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Footnotes

In the footnotes of this Report, references to oral evidence are indicated by 'Q' followed by the question number. References to written evidence are indicated in the form 'Appendix' followed by the Appendix number.

Contents

Report

Summary

Despite the downturn in civil passenger travel that followed the events of 11 September 2001, continued uncertainty in the Middle East and the SARS crisis in Asia, the UK aerospace industry (UKAI) remains one of the most successful sectors of UK manufacturing. In 2003, the UKAI accounted for 0.6 percent of UK gross value added (GVA) and four percent of value added by the UK's manufacturing industry as a whole. The UKAI is also one of the UK's major export sectors, generating a trade surplus of just over £2.5 billion in 2003, compared with manufacturing overall, which had a trade deficit. The UKAI provides direct and indirect employment in the UK for around 255,000 people.

Although productivity levels in the UKAI are generally higher than the UK average, they remain disappointing when compared to the industry's main international competitors. However, there are signs that UKAI productivity growth is beginning to outpace these competitors. We also found evidence to suggest that there will be a further challenge for the UKAI as competition from emerging economies is growing. Given the choice, aerospace companies tend to invest where the conditions are most favourable and, in particular, where they can work in partnership with government-funded R&D. Subcontracting abroad by aerospace companies is increasing as a result of lower costs or more favourable incentives, such as public R&D investment.

The UKAI itself invests heavily in R&D, and is second only to pharmaceuticals in its R&D intensity. UKAI companies invest more in R&D than their international competitors. Of the top aerospace companies in 2003, four UKAI companies, Rolls-Royce, Cobham, Smiths and BAE Systems (which was ranked second behind only Finmeccanica of Italy) appeared in the top twenty in terms of R&D intensity.

UK Government support for UKAI R&D has fallen over the last few years. The recent re-organisation of DTI funding programmes has opened new opportunities for aerospace R&D funding through the DTI's Technology Programmes. Aerospace companies can also benefit from R&D tax credits and repayable launch investment. There is, as yet, little evidence of whether the new funding streams will compensate the UKAI for the loss of previous support programmes. However, evidence from the latest round of Technology Programme funding, where the aerospace industry received a quarter of the £60 million distributed, suggests to us that they might.

The work of the Aerospace Innovation and Growth Team (AeIGT) is a prime example of what can be achieved for an industry through the willing collaboration of its stakeholders. The UKAI is one of the most important sectors of the UK economy and we believe that, through their support for the AeIGT, this has been recognised by Government. With a target date for the implementation of the recommendations of the AeIGT's Report on the future of the UKAI of 2022, we believe it will be some time before a meaningful assessment of progress can be made with any degree of confidence. However, the progress which has been reported to us suggests that a good start has already been made.

1 Introduction

1. The UK aerospace industry (UKAI) is one of the most successful sectors of UK manufacturing. Its importance and achievements can be illustrated as follows:

— In 2003, the UKAI had a turnover of just over £17 billion and captured ten percent of the world market for aerospace products;

— The UKAI accounted for just over four percent of UK manufactured output and directly contributed just over £5.5 billion to UK gross value added (GVA)[1] in 2002, a similar level to the pharmaceutical industry;

— There has been a consistently positive aerospace trade balance in the past two decades. In 2003 it was £2.6 billion (close to its long run average of £2.8 billion);

— In 2003, the UKAI directly employed just under 122,000 people, 0.4 percent of total UK employment, and three percent of total manufacturing employment. An additional 150,000 people have been estimated to be indirectly employed by the industry;

— UKAI productivity was £54,000 per head in 2001, 50 percent higher than the UK average and 35 percent higher than for manufacturing as a whole; and

— The aerospace industry invested just over £2 billion in UK R&D in 2003, second only to the pharmaceutical sector. Three aerospace companies featured among the top ten UK R&D investors.[2]

2. 2002 and 2003 were difficult years for the UKAI. Turnover relating to civil projects was especially low as the full impact of lower civilian passenger travel, due to the global economic slowdown and the events of 11 September 2001 in the US, were felt. The main issues of concern for the UKAI are: the economic 'health' of the industry; its future competitiveness; and the implications for government aid to the industry following the latest WTO dispute between the US (Boeing) and the EU (Airbus). These concerns prompted our inquiry.

3. During the course of our inquiry, we took formal evidence from: the Society of British Aerospace Companies (SBAC), Airbus UK, the trade union Amicus, QinetiQ (the former Defence Agency Research Agency, post privatisation), the Aerospace Technology Steering Group (ATSG), the Department of Trade and Industry and Boeing. We received nine written memoranda from other businesses and organisations, which are reproduced in the Appendices. We also received a letter from Smiths Group plc in support of the written evidence submitted by the SBAC, which has not been printed.

[1] A measure of gross domestic product (GDP)

[2] See Appendix 9 and Appendix 14

2 The UK aerospace industry (UKAI)

4. International comparisons of turnover in aerospace industries are difficult to measure accurately, due to difficulties in defining the boundaries of the industry, exchange rates and assigning turnover to nations in such an international sector.[3] However, our witnesses generally agreed that in terms of value added the UK had the second largest aerospace industry in the world, after the US (table 1).[4]

Table 1: UK, US, French and German aerospace industry value added

£ million, current exchange rates

	UK	USA	France	Germany	Total	UK's share	UK's rank
1992	3,424	27,091	2,092	2,850	35,455	9.7%	2
1993	3,140	29,004	1,772	2,605	36,521	8.6%	2
1994	3,701	25,662	2,484	2,287	34,134	10.8%	2
1995	3,270	23,487	3,612	2,187	32,557	10.0%	3
1996	3,208	25,749	2,323	2,753	34,034	9.4%	2
1997	3,873	26,035	3,857	2,752	36,517	10.6%	2
1998	4,379	28,067	3,594	3,107	39,147	11.2%	2
1999	4,860	31,365	3,730	3,847	43,802	11.1%	2
2000	5,340	32,856	3,685	3,317	45,198	11.8%	2
2001	5,754	37,246	4,576	4,003	51,580	11.2%	2
Percentage change 1992-2001	*68%*	*37%*	*119%*	*40%*			

Source: OECD STAN database, see Appendix 10

5. The US aerospace industry is by far the largest, driven mainly by the size of its domestic market (half of all the world's civil air traffic being conducted inside the US) with sales in 2003 four times those of the UK industry (table 2). The US industry also has greater economies of scale, more R&D and the advantage that aircraft are traded in US dollars.[5] Table 2 (below) indicates the size of some of the national industries.

6. The two main European aerospace industries (in the UK and France) are of roughly similar size in terms of turnover. Outside Europe and the US, the largest industry is that of Canada, which had around half the turnover of the UK in 2003. Some emerging economies, such as Taiwan, Indonesia and Brazil, have established their own 'indigenous' aerospace industries, which, once fully developed, will have an impact on the international market. The present status of the Russian aerospace industry is unclear and Russian civil aerospace products have yet to make an impact on world markets. It is possible that it will eventually become a significant player in partnership with western firms.[6]

[3] Q 2

[4] For example see: Qq 1 (SBAC) and 196 (DTI)

[5] Trade and Industry Committee, Third Report of Session 1992-93, *British Aerospace Industry*, HC 563-i, page 11

[6] DTI/AeIGT, *An Independent Report on the Future of the UK Aerospace Industry*, June 2003, page 28

Table 2: Estimates of aerospace industries' turnover and employment, 2003

	Turnover (£ millions)	Employees (000s)
US	91,000	475
France	17,000	106
UK	17,000	124
Germany	11,000	75
Canada	9,000	76
Italy	7,000	38
Japan	7,000	30
Spain	3,000	23

Source: Based on HC Library estimates and AeroSpace and Defence Industries Association of Europe, *Facts & Figures 2003* , 2004

Table 3: Major aerospace industry companies

Based on aerospace related sales, 2003 (£million)

	Company	Country	Turnover
1	Boeing	US	30,884
2	EADS	Netherlands	21,687
3	Lockheed Martin	US	19,458
4	Northrop Grumman	US	16,031
5	BAe Systems	UK	12,566
6	Raytheon	US	11,964
7	General Dynamics	US	10,008
8	General Electric	US	8,267
9	United Technologies	US	8,083
10	Thales	France	5,802
11	Honeywell	US	5,391
12	Bombardier	Canada	4,937
13	Snecma	France	4,618
14	Finmeccanica	Italy	4,383
15	Rolls-Royce	UK	4,090
Other UK companies among top 75			
24	GKN	UK	1,548
29	Smiths Group	UK	1,270
37	Cobham	UK	815
39	BBA Group	UK	796
64	Meggitt	UK	328
67	Dunlop Aerospace	UK	323
71	Ultra Electronics	UK	284

Note: Assumes £1 = $1.63. Source: *Flight International* , 10-16 August 2004, pages 36-4.

