD senior official also sits on the UK Space Board. The Government recognises the benefits that exploitation of dual use technologies offer and accept the Recommendation that they be evaluated and included in the new BNSC strategy. The proposed NSTP could be the vehicle for the evaluation.

16. We are disappointed by DfID's lack of response to this inquiry. The use of space has clear relevance for DFID in the field of disaster monitoring and other environmental applications. We recommend that the BNSC strengthen links with DFID in relation to the use of space for environmental and disaster monitoring. (Paragraph 84)

The Government agrees that space assets can contribute to its international development work in the areas of disaster, humanitarian and environmental management including food security; indeed DFID and its development partners already make use of space technology. BNSC and DFID will seek to identify common interests and how to make best use of appropriate space technologies and services for international development. For example, DfID are planning a seminar with UK space on "Satellites and International Development" in Autumn 2007.

17. We recommend that the BNSC continue to develop a close relationship with the National Offender Management Service, the Ministry of Justice and the Home Office Scientific Development Branch. These organisations should continue to monitor possible applications of satellite technology in offender management and security. (Paragraph 86)

The Government accepts this Recommendation. BNSC HQ will work to develop its relationships with these bodies (including with the Home Office Scientific Development Branch with whom regular meetings already take place), especially those with changed responsibilities following the recent creation of the Ministry of Justice, to provide assistance and advice on the potential role for space within their activities, through mechanisms such as the GIFTSS initiative.

18. More research is needed to understand how space applications might provide solutions for social problems. We recommend that BNSC work with ESRC and NHS Research to develop research funding calls, possibly in conjunction with STFC and with reference to the Foresight programme within DIUS, focused on the social and potential health applications of satellite technologies. (Paragraph 88)

The Government recognises the potential benefits that the space sector may bring in helping to deliver solutions to social problems and BNSC will explore with relevant non-Partner Research Councils (e.g. Economic and Social Research Council, Engineering and Physical Sciences Research Council) and other bodies e.g. National Institute of Health Research, Department of Health and the Technology Strategy Board to further understand and maximise the potential opportunities that satellite technologies and services can offer in this area.

19. We believe that it would unusual and inappropriate for industry to be a partner in the BNSC partnership. (Paragraph 89)

The Government agrees with this Recommendation. However it values the contribution that industry makes to policy development through BNSC's committees and by other means.

20. We recommend the creation of a Space Forum whose membership would include representatives appointed by the Secretary of State from industry, education, and academia. We suggest that this should be a dynamic small body with a maximum membership of fifteen, staffed by a small independent secretariat. The Forum should meet several times a year to scrutinise space policy and should report annually to the Secretary of State on the work of BNSC. (Paragraph 90)

The Government recognises the value of independent oversight of and advice to government programmes. In the implementation of the new strategy the existing advisory structure will be reconsidered and a suitable structure set in place.

European Space Agency

21. The UK's involvement in ESA is worthwhile. It enables UK scientists and engineers to take part in programmes that would otherwise be beyond their reach. Given the UK's level of investment in ESA, we urge the Minister with responsibility for space to sustain ongoing contact with the Director General of ESA. (Paragraph 95)

The Government welcomes the Committee's view on the value of ESA as a delivery mechanism for space activities. The UK has consistently used ESA as the primary vehicle for delivering its space projects, and the DG BNSC enjoys a good working relationship with the DG of ESA. Ministers place great emphasis on developing and maintaining

contact with all stakeholders and space is no exception. The first meeting of the DIUS Minister with the DG of ESA was held on 12th Sept 2007. The purpose of the meeting was to discuss the roadmap and key issues in preparing for the ESA Ministerial Council meeting expected in late 2008.

22. Although there are individual optional programmes where investment could be increased, we support the UK's selective approach to ESA and we believe that the UK has maintained on average a reasonable level of investment in ESA programmes. (Paragraph 106)

The Government welcomes this comment, and we will remain alert to key programmes of strategic importance to the UK. UK participation in ESA's optional programmes will continue to be based on the scientific, societal and/or industrial benefits expected to accrue to the UK space community and beyond.

23. We acknowledge that all involved have taken action in order to remedy the under return to the UK. We recommend that the BNSC develop a strategy with ESA over the next year in order to ensure that this situation does not recur. (Paragraph 112)

The Government welcomes the acknowledgement of BNSC's work to rebalance the UK industrial return from ESA and agrees with this Recommendation. BNSC continues to pursue a number of initiatives with ESA, to better understand fluctuations in the return statistics and to broaden the range of opportunities for UK industry. BNSC will continue to pursue selective activities that provide the best opportunities to the UK industrial space community to lead in technology areas both established and new.