7. The SBAC told us that the UKAI is one of the most significant sectors in the UK economy, comprising 2,500-3,000 companies, and adding: "high value in economic, technological and social returns both nationally, and across the regions".[7] Table 3 (above) shows the size of UKAI companies relative to companies elsewhere in terms of aerospace turnover in 2003.

8. The considerable economies of scale available to the aerospace industry and the ever-increasing cost of developing new aircraft and engines, have encouraged greater

[7] Appendix 14, para 1

international collaboration and fewer 'prime manufacturers' of complete airframes or engines.[8] There are currently two 'prime' manufacturers of large civil aircraft: one American (Boeing) and one European (Airbus) with British participation. There are three prime manufacturers of civil aero-engines: two American (General Electric and Pratt & Whitney) and one British (Rolls-Royce), all of which manufacture both civil and military engines. There are also a number of manufacturers of airframes and engines for smaller regional aircraft.[9] Each prime manufacturer obtains components from many different parts of the world, and all have collaborative arrangements with firms in other countries.[10]

9. In the UK, and elsewhere, there is considerable interdependence between the military and civil sides of the aerospace industry. Not only do the major UKAI companies produce for both markets, but much of the technology is common to both. For example, according to Rolls-Royce, military aero-engines have requirements different from civil ones only in respect of detectability.[11] There are many examples both of technology being transferred from civil to defence uses and vice versa.[12] The civil proportion of total UK aerospace turnover rose steadily up to 1991, from 25% in 1980 to 45% in 1991.[13] Since 1991, the proportion of UKAI turnover represented by the defence (50% of turnover in 2003) and civil (50%) sides of the aerospace industry has remained: "relatively well-balanced",[14] suggesting that defence work has sometimes filled the production gaps caused by a decline in civil aerospace demand, and vice versa.

10. The UKAI can be broken down into five sectors: aircraft systems and frames (46% of 2003 turnover); aircraft equipment (25%); aircraft engines (22%); missiles (5%); and space (2%).[15] We have not examined the space and missile sectors, since we did not believe we could do justice to them the time available and have concentrated on the aircraft production segment, which represented 93 percent of turnover in 2003.[16] The UK's civil space activities have also recently been scrutinised in detail by the Committee of Public Accounts.[17]

Contribution to GDP

11. In 2003, UKAI turnover for UK-based aerospace activity stood at £17 billion and its contribution to UK gross value added (GVA) was just under £6 billion. This was approximately 0.6 percent of UK GVA and four percent of value added by the UK's

[8] Q 176

[9] Speed News website (15 March 2005): www.speednews.com/lists/lists.shtml

[10] An example of the complexity of the international partnerships and collaborative programmes which exist can be found in: DTI/AeIGT, *An Independent Report on the Future of the UK Aerospace Industry*, June 2003, page 34

[11] Trade and Industry Committee, *British Aerospace Industry*, page 14

[12] Q 239

[13] SBAC, *Facts and Figures 2003*, July 2004, page 7

[14] Appendix 14, para 1

[15] SBAC, *Facts and Figures 2003*, July 2004, page 6

[16] Aircraft systems and frames - 46%; aircraft equipment - 25%; and aircraft engines - 22%.

[17] Committee of Public Accounts, *Department of Trade & Industry: The United Kingdom's Civil Space Activities*, Sixth Report of Session 2004-05, HC 47-i

manufacturing industry as a whole.[18] However, the SBAC told us that the direct economic activity of the UKAI was also supported by an additional indirect contribution of 0.7 percent of GVA from the industries' supply chain, raising its overall contribution to 1.2 percent of UK GVA.[19]

Contribution to UK Trade

12. The UKAI is one of the UK's major export sectors and is a "significant earner of foreign exchange for the UK",[20] generating a trade surplus of just over £2.5 billion in 2003.[21] The UKAI generated exports of an average £100,000 per employee between 1999 and 2003. This compared to an average in UK manufacturing overall of £42,000 per head in 2001. During the same period, the UKAI contributed an average of £17,000 per employee per annum to the UK trade balance, compared with manufacturing overall, which had a trade deficit of an average £9,000 per employee per annum. UKAI's aerospace exports have increased their share of world markets from 6.5 percent in 1992 to ten percent in 2001.[22]

Employment

13. Employment in the UKAI has increased steadily from around 99,000 in 1995 to 122,000 in 2003, 0.4 percent of total UK employment, and three percent of total UK manufacturing employment.[23] The SBAC told us there are also an estimated 134,000 employees elsewhere in the UK which are supported in the supply chain to the UKAI, giving a total of both direct and indirect employment in the wider supply chain of just over 255,000.[24] The UKAI is the largest aerospace industry in Europe, accounting for just over 30 percent of direct EU aerospace industry employment.[25] The UKAI is also active outside the UK; the Aerospace Innovation and Growth Team (AeIGT) have estimated that for every two people employed by UK aerospace companies in the UK, another person is employed by those companies overseas.[26]

Productivity

14. Productivity, as measured by the value added per head, in the UKAI has generally improved in real terms since 1992.[27] In 2001, productivity in the UKAI (£54,000 per head) was 50 percent higher than the UK average (£36,000 per head) and 35 percent higher than

[18] Appendix 14, para 1.2.1

[19] *Ibid.*

[20] Q 191

[21] Appendix 18

[22] Appendix 14, para 1.3.1

[23] Source: OECD STAN database, SBAC survey statistics suggest that UK aerospace employment was around 147,000 at the end of 2001 and was reduced to 117,000 at end 2002 as a result of 9/11, before recovering to 122,000 at end 2003.

[24] Appendix 14, para 1.1.1

[25] Q 4

[26] Appendix 9

[27] *Ibid.*

the manufacturing average (£40,000 per head).[28] The SBAC told us the UKAI features strongly in regions such as Northern Ireland, the North West and South West England where productivity was ten to 20 percent below the national average. They believed that without the contribution of the UKAI to productivity in these regions, the differential would be 'significantly' worse.[29]

International comparisons of productivity

15. There is no reliable and consistent series of figures for the productivity of the different national aerospace industries, which would make international comparisons possible. Dr Sally Howes, Director General of the SBAC, told us that such comparisons were: "extremely difficult to make".[30] Further: "with both our colleagues in DTI and across industry we do recognise that there are some weaknesses in trying to get comparable information".[31] With this in mind, we asked the DTI if they could provide us with their 'best-available' estimates of productivity in the aerospace industries of the UK's main competitors. The estimates they provided are given in table 4:

Table 4: Labour productivity in aerospace industries, 1991 to 2001

Converted from domestic currencies using Purchasing Power Parities (000s)

	Canada	US	France	Italy	Germany	UK	Japan	Spain
1991	52	61	29	43	42	48	40	49
1992	60	61	36	40	44	43	41	52
1993	67	64	30	41	37	45	45	60
1994	71	65	45	47	37	55	43	55
1995	85	66	65	45	35	51	50	52
1996	83	72	43	42	45	50	52	58
1997	94	74	87	49	58	61	56	62
1998	79	75	82	70	67	60	66	64
1999	95	88	89	69	78	64	58	63
2000	110	92	93	94	71	70	52	67
2001	125	106	110	99	83	80	70	54
Labour productivity levels in 2001 (UK=100)								
	158	133	138	124	104	100	88	68
Annual average growth rate 1990/92 to 2001								
	3.2	*2.1*	*1.4*	*0.1*	*5.9*	*4.7*	*4.8*	*-0.3*

Source: Appendix 10 - Derived by DTI from OECD STAN Database and Groningen Growth and Development Centre, 60-industry Database, October 2004.