24. We recognise the work that BNSC has undertaken helping ESA with the reform of its processes and encourage the BNSC to continue working in this area. (Paragraph 114)

The Government welcomes this Recommendation. BNSC will continue to pursue the reform debates on behalf of the partnership. We expect the final decision on the new finance systems for the UK inspired financial reform to be taken in March 2008. The discussions on evolution of the Agency, and especially enlargement and the revised decision-making processes, will continue through until the Ministerial. The UK will continue to work actively with ESA on these issues.

25. We believe that the establishment of an ESA centre in the UK would be beneficial and recommend that the BNSC pursue this aim as a priority. (Paragraph 117)

The Government welcomes this Recommendation, and the BNSC is in active discussion with ESA on the possible content and structure of a UK based ESA facility, and these will continue in the coming months.

European Union and European Commission

26. We welcome the European Space Policy and the inclusion of space in Framework Programme 7. We recommend that BNSC Headquarters in partnership with DIUS or the STFC hold a series of workshops in order to inform the space community about recent developments. The BNSC should advertise opportunities for scientists and

companies arising from FP7 and should provide advice on applications where necessary. (Paragraph 122)

The Government agrees with this Recommendation, and with regard to the European Space Policy (ESP), commencing in the Autumn BNSC officials will meet regularly in appropriate fora with Commission and ESA officials, and with counterparts from other Member States to draw up an ESP Implementation Plan.

With regard to Framework Programme 7 space-related funding opportunities, BNSC will continue actively to engage with the UK space community. This will include Information Days and circulation of a regular FP7 Space newsletter, and an input to the overall FP7UK web site. BNSC will also seek the views of the space community as part of its strategy for influencing the content of the next Space theme call for proposals from the Commission.

Bilaterals

27. We acknowledge the BNSC's work in encouraging collaboration with other countries such as China and welcome the recent joint statement of intent with NASA. However, the development of new opportunities must not be undertaken if there will be a reduction in scientific quality. We recommend that the BNSC outline its current activities and future intentions in international collaboration in the forthcoming strategy. (Paragraph 129)

The Government agrees with the Recommendation and will set out the context of bilateral collaboration in the forthcoming strategy. BNSC will continue to work with UKTI and FCO Science and Innovation staff and have established an Advisory Group on Trade Promotion and International Collaboration to provide a forum for discussing these activities. Decisions on specific cooperation will be based upon the perceived overall benefit to the UK.

The UK space industry

28. We are impressed by the range of activities undertaken by the UK space industry and by its ambition to remain world-leading. We welcome the work that BNSC has undertaken in this area in order to track the health of the industry and recommend that such studies continue. (Paragraph 139)

The Government agrees with this Recommendation and intends to continue to survey the UK space industry through BNSC.

Government support for the space industry

29. The ARTES programme is important to the UK space industry because it provides vital seedcorn funding for high-risk, early stage R&D. Investment in this programme should produce high returns. We recommend that the Government review its subscription to the ARTES programme before the end of the year. (Paragraph 148)

The Government agrees with the Committee on the importance of the ARTES Programme to the UK space industry, and how the activities have helped the UK to have world class telecommunications capabilities, and win significant commercial contracts for satellites.

The UK will carefully consider its future investments in ARTES in the preparation for the 2008 ESA Council at Ministerial level.

30. We congratulate the BNSC on its innovative approach to finding funding for the Alphasat programme. We recommend that the BNSC involve RDAs in funding ESA missions in future when there is likely to be specific regional benefit. (Paragraph 151)

The Government welcomes this Recommendation. The involvement of Greater South Eastern RDAs was essential to secure the participation of BNSC and INMARSAT in the Alphasat programme. Building upon this success, BNSC will continue to consult and encourage RDAs and other organisations to invest in future ESA missions where there is expected to be significant economic benefit.

31. We are concerned by the impact upon the space industry of the shift of funds from the DTI national programme to the Technology Strategy Board. We welcome the attempts by the BNSC to address this problem through the National Space Technology Programme and hope that industry and academia make the most of this programme. (Paragraph 156)

The current proposals for a strengthening of the existing national activities are being considered as part of the CSR07 settlement for government as a whole. The BNSC will ensure that the detailed content of any such programme, how it integrates with other relevant national initiatives, and how it will be managed will be made publicly available. This is most likely to be in a stand alone document rather than as an integral part of the strategy document itself.

32. We recommend that the DIUS and MoD initiate another programme as a successor to the MOSAIC programme within the next year. (Paragraph 159)

The Government recognises the value and success of the BNSC MOSAIC small satellites initiative. While welcoming the Recommendation, the Government notes that any future activities will depend upon proposals from partners that will bring benefit to the UK. Discussions between MOD and Industry on potential technologies which may be suitable for small satellite applications and which could offer significant advances in military capability have begun.

33. The investment of private finance in the space industry is crucial and Government co-investment at a seedcorn level would help to attract private finance and venture capital. We acknowledge that the BNSC is already working with industry in this area. We recommend that the BNSC seek ways in which to stimulate the increase of private finance and venture capital in the field of space in its forthcoming strategy. The BNSC should elect a co-ordinator who can work with the venture capital industry in order to help companies to explain their technologies. (Paragraph 164)

The Government agrees that the investment of private finance and funding is crucial and will lead to the development of new and innovative technology, service and applications in the future. We will address this issue in the forthcoming Space Strategy, and within available resources will work to strengthen our activity.

34. We note the importance of SMEs in the space industry and believe that it is crucial that they receive appropriate support. We are concerned that in the past SMEs in the space industry have lacked non-financial as well as financial support from the DTI. We recommend that SMEs be represented on the Space Forum and that the Government establish mechanisms to increase support for SMEs. (Paragraph 168)

The Government recognises the important contribution that SMEs make to the UK Space Industry and the BNSC works both nationally and within ESA to provide SMEs with non-financial and financial support within available resources. In particular, BNSC regularly circulates information to SMEs about business opportunities, encourages participation by SMEs in its technology and industrial committees (e.g. SMEs are represented on the Space Science Advisory Committee and the Aurora Advisory Committee) and has championed ESA contract arrangements to ensure that SMEs are fairly represented by contract volumes. The Government accepts the Recommendation to the extent that it will review its support for SMEs and consider whether an increase is justified, and, if it is established, will consider the merits of SMEs membership of the proposed Space Forum.

35. We are concerned that the current licensing regime impedes enterprise. We welcome the review of licensing and look forward to the public consultation on BNSC's proposals. We recommend that the BNSC pay particular attention to the needs of SMEs in this area. (Paragraph 171)

The Government agrees that in general legislation should not be detrimental to UK business. The BNSC is reviewing the UK space licensing regime. This review takes into account the approaches taken in other countries as well as other applicable sectors.

36. We welcome the BNSC's funding for space surveillance. We recommend that future plans for this area, particularly in relation to a possible European project for space surveillance, be outlined in the new space strategy. (Paragraph 174)

The Government welcomes the Committee's support for BNSC's work on surveillance of space, which is integral to ensuring the security of space based infrastructure. At a European level space is already identified as one of the critical infrastructure sectors within the European Programme for Critical Infrastructure Protection. BNSC will continue to promote the UK capabilities in this area and will outline a vision for the surveillance of space in the new space strategy.

Health of space science and technology in the UK

37. In the light of the contrasting views on the health of space science and technology in the UK, we recommend that the BNSC undertake research in this area and commission a study on the size and health of the space science and technology field. (Paragraph 179)

The Government notes that the responsibility for the health of the space science community lies with STFC, although all BNSC partners have an interest in the wider technology field.

BNSC and STFC's predecessor organisation, PPARC, carried out a number of exercises to map the health of the UK space science community including a review of space science infrastructure (publicly available at <http://www.pparc.ac.uk/RS/Cm/ReptR/SSIRweb.asp>)

and a review of technical strengths in academia and industry (the ABOTTS report), see <http://www.pparc.ac.uk/aurora/Documents/Abbotsrep.pdf>. The intention is to continue as appropriate these types of study in the future.

38. We are concerned that there is a skills shortage in the space industry. Potential space scientists and engineers may be moving into other sectors due to the low profile of the industry. Although the UK is currently able to attract and retain international scientists and engineers to fill the gap left by a lack of "home-grown" talent, we are concerned that this situation is not sustainable, particularly if the number of overseas students entering UK universities declines. We believe that a broad programme of incentives may be necessary to ensure a continued flow of people into the space sector from UK universities and from abroad. We recommend that the BNSC work with DIUS, HEFCE, individual universities and industry in order to develop a 'people' strategy to address the skills shortage. (Paragraph 183)

The Government is acutely aware of the skills challenges facing Britain, and the creation of DIUS offers an unprecedented opportunity to address the issues. The Government is already investing £5 billion a year to support Science, Technology, Engineering and Mathematics (STEM) subjects, and has committed to increasing this. The programme set out in the Science and Innovation Framework 2004–14 includes actions to increase participation in STEM subjects at all levels of education.