Notes: Data should be interpreted as indicating broad orders of magnitude of differences across countries and over time as data taken direct from national surveys can give a quite different picture; there may well be legitimate reasons for at least some of these differences. For example, estimates for France in 2001 vary from 92 to 110 depending on source chosen. Aerospace is defined as International Standard Industrial Classification heading 353. Labour productivity is defined as GVA per worker employed in that sector. *Rates of growth in productivity are sensitive to base year chosen which is why productivity levels have been averaged for 1990 to 1992.*

16. Within the limits of the available data, table 4 shows that in 2001 the UK was ranked sixth out of the eight aerospace industries shown, in terms of productivity. The UKAI was

[28] Appendix 14, para 2.2.1

[29] *Ibid.*, para 1.5.4

[30] Q 2

[31] *Ibid.*

58 percent less productive than the highest ranked aerospace industry, Canada. However, table 4 also shows that, over the period, the UKAI was ranked third in terms of average productivity growth, behind the leader Germany and only just behind Japan. This suggests that, should this trend continue in the long-term, the UKAI will eventually 'catch' and pass its main competitors in terms of productivity levels.[32]

R&D and technology spill-overs

17. The UKAI invested just over £2 billion in R&D in 2003, 12 percent of UKAI turnover and an annual increase of 18 percent over 2002. Three aerospace companies featured among the top-ten UK R&D investors: BAE Systems (ranked No. 3), Airbus (ranked No. 7) and Rolls-Royce (ranked No.10), investing £1.4 billion between them.[33] The current situation in UKAI R&D is looked at in more detail in the next section of this Report.[34]

18. Aerospace is a high-technology manufacturing industry which provides high value goods and services to a wide range of markets.[35] Many of the technologies, methods and processes researched and developed by the UKAI are now being employed in a wide range of other UK business sectors. Examples of spin-offs originating from the UKAI include the design of racing cars, wind turbines, oil rigs and bridges.[36] Other examples of technology transfer within companies include: "power management systems, composites and computer chip technology transferred from aerospace to telecoms, medical and other industrial applications".[37] Airbus told us that the benefits of these technology spill-overs are likely to be large, as economic studies had provided evidence of significant social returns from this type of R&D. They cited a recent DTI study,[38] which reported that social rates of return to R&D were considerably in excess of private rates of return. Typically, private rates of return were in the region of 25 percent (range 9% to 43%), with corresponding social rates of return from spill-overs of at least 50 percent (range of 10% to 160%).[39]

Regional Impact

19. The UKAI is important to the economies of, and employment in, many of the UK's regions. The SBAC told us that ten regional authorities had audited the economic importance of aerospace and had identified it as a priority industry for generating economic growth. These included: the devolved administrations in Northern Ireland, Scotland, and Wales; and the North West, North East, East Midlands, West Midlands, South East, South West, and East of England Regional Development Agencies (RDAs).

[32] One vision of the AeIGT Report; *An Independent Report on the Future of the UK Aerospace Industry,* published in June 2003, was that by 2022 productivity in the UKAI must exceed that of the US, France and Germany for the UKAI to remain competitive. For this to happen the UKAI would have to grow at a faster rate than our competitors, as suggested by the figures in Table 4.

[33] DTI, *The 2004 R&D Scoreboard*, October 2004, page 30

[34] See page 18

[35] Appendix 14, para 1.4.1

[36] Q 115

[37] Appendix 14, para 1.4.1

[38] See: DTI, *Prosperity for All*, September 2003, p28

[39] Appendix 2, para 2.7

Each of these areas had supported the establishment of a regional aerospace trade association to: "help accelerate the growth of aerospace in the region".[40] In a number of these regions, aerospace had been demonstrated to form the centre of high-technology clusters of design and manufacture, with a large number of small and medium sized enterprises (SMEs) clustered around larger sub-system manufacturers and 'primes'. The example given to us by the SBAC was the aerospace industry based around Airbus UK, BAE Systems and Rolls-Royce in the North West of England, which accounted for 54 percent of the high-technology jobs in the region. [41]

Foreign Direct Investment

20. The global nature of aerospace industry collaboration lends itself to companies investing in other countries. There have been a number of overseas companies which have directly invested in or purchased UKAI companies.[42] Recent examples include: the acquisition of Messier-Dowty, a leader in the design, development, manufacture and support of landing gear systems, by SNECMA of France and of TRW (Lucas Aerospace), a designer and manufacturer of commercial and military aerospace systems, by Goodrich of the US.[43] The DTI told us that, according to SBAC estimates in 2003, aerospace companies located in the UK which were owned by overseas parent companies accounted for around 40 percent of the turnover generated by the UKAI while employing 45,000 people.[44]

21. The UKAI has also been highly acquisitive in the recent past,[45] with around forty takeovers announced in 2004, worth in excess of $3.5 billion.[46] In particular, BAE Systems made five acquisitions in the US, which included Boeing Commercial Electronics and Digital Net Holdings, the latter being a $600 million business which supplies software to the US Defense Department. Smiths Group also made five US acquisitions during 2004, targeting sensor and detection companies active in the developing safety and security sectors. The majority of these acquisitions took advantage of the strength of sterling relative to the US dollar to acquire technology capability and US market access.[47] This trend is likely to continue with the recent announcement that BAE Systems has bid $2.2 billion for United Defense Industries, a US defence company.[48]

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[40] Appendix 14, para 1.5.1

[41] *Ibid.*, para 1.5.2

[42] Appendix 9

[43] More information on the takeover of Messier-Dowty by SNECMA and TRW (Lucas Aerospace) by Goodrich can be found on the SNECMA and Goodrich websites (1 March 2005): www.snecma.com and www.goodrich.com/Main

[44] Appendix 9

[45] Appendix 3, para 5

[46] Appendix 9

[47] *Ibid.*

[48] 'BAE seizes UDI in $4bn raid on US market', *Financial Times on-line* (FT.com), available on the Financial Times website (7 March 2005): http://news.ft.com/cms/s/527e863c-8edf-11d9-bb12-00000e2511c8.html

Major UK aerospace companies

BAE Systems (BAE)

22. British Aerospace was formed as a nationalised corporation in 1977 by the merger of the British Aircraft Corporation, Hawker Siddeley Aviation, Hawker Siddeley Dynamics and Scottish Aviation. The British Aircraft Corporation itself was the product of takeovers and mergers over the years involving many well known names such as Avro, de Havilland and Vickers. BAE Systems (BAE) came into its present form in 1999 when British Aerospace and GEC agreed to create a global aerospace and defence company, merging British Aerospace with GEC's Marconi Electronic Systems business.[49]

23. BAE remains the UK's largest engineering company with 36,000 employees in the UK (100,000 in total worldwide) and is now mainly a defence company.[50] In 2003, BAE had total sales of £12.6 billion, and an order book worth £46 billion.[51] The company operates in the aerospace sector in addition to a wide range of other military applications. These include nuclear submarines, naval warships, radar and communications systems, and flight control systems. In terms of aircraft, BAE has a 33 percent[52] share in the Eurofighter project with the European Aeronautic Defence and Space Company N.V. (EADS)[53] of the Netherlands and Alenia, an Italian company. BAE is also involved in the Joint Strike Fighter (JSF) with Lockheed Martin and Northrop Grumman of the US.

24. Eurofighter is a collaborative programme which has been estimated to support 16,000 direct UKAI jobs. Although late into service, the DTI told us: "the programme remains industrially significant for the UK".[54] BAE has the responsibility for the design and development of the forward fuselages, including the cockpit systems, and the final assembly of the UK's part of the order. The DTI also told us that this recognises BAE as "probably the only European aerospace company with the capability to undertake complex avionics, weapons and airframe integration work, sustaining the company's ability to develop future air systems".[55] The JSF is currently the largest global defence aerospace programme, with the US expected to purchase 2,600 aircraft, the UK 150 and the rest of world up to 3,000.[56] It is a US-led programme, with Lockheed Martin acting as the 'prime' and the UK as the only 'tier-one' partner; the programme is estimated to be worth over £20 billion to the UKAI over its production life. BAE is responsible for manufacturing the rear fuselage of the JSF.[57] Other military aircraft which the company manufactures include the

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[49] A full chronology of BAE Systems' history can be found on its website (4 March 2005): www.baesystems.com/aboutus/

[50] Appendix 9

[51] BAE Systems website (4 March 2005): www.baesystems.com/facts/plc.htm

[52] Trade and Industry Committee, *British Aerospace Industry*, page 14

[53] EADS came into being on 10 July 2000 from the link-up of the French Aerospatiale Matra, CASA (Construcciones Aeronáuticas S.A.) of Spain and the German DaimlerChrysler Aerospace AG (Dasa). DaimlerChrysler and the French holding company SOGEADE (Lagardère, French state) each hold over 30 percent. The Spanish state holding company SEPI owns 5.5 percent. The remaining 34 percent of its shares are traded on stock exchanges.

[54] Appendix 9

[55] *Ibid.*

[56] *Ibid.*

[57] *Ibid.*

Hawk (trainer) and the Nimrod (reconnaissance).[58] Aircraft production is concentrated in Warton and Samlesbury in Lancashire and Brough in East Yorkshire.[59]

25. BAE no longer produces its regional civil aircraft: the Avro RJ series of jet aircraft (which had superseded the BAe 146) and the Jetstream turboprop aircraft. BAE's main involvement in civil aircraft production is now the Airbus project.[60] Without the company's shareholding in Airbus, the UK would be largely excluded from the production of large civil aircraft.

Airbus SAS

26. Airbus Industrie, the forerunner of Airbus SAS, was established in 1970, with French and German partners. BAE (then British Aerospace) became a full member in 1979. Aerospatiale of France and Deutsche Aerospace Airbus of Germany each had a 37.9 percent share, British Aerospace a 20 percent share and Construcciones Aeronáuticas S.A. (CASA) of Spain 4.2 percent.[61] Airbus SAS is currently 20 percent owned by BAE Systems with the remainder owned by EADS.

27. Starting with just one model, the Airbus range of civil aircraft has gradually expanded, and now covers requirements between 100 (A318 type aircraft) and 555 (A380) seats.[62] Airbus is currently enjoying market success. Its share of the large civil aircraft market has grown from 8 percent in 1980, to 20 percent in 1992 and 52 percent in 2003, exceeding Boeing in delivery volume and making Airbus the world's largest supplier of civil aircraft.[63] The next milestone for Airbus will be the first flight of the A380, 555 seat 'super jumbo' in the first quarter of 2005. This is due to enter into full service in 2006, and Airbus currently has 129 firm orders.[64] Airbus has also responded to Boeing's new 250-seater 7E7 'dreamliner' aircraft, and has launched a rival model, the A350.

28. Airbus is also set to enter the defence market with the A400M military transport (Strategic Transport Aircraft). This is a multi-national European programme and the UK will take 25 of the 180 currently ordered. The military transporter is due to have its first flight in 2008 following assembly in Seville, Spain. Through its holding in the Air Tanker consortium, Airbus also hopes to provide its Future Strategic Tanker Aircraft (FSTA) to the MoD.[65] This will be the largest UK-defence Private Finance Initiative (PFI), worth over £13 billion. Air Tanker was announced as the preferred bidder in early 2004 and if successful, would bring direct benefits to the UKAI through the use of Airbus' A330 airframe.[66] Selection of Air Tanker by the UK Government as the preferred bidder has been instrumental in placing the A330 as a credible competitor in the air tanker market, which

[58] BAE Systems website (4 March 2005): www.baesystems.com/facts/programmes/airsystems/index.htm

[59] *Ibid.*

[60] BAE Systems website (4 March 2005): www.baesystems.com/facts/plc.htm

[61] Trade and Industry Committee, *British Aerospace Industry*, page 23

[62] Appendix 2, section 2

[63] Appendix 9

[64] *Ibid*.

[65] See the MoD website: www.raf.mod.uk/equipment/fsta.html

[66] Appendix 9

had previously been dominated by Boeing. For example, Australia has recently opted for the A330 model for its own defence requirements. The DTI told us that negotiations between the MoD and Air Tanker over the signature of the UK contract were continuing. [67]

29. Airbus SAS's UK subsidiary, Airbus UK, has sites in Filton (Bristol), producing ribs for wings, and Broughton (North Wales), where wing skin panels are manufactured and wings assembled.[68] Airbus UK told us that they had a workforce of over 12,000 employees in the UK and current Airbus programmes supported: "80,000 UK jobs from direct, indirect and induced employment. This will rise to around 100,000 UK jobs when the A380 and A400M projects reach full production". [69]

Rolls-Royce plc

30. Already established as a motor manufacturer, Rolls-Royce turned to making aero-engines during the First World War. It was the development of the Merlin engine in the 1930s, used for both Spitfires and Hurricanes during the Second World War, which changed Rolls-Royce from a relatively small company into a major player. In 1953, Rolls-Royce moved into civil aircraft, building the Dart engine for the Vickers Viscount airliner. The growth of transatlantic travel in the early 1960s saw the launch of what is still one of Rolls-Royce's major products, the RB211 engine. There were, however, problems with this new engine, which resulted in the company being brought into state ownership in 1971. The Rolls-Royce motor business was separated from the aero-engines division and floated on the stock exchange in 1973. 1987 saw Rolls-Royce aero-engines return to the private sector.[70]

31. Rolls-Royce is now the UK's sole aero-engine manufacturer and the world's second largest commercial aero-engine supplier, behind General Electrics of the US, with some 30 percent of the world market. The company manufactures gas turbine aero-engines for civilian and military aircraft, including small business jets, passenger airliners, helicopters and combat aircraft. Rolls-Royce engines are currently used in aircraft operated by 500 passenger airlines, 4,000 corporate operators and more than 160 armed forces. Rolls-Royce employs 35,000 people around the world, 40 percent of whom are outside the UK. Annual sales are just under £6 billion, and they currently have an order book valued at over £19 billion.[71] The company's main plants in the UK are in Derby, Bristol, Barnoldswick and Anstey.[72]

32. Through its 32 percent stake in the International Aero Engines (IAE) consortium, Rolls-Royce provides engines for the Airbus A320 family. It also supplies the regional jet and commercial helicopter markets through US–based Rolls-Royce Inc. The company recently achieved certification for the Trent 900 engine to power the first flight of the new

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[67] *Ibid.*

[68] Q 80

[69] Appendix 2, para 2.1

[70] A complete history of Rolls-Royce's involvement in aero-engine manufacture is available on their website (4 March 2005): www.rolls-royce.com/history/brief/default.htm

[71] Rolls-Royce website (7 March 2005): www.rolls-royce.com/about/overview/default.jsp

[72] See Rolls-Royce website (15 March 2005): www.rolls-royce.com/history/brief/default.htm

Airbus A380 'super jumbo', early in 2005. Also in development is the Trent 1000 derivative which will power the Boeing 7E7 'dreamliner'. The Trent 1000 remains the only 7E7 engine option presently selected by airline customers; in particular, 'launch' customer All Nippon Airlines chose the engine in preference over the alternative option from General Electric.[73]

33. In defence aerospace, Rolls-Royce engines power around one quarter of the world's military fleet. The DTI told us that Rolls-Royce had designed and manufactured the EJ 200 engine for the Eurofighter and had a key role on the JSF programme: "particularly owing to its leadership in vertical thrust propulsion".[74]

Bombardier Aerospace

34. The Canadian Company, Bombardier, is active in the UK (Belfast) through its wholly owned subsidiary Shorts, which it acquired from the UK Government in 1989. Short Brothers was best known in the first half of the twentieth century for its seaplanes and flying-boats, which had both civilian and military applications. The company was taken into public ownership in 1943 as a wartime measure. After the Second World War, the company was involved in the production of the Canberra aircraft. In the 1950s it was responsible for some of the early work on the development of vertical take-off and landing (VTOL) aircraft. In 1988, Short Brothers was offered for sale by the UK Government.[75]