As part of its wider support for STEM subjects, DIUS is considering, with the research councils, the higher education funding bodies, Quality Improvement Agency and other stakeholders, whether there may be particular problems with the supply of skills in specific areas, and whether more targeted interventions are needed. DIUS as a BNSC partner will work with BNSC HQ to ensure that concerns identified in the Committee's report about STEM-related subjects useful to the space industry will feed into this consideration.

Creation of the Science and Technology Facilities Council

39. We welcome the creation of the STFC and were pleased to hear assurances from the Chief Executive that the STFC will not favour funding for large facilities over basic science. We recommend that the STFC work with NERC and EPSRC to ensure that there are no gaps in funding for research in space science. (Paragraph 190)

In order to address this issue, the Government proposes that the Chief Executive of STFC will write to Chief Executives of other relevant Research Councils inviting them to consider the need for a standing mechanism to address inter-Council space research issues, perhaps through RC-UK Research Directors meetings.

Current levels of investment

40. We are concerned that investment in space science instrumentation has reduced over the last decade. We recommend that the STFC increase funding for space science instrumentation. (Paragraph 194)

STFC recognises the issue, which was highlighted by PPARC in its submission to the Committee. Availability of resources for space science instrumentation is tensioned by

STFC against other priorities. However, STFC proposes to include a challenging objective in the new BNSC strategy to raise the level of spending on instruments for ESA projects to the average for European countries over the life of the strategy.

Technology development

41. We welcome PPARC's approach to the Aurora programme and recommend that the BNSC develop mechanisms to increase the co-ordination between industry and academia at early stages in technology development, if necessary on a mission by mission basis. (Paragraph 198)

The Government acknowledges the benefits of the approach adopted by the Aurora programme and accepts this recommendation. The coordination between Academia and Industry in the early stages of technology development is key and we will continue to develop mechanisms to ensure this occurs, whether at programme or project levels, as appropriate. For example, the recent establishment of the DIUS/NERC-funded Centre for Earth Observation Instrumentation aims at facilitating such collaboration at the early stages of EO technologies and instrumentation development, both at programme and project levels.

42. We welcome the proposal for the National Space Technology Programme and urge the Government to provide appropriate funding for this initiative. Information about the detailed mechanisms of the programme and clarification regarding its performance management and anticipated interaction with other bodies should be published in the forthcoming strategy. We recommend that the BNSC lead and manage the operational aspects of this programme. Arrangements should be altered so that the Director General of BNSC can be the Accounting Officer without the need for delegation of responsibility from the STFC. (Paragraph 209)

Further to the response to Recommendations 13 and 31, arrangements will be firmed up when funding is available. STFC will delegate responsibility for managing any new programme to the DG BNSC.

Technology spin-off

43. We recognise that there are mechanisms for knowledge transfer within the space sector. Given that the space sector is characterised by its remit across numerous Government departments as well as the STFC, NERC, and EPSRC, we recommend that the BNSC establish a broad space knowledge transfer network for academics and industrialists from the upstream and downstream space industry and related sectors to complement existing activities. We recommend that BNSC and ESA continue to emphasise the importance of knowledge transfer between the space field and other sectors. (Paragraph 221)

The Government agrees with both of these Recommendations and notes the substantial progress that the STFC Knowledge Exchange Service and its KITE Club initiative have made in this area. A technology showcase event is planned for early 2008 and BNSC is working together with its partners to dovetail the initiatives in this area. The Sensors & Instrumentation Knowledge Transfer Network includes particular focus on Knowledge

Transfer in the upstream Space Sector and works together with the Location and Timing Knowledge Transfer Network, which focuses on downstream applications of space. The DIUS/NERC Centre for Earth Observation Instrumentation has a strong knowledge transfer activity which will help cross the academic/industrial boundaries. Also relevant are the success of recent spin-outs from RAL such as Thruvision and Orbital Optics as examples of wealth creation from the science base. In the longer term, as proposed in the response to Recommendation 39 above, a need is foreseen for a standing mechanism to address inter-Research Council space research.

Introduction to Earth observation programmes

44. We are impressed by the UK's commitment to Earth observation internationally and nationally. We welcome the establishment of the NERC National Centre for Earth Observation and the Centre for Earth Observation Instrumentation. It is essential that these bodies develop relationships with other organisations such as the STFC, Defra and the Met Office. Earth observation is especially important to the study of climate change. It is crucial that the UK work internationally to ensure provision, availability and maintenance of long-term, sustained data sets in this area. (Paragraph 227)

The Government is pleased to note the Committee's positive views on the UK's commitment to Earth observation nationally and internationally. The DIUS/NERC funded Centre for Earth Observation Instrumentation and the precursors of the NERC-funded National Centre for Earth Observation are actively engaging with relevant BNSC partners and other key stakeholders. The climate change agenda is a major focus for both Centres. The UK will continue to work internationally to ensure provision, availability and maintenance of long-term, sustainable data sets in this area.