35. Bombardier told us that Shorts was now their centre of excellence for fuselage and nacelle (a streamlined enclosure for an aircraft engine) design and production, and accounted for 12 percent of Northern Ireland's manufacturing exports. The company employed around 5,600 people directly, six percent of manufacturing employment in Northern Ireland, and supported a further 9,000 jobs down its supply chain.[76]

36. Bombardier's civil aerospace division now manufactures a range of regional passenger aircraft (CRJ and Q series), business aircraft (including the Learjet) and the Canadair 415 amphibious aircraft, a flying boat designed for fire fighting. The DTI told us that the CRJ series is presently experiencing some difficulties in the international market, driven by the poor financial performance of some of its US airline customers.[77] This has resulted in recent job reductions throughout the Bombardier group, including Belfast. The company recently announced jobs cuts at Shorts totalling 560 by July 2005, with an additional 330 dependant on the future of Delta Airlines in the US.[78]

37. Bombardier is considering the development of a new family of 110-135 seat aircraft, the CSeries. The company announced in 2004 that it was considering Shorts in Belfast as a production site for the CSeries and had opened talks with the Northern Ireland

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[73] Appendix 9

[74] *Ibid.*

[75] A complete history of Bombardier is available on their website (7 March 2005): www.bombardier.com/index.jsp?id=0_0&lang=en&file=/en/0_0/0_0_1_6_2.html

[76] Appendix 7, para 1.2

[77] Appendix 9

[78] 'Bombardier to cut 560 jobs in Belfast', *Financial Times*, 7 October 2004, p4

Development Agency regarding the public support which could be made available.[79] It is possible that the UKAI could contribute over 30 percent of the total value of the aircraft, if it is launched.[80]

Smiths Group

38. Smiths Group is a world leader in electronic systems for civil and military aircraft. It also specialises in actuation systems, precision components and detection systems. Smiths employ 5,500 people in 18 sites around the UK. The company is a major supplier to Boeing and Airbus of equipment on all their large civil aircraft as well as on many of Boeing's business jets. It also provides a range of highly integrated systems for civil and military helicopters and has important positions on current military aircraft, including the JSF, the Lockheed Martin F-22 and Hercules C-130J, Boeing F/A-18E/F and Eurofighter. [81]

[79] 'Bombardier mulls UK plant', *Financial Times*, 19 July 2004, p22

[80] Appendix 9

[81] *Ibid.*

3 The UK aerospace industry's current performance

Civil aerospace

39. The aerospace market is typically cyclical, with the cycles closely linked to global economic performance. Pre-2001 the civil aerospace sector of the industry was operating at full capacity with "record production levels of business".[82] Our witnesses told us that since 2001, a number of events had caused a slowdown in passenger air-travel (civil aviation sector),[83] which had led to a fall in demand for the UK's commercial aerospace products. The events our witnesses highlighted included: the impact of the global economic slowdown, which was exacerbated by the terrorist attacks of 11 September 2001 in the US; continued uncertainty in the Middle East, including the conflicts in Afghanistan and Iraq; and the SARS crisis in Asia.[84]

40. The DTI told us that the civil aviation sector was beginning to recover and that commercial aerospace manufacturers were: "planning to increase production rates in 2005 with further increases planned for 2006 and beyond".[85] Datamonitor have forecast that the global civil and defence aerospace sector will grow at an average annual rate of four percent between 2003 and 2008, with the highest growth, at six percent, expected in 2007.[86] By comparison, Oxford Economic Forecasting (OEF) have estimated that the UKAI will expand over the same period by just over eight percent per annum, with the highest growth, 12 percent, expected in 2004.[87] In the long run, worldwide air-passenger travel is expected to rise significantly, creating growth in the market for civil aircraft. In terms of aircraft demand, the DTI have forecast that 15,000 aircraft carrying more than 100 passengers will be required to be delivered worldwide between 2002 and 2021.[88] Rolls-Royce have forecast that for the period 2004 to 2023 there will be a total of 43,000 aircraft delivered, including the production of 20,000 jets carrying more than 110 passengers.[89] However, the DTI told us that talk of a recovery may be premature, as some airlines had continued to struggle with continuing high oil prices which threatened their financial performance.[90]

[82] Appendix 7, para 2.1

[83] US airlines have been estimated to have lost a combined $20 billion in revenues during 2001 and 2002. Source: DTI/AeIGT, *An Independent Report on the Future of the UK Aerospace Industry*, June 2003, page 57

[84] For example see Appendix 7, para 2.1; Appendix 9, section 3; and DTI/AeIGT, *An Independent Report on the Future of the UK Aerospace Industry*, June 2003, page 57, para 5.3.1

[85] Appendix 9, section 3

[86] Datamonitor, *Global Aerospace and Defense*, May 2004

[87] OEF, *UK Sectoral Prospects: Autumn 2004*, October 2004

[88] DTI aerospace industry website (7 March 2005): www.dti.gov.uk/aerospace/commercial.htm

[89] Rolls-Royce website (7 March 2005): www.rolls-royce.com/civil_aerospace/overview/market/outlook/default.jsp

[90] Appendix 9

Defence aerospace

41. Defence aerospace markets are typically less cyclical than civil aerospace markets, with performance more closely linked to a country's defence budgets than its economy. The DTI told us that the US defence budget is expected to increase by around 30 percent in real terms through to 2009, whereas the UK and European defence budgets were likely to decline slightly. This would affect the strategies of many UKAI companies, particularly those with major US and European subsidiaries: "the nature of defence research and technology and equipment procurement will evolve over time to place a greater emphasis on the military capability of networked systems and a lower emphasis on platforms, although these will remain important and the change will be gradual given the UK's [and other Governments'] committed buys of aircraft, ships and land systems".[91] Even given the expected increase in demand for defence aerospace products, our witnesses told us that access to defence markets in other countries remained a problem.[92] In many cases, government controls were in place so that UKAI would not be able to gain a fair market share of this growth.

Market access

42. The globalisation of the aerospace industry on the supply (production) side has not been matched on the demand side. This has not been such a major problem for the civil aerospace side of the industry but has remained so for the defence side.[93] Our witnesses told us that, with the notable exception of the UK, national defence markets "remain largely entrenched" and closed to foreign entry.[94] The SBAC, in particular, told us that a lack of defence market access, especially in the UK's main markets of the US and EU,[95] could undermine the recent improvement in the performance of the UKAI, post 2001.[96] The main stumbling block they identified to wider market access for the UKAI was the question of technology transfer: "if we cannot supply, particularly on the defence side where you know we have issues around technology transfer etc., that is quite a significant issue for us on which we have to make progress. Also, we need to keep the playing field level".[97]

43. The restriction of technology transfers between countries can mean that indigenous firms have an unfair advantage when bidding for national contracts. For example, under the US's International Traffic in Arms Regulations (ITAR): "it is unlawful: to export or attempt to export from the United States any defense article or technical data or to furnish any defense service for which a license or written approval is required by this".[98] US aerospace companies undertaking a US Government contract do not have to be concerned

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[91] Appendix 9, section 3

[92] For example see: Appendix 14, para 3.2.3

[93] Q 255

[94] See Appendix 14 para 3.2

[95] Q 58

[96] Q 48

[97] *Ibid.*

[98] International Traffic in Arms Regulations (ITAR), part 127.1

about the transfer of technology across borders when they are the single contractor. In comparison, a US company which collaborated with a UKAI company or a UKAI company which bid on its own, is placed at an unfair advantage as it has to ensure that there will not be an export of technology which the US Government may consider sensitive. The penalties for any person or company found to have wilfully violated the ITAR are stringent.[99]

44. Some UKAI companies have attempted to 'circumnavigate' the ITAR by acquiring US aerospace companies as subsidiaries.[100] However, UKAI companies may not reap the full benefits of R&D carried out within their subsidiary, as, under the ITAR, they may be unable to 'export' the technology back to the UK.[101] A lack of access to overseas aerospace technologies can also have a secondary impact. The SBAC told us that where the MoD had invested in US aerospace programmes, UKAI companies had established subsystem design and manufacturing positions, as demonstrated by the JSF, Airborne Stand-Off Radar (ASTOR), and Hawk fixed-wing trainer. They believed such programmes would be in service for over 30 years so that: "it is essential that the UK also achieves overall positions on these programmes to ensure that the systems concerned can be supported, upgraded and modified throughout their service life, with the necessary transfer of technology to enable this to happen".[102] If UKAI companies were to retain the capability necessary to offer ongoing maintenance and support for UK Government defence equipment in the UK, as opposed to migrating to the US through acquisition, the SBAC told us that it was critical that mechanisms were introduced to allow transatlantic technology transfer.[103]

45. The Government appears to have been keen to effect a solution to the problem of technology transfer from the US. In 2002 the Government stated: "A key aim is to conclude successfully current negotiations on a waiver from the US International Traffic in Arms Regulations, which would allow the export of unclassified defence items and technology to UK companies for UK and US use without a requirement for US export licences".[104] The *Defense Authorization Act for Fiscal Year 2005* was signed into US law in October 2004. Despite the inclusion of a provision granting an ITAR waiver to the UK in the original Senate version of the Bill, it was eventually dropped from the final agreed text of the Act, following strong opposition from the House of Representatives. However, during conference negotiations on the Bill, concessions were agreed between the Senate and the House to allow preferential treatment to be given to the UK, and Australia, with respect to export applications for ITAR-controlled items.[105] This, the SBAC told us, had "allayed some of UKAI's concerns".[106]

46. While giving evidence to the Quadripartite Committee on Strategic Export Controls in January 2005, the Foreign Secretary told the Committee: "We were greatly disappointed

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[99] *Ibid*., part 127.3

[100] Appendix 4

[101] Q 136

[102] Appendix 14, para 3.2.5

[103] *Ibid.*

[104] MoD, *Defence Industrial Policy*, MoD policy paper number 5, October 2002

[105] HC Library, their reference: ENQ2005/2/119-IADS

[106] Appendix 14, para 3.2.6

that the Congress deleted the provisions for an ITAR exemption from the Defence Authorisation Act. We welcome the fact that language was included in support of the expeditious processing of export licence applications and we were discussing the way forward with the US administration. It has been a constant source of discussion between the Prime Minister and President Bush, Secretary Powell and myself and our officials. It is disappointing. The administration did its best. On these issues it is for the Executive to propose and for Congress to dispose and they came to a different view. It is disappointing, particularly given what a close and reliable ally we have been for the United States through thick and thin".[107] It remains to be seen if a provision to grant a full ITAR waiver to the UK will be re-introduced in the Senate in the next Defense Authorization Bill for FY2006, which is scheduled to be examined during 2005. Along with our colleagues on the Defence, Foreign Affairs, and International Development Committees, we are extremely disappointed that the US Congress has deleted provisions that would have enacted an ITAR waiver for the UK.[108]

47. We asked for the views of the DTI on what UKAI companies could do to overcome the problems associated with technology transfer, given that an ITAR waiver would not be immediately forthcoming. They told us: "You [companies] just have to be patient and work through it. In terms of the ITAR waiver, it is fair to say that we are slightly disappointed that it has not been possible to conclude this yet but all we can do is continue in our efforts to work with the US authorities to try and achieve it".[109]

48. **The UK aerospace industry (UKAI) requires Government help to reduce barriers to trade in terms of technology transfer, especially in the US. We recommend that the UK Government should continue to press the US Administration to support increased access to US technology for UKAI companies through an International Traffic in Arms Regulations (ITAR) waiver for UKAI companies.**

Emerging international competitors

49. Despite high barriers to entry, new competitors are continuing to emerge in developing economies, typically driven by government support and a desire to create an indigenous aerospace design and manufacturing capacity.[110] Examples of emerging competitors in the civil aerospace market given to us by our witnesses included Chinese and Russian efforts to develop regional jet programmes. Sir Michael Jenkins, President of Boeing UK, told us the Chinese authorities were looking to build around 150 regional airports within the next decade.[111] Overseas partners, such as General Electric, Boeing and SNECMA were currently assisting in the design process for a 70-seat Chinese regional jet in order to gain market access for their engine and systems products.[112] However, Sir Michael remained uncertain whether China would become a major aircraft manufacturer of its own regional

[107] Defence, Foreign Affairs, International Development and Trade and Industry(Quadripartite Committee on Strategic Export Controls), First Joint Report of Session 2004-05, *Strategic Export Controls*, HC 145, 23 March 2005

[108] *Ibid.*

[109] Q 217

[110] Appendix 14, para 3.1

[111] Q 258

[112] Q 214 (DTI)

jets, just because indigenous demand had been demonstrated. He cited the example of Japan which had deliberately chosen not to manufacture its own aircraft but had instead decided to concentrate on making subsystems for the main aircraft producers.[113]

50. Boeing suggested to us that their 'duopoly' with Airbus in the sale of large civil aircraft could be under threat in the long-term from incumbent regional aircraft producers such as Bombardier of Canada and Embraer of Brazil, which could move into producing larger aircraft in the future.[114]

51. Examples of emerging competitors also exist in defence aerospace markets. Korea has flown its own 'advanced' jet trainer and Taiwan has developed its own jet fighter aircraft: "albeit with limited success".[115] The DTI told us that these efforts were being assisted by 'licence build agreements' with foreign companies, where existing manufacturers licensed the assembly of aircraft 'kits' to lower-cost economies. Such agreements allowed these countries to acquire the skills of aircraft integration and assembly: "the first step towards developing a full indigenous capability". [116] This would provide further competition for the UKAI.

52. There has also been some concern amongst the UKAI community that increased competition from low-cost economies could cause problems at the bottom end of the UK aerospace supply chain. In March 2004, a report commissioned by the Farnborough Aerospace Consortium predicted that between 30 and 50 percent of the UKAI's smaller suppliers could close due to competition from low-cost economies.[117] The report found that larger UKAI companies had become aware of, and were making use of, firms in lower-cost economies. At the same time, UKAI SMEs were less aware of these benefits and were more likely to suffer from the increased levels of competition.[118]

53. **We conclude that the challenge from the emergent competitors, be they lower-cost economies or other developing economies, is growing. Subcontracting abroad is increasing as a result of lower cost or more favourable incentives, such as public R&D investment. As far as we can see, there has been no official study into the 'threat' from emerging competitors to the UKAI. Research which has been carried out has tended to focus only on UKAI's developed competitors. We recommend that the UK Government should undertake a study of these emerging aerospace industries as soon as possible to gauge the future challenge to the UKAI.**

Investment in R&D

54. The SBAC told us that the UK's success in aerospace markets stemmed directly from its R&D investment, which: "stimulates innovation and knowledge creation, supports

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[113] Q 259

[114] *Ibid.*

[115] Appendix 9, para 4.5

[116] *Ibid.*

[117] Bravura Consulting for Farnborough Aerospace Consortium, *The True Cost of Subcontracting Work to Low Cost Economies*, March 2004

[118] *Ibid.*

research in universities, and has considerable spin-off benefits into non-aerospace activities".[119] Investment in R&D also allowed UKAI to: "achieve sustained productivity growth and competitiveness, to ultimately deliver a positive contribution to the UK economy both nationally and in the regions".[120]

55. R&D of all types is difficult to measure and compare, partly due to difficulties in defining the boundaries between research, technology acquisition, development and product development, and partly because relevant information is not always made public, or is not compiled on a consistent basis. Moreover, business-funded R&D varies from year to year, for example according to a company's cycle of product development, or because external funding has reduced the need for company funding.[121]

56. However, the evidence suggests that the UKAI invests heavily in R&D, and is second only to pharmaceuticals in its R&D intensity (R&D as a percentage of turnover) in the UK. Between 1996 and 2003, UKAI R&D expenditure averaged 0.2 percent of GDP and ten percent of total R&D in the UK.[122] In 2003 alone, UKAI-funded R&D investment was just over £2 billion,[123] and there were three aerospace companies featured among the top-ten UK R&D investors: BAE Systems (ranked No. 3), Airbus (ranked No. 7) and Rolls-Royce (ranked No. 10), investing £1.7 billion between them.[124]