45. The BNSC has undertaken several initiatives in order to increase awareness across Government of Earth observation. However, we believe that understanding of the variety and potential uses of Earth observation data could be increased. We recommend that the BNSC develop a strategy to improve understanding of Earth observation across Government. The new Centre for Earth Observation and Centre for Earth Observation Instrumentation should be hubs for knowledge transfer from academia to user Government departments and agencies. (Paragraph 234)

The Government accepts this Recommendation. We will review our approach and develop our strategy to increase the level of understanding of EO across Government. Exchange of knowledge between academia and users, including Government departments and agencies, will be a key strand of activity within the NERC-funded National Centre for Earth Observation, as it is in the DIUS/NERC Centre for Earth Observation Instrumentation.

46. The BNSC lacks a clear and co-ordinated Earth observation programme. We recommend that the BNSC review the co-ordination of its work in this sector, including the role of the Earth Observation Programme Board, and apply the lessons learned. We recommend that BNSC Headquarters lead on the creation of a GEO strategy, working closely with Defra and other interested parties. (Paragraph 238)

The Government believes that there is a well-coordinated Earth observation programme within the main funding partners of BNSC, but there is scope for improving the clarity and

co-ordination of activities, and BNSC HQ will review and seek to strengthen the coordination of its activities in Earth observation, recognising the activities and priorities of the various partners involved. The roles of advisory boards, including EOPB, will also be reviewed in the near future.

On GEO, recalling that the initiative covers issues wider than space, the Government intends to consider this Recommendation further in light of additional work by Defra, in cooperation with BNSC HQ and other Government departments.

GMES

47. We understand the reasons for Defra's cautious approach to funding GMES and recommend that it continue to work with the BNSC and the ESA regarding its concerns about the programme. If these concerns are addressed, given that extra funding to GMES would benefit UK industry through the ESA's policy of *juste retour*, we recommend that the Government consult industry regarding the level of subscription it deems necessary to stimulate activity and then consider providing additional funding to GMES. (Paragraph 251)

The Government welcomes these Recommendations, and recognises the potential benefit of GMES to the UK. UK funding of subsequent stages of the programme will be determined in part by the degree to which our existing concerns have been addressed; in part by the views of stakeholders, most notably end-users and industry; and by the availability of resources.

48. Defra's lead on GMES is proving problematic. We recommend that the BNSC Headquarters provide the lead and work closely with Defra as primary user. GMES is a programme where a strengthened BNSC Headquarters could provide leadership, drive and ambition. (Paragraph 256)

Defra, as the key user department, is the appropriate place for the UK Government lead and coordination of the overall GMES initiative, because the interests of GMES go beyond space-based observation. In the context of the GMES Space Component, the Government agrees that BNSC Headquarters, in partnership with Defra and other users across Government, should take over responsibility for the UK lead, to include interactions with ESA and EUMETSAT and coordination of future Government funding decisions on the Space Component Programme.

49. The Government needs to work out how it will support applications arising from GMES. We recommend that the BNSC commission a study similar to the ABOTTS report looking at the opportunities and challenges created for the UK Earth observation sector by the GMES programme. The UK's approach to the GMES programme including applications should be outlined in the space strategy. (Paragraph 259)

The Government agrees with this Recommendation. BNSC will commission a study to build on activities already undertaken in the context of developing the business case for GMES.

Satellite navigation

50. We welcome the work that DTI and DfT have undertaken to identify new applications and services that will be enabled by Galileo. We recommend that the Government report on progress in this area in the annual BNSC report. (Paragraph 261)

DIUS and DfT will continue to work to identify new applications and services that will be enabled by Galileo. BNSC publishes an annual "UK Space Activities (year)" report. The report for 2007 provides a chapter on satellite navigation and includes a section on GNSS applications. In future years this report will continue to cover all relevant aspects for the year of the report.

51. We seek assurance from the Government that it will continue working at a European level to ensure that Galileo remains a civil system under civil control. The Government must clarify the ways in which military forces would be allowed to use Galileo and whether Galileo could be used for military applications. (Paragraph 262)

Galileo has been defined and agreed as a civil programme under civil control since the project's inception and the EU Transport Council has repeatedly endorsed this, most recently in its October 2006 Council Conclusions. In the December 2004 Transport Council Conclusions it was also made clear that changing the civil status of Galileo would require a decision under the terms of the Common Foreign and Security Policy (CFSP). CFSP decision-making is by unanimity.

While Galileo's open service, like that of GPS, can be accessed by all and therefore could be used by military forces, e.g. for navigation or location purposes, the Government's policy is to oppose the development of Galileo for any purely military applications. We remain committed to ensuring that Galileo's development continues in line with its agreed status as a civil programme under civil control.

52. We recognise the role taken by DfT to co-ordinate work on the Galileo programme. We recommend that DfT be known as primary user for this programme, DIUS as primary funder and BNSC Headquarters be identified as the lead with the appropriate transfer of staff accordingly. (Paragraph 263)

Galileo was conceived as a European Union transport infrastructure programme and decisions on it fall to the EU Transport Council. The EU budgetary authorities are also involved. It is therefore appropriate for the lead in co-ordinating Government policy on Galileo to be taken by DfT. They work in close co-operation with BSNC, which leads on ESA and the jointly funded Galileo development programme overseen by ESA. DfT is a member of the BNSC Partnership and a DfT member of staff is currently on loan to BNSC on Galileo.

Other Government departments have a strong interest in the Galileo programme, and DfT co-ordinates the Whitehall view. It also reports regularly to the European Scrutiny Committees. The Government believes it would be inappropriate to change these arrangements, which have been in place for several years.

53. We are concerned that the failure of the concessionaire and subsequent alternative funding proposals for the Galileo programme are likely to result in rising costs to the UK. We recommend that, before the next Transport Council meeting, the Government publish a new analysis of the costs and benefits of the Galileo programme to the UK. We recommend that the Government report to Parliament on a regular basis on its intentions in relation to Galileo. (Paragraph 269)

Galileo is a European Community project. The UK, along with other ESA members, has directly contributed towards the development costs of the system, split equally between the Community and ESA, through its subscription to ESA. The remaining half of the development funding has come from the Community budget. The March 2002 Transport Council concluded that “any further public sector funding of Galileo, in any of its phases, should be met by redeployment under the appropriate ceilings of the Financial Perspectives in force at that time”. Any increase in the deployment and operating costs will therefore need to be found from within the agreed Community Financial Perspectives.

The Government nevertheless shares the Committee’s concerns over the potential for increased costs under any new public procurement models to be brought forward by the Commission to the Transport and ECOFIN Councils as these costs could only be accommodated at the expense of other Community spending. If it is the decision of the Transport Council that the Community should pursue public procurement of an operational capability, then the Government will continue to work to ensure value for money through clarity in governance and open competition in line with our commitments to Parliament.

As a Community project, the costs and benefits of Galileo can only reasonably be judged on a Europe wide basis. In a minutes statement to the June Transport Council, the UK and the Netherlands called on the European Commission to provide a detailed analysis of the costs and benefits of any proposals it brings forward for Council consideration. This minutes statement also emphasised the need for a reassessment of the business case for Galileo, competitive procurement, sound risk management, and ensuring that any extra funds are kept within the current EU financial perspective.

The European Scrutiny Committees are kept regularly informed of developments on the Galileo programme by letters from Transport Ministers and by Explanatory Memoranda on official Commission documents as appropriate. In addition, before and after Transport Council meetings, the Department issues Ministerial Statements to Parliament. Most recently, the Minister of State for Transport, Rosie Winterton, spoke for the Government in a debate on Galileo on the Floor of the House of Commons. She will appear before the Transport Committee on 10 October 2007.

Telecommunications

54. The telecommunications sector is still growing. It is important that the Government continues to fund initiatives in this area such as ARTES and Alphasat, which provide vital seedcorn funding for high-risk, early stage R&D. (Paragraph 273)

Please see response to Recommendation 29

55. We recommend that the Government work at a European level to ensure that there is a consistent standard of regulation across Europe. When reviewing its practices, Ofcom should take the views of satellite operators regarding the international impact of its activities into account. (Paragraph 277)

The Government agrees with this Recommendation. BNSC works closely with Ofcom and participates in a number of Ofcom's Working Parties and Advisory Groups and can attend the relevant ITU meetings and Study Groups as UK delegates. Ofcom also participate in a number of BNSC Advisory Boards to advise on spectrum related matters. In addition, BNSC participates in relevant Ofcom public consultations where there are space interests and promulgates the existence of those consultations to our industrial and institutional customers. Individual BNSC Partners such as the Met Office regularly participate in these fora dealing with spectrum issues relevant to their activities. Ofcom's task of assessing the relative merits of the often competing demands for the spectrum not only within the UK, but in Europe and the rest of the world is a difficult task. The methods that Ofcom uses to do this within the UK, by consultation and impact assessment, is consistent with best practice. We will work with Ofcom to explore ways of further improving for stakeholders the transparency of processes and information behind these decisions both within the UK and Europe.

Exploration

56. We welcome the UK's involvement in the Aurora programme and recommend that the STFC ensure that the UK maintains its strong role in this programme. (Paragraph 282)

STFC hopes to maintain a strong role in the ESA Aurora programme subject to its settlement in CSR 2007.

57. We welcome the recent Joint Statement of Intent signed by BNSC and NASA and hope that this signals the beginning of fruitful collaboration on the MoonLITE and MoonRaker missions. We congratulate the STFC on its timely funding of preparatory work in this area. (Paragraph 286)

BNSC/STFC has established a Joint Working Group with NASA to identify opportunities for cooperation in the field of exploration. STFC await settlement of their CSR 2007 before deciding how to continue this project.

58. We welcome the BNSC's active involvement in the Global Space Exploration Strategy. We recommend that the findings of the BNSC Space Exploration Working Group be published and subsequently incorporated appropriately into the forthcoming space strategy. The Space Strategy 2007–2010 should outline how the UK intends to respond to the different international exploration projects. (Paragraph 291)

The report of the BNSC Space Exploration Working Group was published on September 13th 2007. The Government will review its recommendations in order to assess whether and how to implement them over the life of the new BNSC Space Strategy.

Manned spaceflight

59. It appears that the Government currently objects to manned spaceflight on principle and we believe that this stance is unjustifiable. Manned spaceflight proposals, like other proposals in other areas of space, should be judged according to a cost-benefit analysis. We recommend that whilst the BNSC emphasise the UK's interest in robotic missions at this stage, it also keep the option of scientific manned spaceflight missions open for the future. The Government's stance should be flexible enough to ensure that the best science can be funded, whether that be undertaken by manned or robotic exploration. (Paragraph 306)

The Government remains content with past decisions on manned space flight and will review future activity on merit. It notes more recent advice from several sources including the Royal Astronomical Society and the BNSC Space Exploration Working Group that human space exploration has the potential to deliver substantial benefits in science, technology, commercialisation and inspiration while also having significant cost implications.

Space medicine

60. We have not seen enough evidence to be convinced that a special stream of funding should be given to space medicine. Funding should continue to be available from MRC through peer-reviewed response-mode funding. The MRC should monitor developments in the field and liaise appropriately with BNSC. Given the current climate in global exploration, the BNSC should explore routes for non-financial co-operation with organisations such as NASA and ESA in this area. (Paragraph 319)

In response to this Recommendation, BNSC will offer to brief MRC officials on the opportunities available to the UK in space medicine in order to establish whether there is any interest in current opportunities (such as bilateral arrangements with NASA), in ESA's ELIPS microgravity programme (as proposed by the Space Exploration Working Group) or in future opportunities that may arise from UK involvement (if any) in human space exploration through the Global Exploration Strategy. If there is interest, BNSC will investigate the relevant opportunities—for example by exploring if possibilities exist for involvement in the medical aspects of ELIPS or for collaboration with suitable medical research institutes in the US.

Space tourism

61. We are excited by the potential afforded by sub-orbital travel and the rise of the space tourism industry. We do not believe that it is the responsibility of Government to fund this work but developments in this area should be encouraged through appropriate regulation. The BNSC should use its consultation on regulation to discuss the establishment of a regulatory framework and responsible body with the relevant authorities. We recommend that the Government continues its policy of non-financial support to the space tourism industry and that it outline the developing nature of that support in the forthcoming space strategy. (Paragraph 334)

The Government agrees with this Recommendation and is keen to explore the commercial opportunities for the UK offered by this new emerging field as well as to develop a suitable regulatory regime for it. It has had preliminary discussions with FAA colleagues in the USA with a view to understanding their approaches. It will be seeking views on the approach to space tourism in the public consultation relating to the review of the Outer Space Act (OSA) regulatory approach.

Launchers

62. We share the BNSC's belief that in the development of launchers the "market" will provide. But there should be no "in principle" block on funding the development of launchers in the future. We recommend that the MoD and DIUS discuss whether a seed-corn funding exercise or prize might be developed in the future to provide an incentive for the development of a low cost small satellite launcher. (Paragraph 342)

The Government agrees with this Recommendation and will seek in particular to explore opportunities in the small satellites launcher market. The benefits of adopting a prize approach will be kept under review.

Impact of space

63. The evidence that we have seen regarding the unique ability of space to increase interest in science is inconclusive. The Department for Children, Schools and Families should work with BNSC and interested organisations to assess what research is required to assess first the impact of space upon interest in science and secondly how an interest in space might be harnessed in order to encourage students to pursue scientific study to GCSE, A level and degree level. (Paragraph 349)

The Government notes the comments of the Committee. There is some impressive evidence (e.g. Scottish Space School, University of Leicester) albeit limited. The DCSF will work with BNSC and other interested organisations to explore options for research around this area. Research of this nature tends to be inconclusive so both DCSF and BNSC consider that a more productive and cost effective option would be to collate the currently available evidence on the impact of space on the take up of science subjects; and research what existing good practice exists around using space as a way of enabling teachers to enthuse and inspire children about science, and to encourage young people to pursue science beyond their formal education.

The end product could be a small number of case studies that would be made available to all schools and would look to address related issues such as encouraging greater interest among girls in the physical sciences.

Space in education

64. The lack of involvement from DfES in the field of space education, despite its role as a partner in BNSC, was disappointing. We hope that the Department for Children, Schools and Families will become involved in this field and will work closely with BNSC and the DIUS. (Paragraph 355)

See response to Recommendation 14.

65. We are disappointed that, despite their initial investment, DfES did not actively follow up the Bringing Space into School Science report. The fact that many of the recommendations made by this report could be met by Yorkshire Forward's plans for a European Space Education Office in the UK seems to have resulted more from luck than judgement. (Paragraph 359)

The Government disagrees with the conclusion with respect to the plans of Yorkshire Forward. BNSC and Yorkshire Forward have worked closely, from the beginning, in defining the scope for the UK's European Space Education Resource Office (ESERO-UK). The Contract Management Group, overseeing the implementation of the ESERO-UK, is composed of senior representatives from BNSC HQ, STFC, Yorkshire Forward and ESA. The advisory group for ESERO-UK is composed of a comprehensive range of representative organisations including, BNSC HQ, STFC, teachers, visitor centres and regional agencies from Scotland, Northern Ireland and Wales. A BNSC Director chairs this advisory group. This arrangement is designed to ensure a proper focus for ESERO-UK. A suitable arrangement for DCSF participation in this ESERO – UK advisory structure is currently being discussed.

66. We welcome the plans for the establishment of an European Space Education Resource Office contact point in the UK and we congratulate Yorkshire Forward on its ambition in taking this project forward. The plans for this project should be outlined in the space strategy. It is crucial that the UK and ESA agree on the aims, remit and activities that are encompassed by the project. We are concerned that the UK has higher expectations of this project than ESA since BNSC is presenting it as an all-encompassing solution to its problems in space education. As a result, the initiative may not deliver all that is required. We seek reassurance that this will be the start of a truly national education project and urge the BNSC to clarify in the space strategy which body will be responsible for education in this area. (Paragraph 363)

The Government notes the comments of the Committee. The new UK Civil Space Strategy will address future plans on space-related education and skills. Recommendations 14 and 65 are also relevant to this recommendation.

The main purpose of these initiatives is not however to establish a separate national (space) education project. They are intended to bring co-ordination and cohesion to the rich and diverse array of space-related education activities in this country and not to duplicate them.

67. The ESERO contact point project should be used as a driver to create a one-stop website for space material. BNSC should work closely with STFC, the Department for Children, Schools and Families, and ESA to ensure that material fits into the curriculum. It is crucial that feedback is sought from teachers on the usefulness of such a website and the appropriateness of the material provided. (Paragraph 364)

The Government agrees with this Recommendation: the ESERO-UK pilot work programme includes plans for a website for space education material. Previous responses have described arrangements for ensuring co-ordination between BNSC, STFC and DCSF. The ESERO-UK work closely with teachers and seek input from them. Its advisory group

includes representation from teachers in the form of membership by The Association for Science Education (ASE).

Outreach

68. We acknowledge the work that the BNSC especially the STFC has undertaken in outreach. We suspect that unfortunately the public is still unaware of the variety, breadth and importance that space activities play in their everyday lives. We encourage the BNSC in partnership with academics and industrialists to seek ways to increase understanding and knowledge in this area. (Paragraph 366)

This is linked to Recommendation 8. The Government fully recognises the role that a good communications policy can play in increasing children, young people, families and others' interest and knowledge in all aspects of science, including space. The BNSC at both a corporate and individual partner level have outreach and awareness programmes. These are constantly seeking new ways of increasing public awareness and understanding – both in terms of what is undertaken and how the space projects impact and hence the lives of UK citizens.

DCSF is commissioning an overarching science, technology, engineering and mathematics (STEM) communications campaign whose overall purpose is to inform pupils, parents and others of the wide ranging and exciting opportunities that are open to students when they choose to study STEM subjects and qualifications up to and post-16. The campaign is scheduled to begin in January 2008. DCSF as a BNSC partner will work with BNSC HQ to look at how space can be embedded within this initiative.

September 2007

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