57. According to SBAC figures, the average R&D intensity for a UKAI company was 12.3 percent of turnover in 2003,[125] and for the EU the figure was 14.5 percent.[126] Figures given for the proportion of companies' own R&D as a proportion of turnover vary widely: BAE Systems 13.1 percent, Rolls-Royce 5.0 percent, Cobham 4.9 percent, Smiths 4.2 percent, and Alvis 1.7 percent.[127] Some companies have increased their R&D expenditure, notably BAE Systems and Airbus; others, such as Rolls-Royce have reduced theirs.[128] International comparisons of aerospace companies' R&D intensity performance show that UKAI companies invest more in R&D than their international competitors. For example, of the top twenty aerospace companies in 2003, BAE Systems was ranked second, only behind Finmeccanica of Italy in terms of R&D intensity (Rolls-Royce was ranked 8th, Cobham 9th, and Smiths 11th).[129]

58. R&D spending by the UKAI contributes to productivity in the aerospace sector and in the wider economy too. Recent research by Oxford Economic Forecasting, undertaken for the SBAC, estimated that the cumulative effect of R&D spending by the UKAI at this level has boosted UK GDP by around 2.5 percent, most of which had been experienced outside

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[119] Appendix 14, para 4.2

[120] *ibid*,, para 4.0

[121] Trade and Industry Committee, *British Aerospace Industry*, para 63

[122] Appendix 14, para 4.2

[123] *Ibid.*, para 4.3

[124] DTI, *The 2004 R&D Scoreboard*, October 2004, page 30

[125] SBAC, *Facts and Figures 2003*, July 2004, page 21

[126] AeroSpace and Defence Industries Association of Europe, *Facts and Figures 2003*, October 2004, page 35

[127] DTI, *The 2004 R&D Scoreboard*, October 2004, pages 4 and 66

[128] *Ibid.*, page 4

[129] *Ibid.*, page 66

the aerospace sector. The SBAC told us that this suggested: "aerospace punches above its weight in terms of its overall contribution to GDP".[130] Since R&D expenditure by aerospace companies comes out of their profits and those profits are being squeezed, it is clear that companies are unlikely to be able to increase their own expenditure on R&D to any degree in the future.[131] However, what matters is not so much what companies themselves are spending on R&D, as the level of overall national aerospace R&D expenditure, including public support for R&D, and how this compares with that of the UKAI's main competitors.

Government funding of R&D

59. The UK is "strong on aerospace research and technology, with a resilient academic science and engineering base, and significant industry funding for applied research and technology".[132] The DTI told us that the Government had provided £141 million of support for UKAI R&D since 1997.[133] This had been provided mainly through the Civil Aircraft Research and Technology Demonstration (CARAD) programme.

60. Government funding, provided through CARAD, was aimed at helping 'key' sectors of the UKAI to maintain a technology base, which would be needed for UKAI companies to remain competitive in world markets. Funding was provided for long-term, pre-competitive R&D into airframes, avionics and aero-engine systems in the UK aerospace industry, universities and research establishments. When the CARAD programme was originally introduced, part of the funding was channelled through the then Defence Research Agency. This enabled the UK civil aerospace sector to gain access to the UK's leading aerospace research organisation. An example of the projects which were granted support through CARAD, was the construction of the European Transonic Windtunnel (ETW) for airflow testing, a collaborative project with Germany, France and the Netherlands, which is located near the Cologne/Bonn airport in Germany.[134] CARAD has now closed but existing projects will run to completion until 2007, with funding of £50 million during this period.[135]

61. The SBAC told us that UK Government investment in aerospace R&D had reduced "substantially in recent years […] investment in civil aerospace R&D via the DTI fell from £104 million in FY1972 to £21.1 million in FY2004".[136] Further, MoD air applied research funding had also fallen from £250 million to £185 million in the last six years.[137] The SBAC suggested to us that this had had "a major impact on the overall aerospace sector".[138]

62. We asked the DTI why the Government had ceased direct support to the UKAI for R&D through programmes such as CARAD. They told us: "what we have moved away

[130] Appendix 14, para 4.2

[131] *ibid*., para 2.1.2

[132] Appendix 9

[133] *ibid*.

[134] Trade and Industry Committee, *British Aerospace Industry*, para 64

[135] Appendix 9, section 7

[136] Appendix 14, para 4.5

[137] Q 20

[138] Appendix 14, para 4.6

from programmes which are geared to supporting particular sectors to programmes which are cross-sectoral in nature. If you take technology programmes, that is probably to the benefit of the aerospace industry because the amount of funding that they were able to access under the previous DTI technology funding was relatively limited, about £20 million a year. They [the UKAI] do not have a special fund for aerospace but they have access to a technology fund and as one of the two sectors in the UK, along with pharmaceuticals which are high R&D, that gives them probably more opportunity than they have with a smaller, dedicated fund".[139]

63. The support given for R&D under the DTI's Technology Programme (technology fund), for which the UKAI can now apply, includes the Collaborative Research & Development (CR&D) grant and Knowledge Transfer Networks (KTNs).[140] CR&D grants are designed to aid UK companies to take advantage of technological developments by reducing their financial risks. Grants are available for support of between 25 percent and 75 percent of the R&D costs. KTNs are aimed at helping UK companies find out what is new in technology, or national and international policies which may be of benefit to them. The KTNs can also aid UK companies to find suitable collaborative partners.[141]

64. DTI funding for the UKAI through the latest Technology Programme call for applications (April 2004) amounted to around one quarter of the £60 million distributed.[142] The Government also announced that just under £19 million of public funding (including money from the April 2004 DTI Technology Strategy call) will be made available for a National Composites Network to: "disseminate composites technology for the aerospace, automotive and other market sectors".[143] EU funding is also available for the UKAI from the Framework Programmes for R&D, of which around €800 million (over four years) has been earmarked for aerospace programmes. The DTI told us that the UKAI tends to gain between ten to 15 percent of this figure,[144] which translates to between £14 million and £21 million per annum.[145] The next call for Technology Programme applications was announced on 15 March 2004.[146]

65. UKAI companies are also eligible for R&D tax credits, through the Inland Revenue, and launch aid through the DTI. As the DTI told us, CR&D, KTNs and R&D tax credits are non-sector specific. We looked at these programmes in detail in our recent inquiry into the knowledge-driven economy and we do not discuss them further here.[147] However, launch aid remains a Government programme which is specifically aimed at supporting the UK's civil aerospace industry.

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[139] Q 202 (Mr Alty)

[140] Appendix 10, section 2

[141] *Ibid.*

[142] Q 219

[143] Appendix 9

[144] *Ibid.*

[145] Assumes €1=£0.692. Source: AeroSpace and Defence Industries Association of Europe, *Facts and Figures 2003*, October 2004, page 37

[146] DTI, *£100m Boost for Great British Ide*as, press notice P/2005/091, 15 March 2005

[147] Trade and Industry Committee, *Progress towards the knowledge-driven economy*, Eighth Report of Session 2004-05, HC 432

Repayable launch investment (RLI)

66. The UK civil aerospace industry receives assistance from the Government in the form of 'launch aid'. 'Launch aid' is a misleading name, since it implies a straightforward subsidy, whereas the money is intended to be repaid to the Government with interest. A more appropriate term, and the preferred term used within the industry, is 'repayable launch investment' (RLI).[148] The DTI describes RLI in the following terms: "Launch Investment is a UK government investment in the design and development of civil aerospace projects. It is repayable at a real rate of return, usually via levies on sales of the product. The government shares in the risk, as the company may not achieve sales at the level or price forecast. Launch investment is available only to the aerospace sector as outlined in the *Civil Aviation Act 1982*".[149]

67. Aerospace projects are characterised by high costs and long payback periods.[150] RLI is intended to remedy a deficiency in the capital markets, which arises from the reluctance or inability of companies or institutions to finance the heavy 'front-ended' development costs of new aerospace projects, since the return is high risk and long-term.[151] By providing RLI, the Government shares in the risk of a project, as a company may abandon the project or not achieve the level of sales, or the price, forecast. Aerospace projects are also highly international, and so RLI enables the Government to secure 'valuable' projects for the UKAI, which might otherwise be carried out elsewhere.[152]

68. The provision of RLI is entirely discretionary. There is no formal scheme, promotion or budget for RLI. Each application is considered on its merits against a range of established criteria and also, by the Treasury, against public expenditure constraints.[153] We asked the DTI what the process was, once an application had been made by a company, including how and when repayments were made. They told us that applications are subject to a rigorous evaluation with the following characteristics:

— In applying for RLI, companies have to set out the nature of the project and their business plan for delivering it. The DTI undertakes market, financial and technical analysis of the project, including assessing the wider economic benefits to the UK;

— Applicants must demonstrate that the project is commercially and technically viable, and that it would not go ahead without Government support;

— Once an evaluation is complete, a recommendation is made to Ministers;

— There is no guarantee that a positive recommendation to support a project will result in an offer to the applicant, and the decision to put public funds into a project is balanced against other public sector funding priorities; and

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[148] Appendix 14, para 6.3.1

[149] DTI website (9 March 2005): www.dti.gov.uk/aerospace/launch-investment.htm

[150] Appendix 9, section 7

[151] Q 203

[152] Appendix 9, section 7

[153] DTI website (9 March 2005): www.dti.gov.uk/aerospace/launch-investment.htm

— If RLI is offered to a company, a contract is negotiated which sets out the terms and conditions. Each project is different and therefore the terms and conditions of the contracts vary. They have evolved over time to take account of policy developments and to meet the UK's international obligations (for example, if European Commission permission is required); then

— After the contracts have been concluded, the DTI holds regular meetings with the company concerned to monitor the progress of the project. [154]

69. RLI payments are made for eligible development costs to companies in the early years of a project. Repayments, when paid, are usually based on a per-aircraft or per-engine levy. These are set at a level to achieve the repayment of RLI with a target rate of interest and within a specified period of time.[155]

70. RLI is open in principle to any UK-based aerospace company. In the past, RLIs have tended to be large projects and relatively few in number. Since 1982, four companies—Airbus, Rolls-Royce, Westland Helicopters (now part of Finnemeccanica of Italy) and Short Brothers (now part of Bombardier)—have been provided with RLI. RLI has been granted to Airbus for the A320 and A330/A340 programmes and most recently for the A380 'super-jumbo' programme (£530 million). Rolls-Royce has been granted RLI for the development of the RB 211 engine, the Trent 'family' of engines, and recently the latest Trent 900 engine (£450 million) for the A380. Westland Helicopters have also received RLI for the development of the EH101 military utility medium lift helicopter, while Short Brothers received RLI for the development of the Lear 45 medium sized corporate jet. The DTI has noted that all these programmes have either repaid at their expected rate of return or are on course to do so.[156] Government expenditure on RLI from 1982 to 2003/04 was just over £2,039 million, while repayments amounted to just over £1,639 million.[157]

71. All our witnesses agreed that the continuation of RLI was essential for the UKAI to remain competitive.[158] The SBAC believes that RLI has been: "fundamental to maintaining leadership in technology, skills, product innovation and environmental enhancement. Aerospace firms are internationally mobile and will continue to be attracted by government support. Without RLI the UK civil aerospace industry will contract and the UK will lose a world class industry".[159] Mr Iain Gray, Managing Director of Airbus UK, told us: "Launch Investment is a hugely important part of Airbus. If we did not have the Launch Investment mechanism here in the UK, I do not believe we would have had the level of work that we have enjoyed both within our own company and the supply chain in the UK over the last decade".[160] Clearly there have been many UKAI projects which could not have proceeded, or would have required much greater foreign participation, but for

[154] Appendix 10, section 1

[155] *Ibid.*

[156] *Ibid.*

[157] *Ibid.*

[158] For examples see: Appendix 2, para 3.3 and Appendix 14, para 6.3.1

[159] Appendix 14, para 6.3.1

[160] Q 70

RLI. Indeed, if the criterion that projects are supported only if they would not otherwise go ahead has been fully applied, none of the projects assisted would otherwise have proceeded.

72. Nevertheless, the industry has criticisms of the way the scheme operates. Mr Colin Green, Vice-President of the SBAC and President—Defence Aerospace at Rolls-Royce, told us that the programme was designated as a 'one time only' source of funding for a project as opposed to being part of an annual budget: "the overriding criticism we have had in the past has been that it is by its nature a one-off decision […] We [the SBAC] would like to see it being more recognised as a normal way of doing business rather than being treated as a one-off in every case".[161] The Royal Aeronautical Society (RAS) told us: "the difficulties faced by equipment manufacturers in qualifying for Repayable Launch Investment will undermine UK competitiveness as their financial and technical risks increased".[162] Although UKAI equipment companies are not specifically excluded from applying for RLI, according to the information given to us by the DTI, no equipment company has received launch aid since 1982.[163] Equipment manufacturers wishing to obtain RLI, such as Dowty in 1986-88, appear to have been discouraged from applying. This could be because the development of equipment costs less, has shorter timescales, and the probability of making a commercial return within a reasonable time scale is much higher for equipment manufacturers than for makers of airframes or aero-engines.[164]

73. **We believe that the development of aerospace equipment has become increasingly complex, risky and expensive and in some cases these investments may represent a proportionally larger financial commitment by the companies concerned than investments which are currently supported by repayable launch investment (RLI). We recommend that the DTI adopts a more positive attitude towards applications by equipment makers for RLI, and that it takes into account the size and resources of equipment companies when assessing whether or not projects require RLI to go ahead.**

International comparisons of public support for aerospace

74. We believe an important criterion on which Government support for the UKAI should be assessed is how it compares with the support given by foreign governments to the UKAI's main competitors and collaborators. Unfortunately, such comparisons are difficult to make, since not only do methods of support vary from country to country, but much of the support given to individual companies by governments is treated as confidential, especially for defence-related R&D.[165] However, Dr Sally Howes, Director General of the SBAC, told us that the AeIGT Report on the UKAI had estimated that support for research and technology (R&T) (a stricter definition of R&D) by the US Government had provided investment to US civil aerospace companies worth £620 million in 1998, compared to government support of £120 million in Germany, £50 million in France and £20 million in the UK.[166] These figures suggested that the public support given to the UKAI for R&D was

[161] Q 41

[162] Appendix 13, para 5

[163] Appendix 10, section 1

[164] Trade and Industry Committee, *British Aerospace Industry*, para 85

[165] Q 204

[166] Q 20

less than that given to the aerospace industries of the UKAI's main competitors by their governments.[167] However, the AeIGT Report readily admitted that its conclusions took no account of government support for UKAI R&D through RLI and R&D tax credits.[168] Further, since the report was published, increased support for the UKAI through the DTI's new Technology Programmes has also become available.

75. We asked the DTI if they could shed some light on the overall level of government support provided to the UKAI's main competitors through programmes such as RLI. They told us: "in order to get an idea of this you would need to see individual contracts. You would need to get into the detail of the agreements that the governments strike with the companies and of course that is highly commercially sensitive".[169] We were concerned with the apparent lack of UK Government information about the support given by other countries to their aerospace industries and asked the DTI how they would know other countries' aerospace industries were not being subsidised beyond 'reasonable grounds'. They told us: "there are a number of checks and balances in the system. For some launch investment, the European Commission will scrutinise the details. Under the 1992 agreement [The 1992 EC/US Agreement on Trade in Large Civil Aircraft], there are some transparency arrangements which we had in the US, where both sides would provide the other with details of support given to industry".[170]

76. **We recommend that the Government conducts a study into the subsidies which are available to other aerospace industries within the EU. If such a study suggests that the UK's European competitors are giving aid to their aerospace industries which could infringe state aid rules, this should be reported to the European Commission at the earliest opportunity. If other EU Member States appear uncooperative, the UK Government should ask the European Commission to carry out its own investigation of assistance given to the aerospace industry across the EU.**

77. **We conclude that Government support for UKAI R&D has fallen over the last few years. The recent re-organisation of DTI funding programmes has opened new opportunities for aerospace R&D funding through the Technology Programmes, such as the Collaborative Research & Development grants and Knowledge Transfer Networks programmes. Aerospace companies are also able to benefit from R&D tax credits. There is, as yet, little evidence as to whether these new funding streams will compensate the UKAI for the loss of the Civil Aircraft Research and Technology Demonstration (CARAD) programme. However, evidence from the distribution of latest round of Technology Programme funding, where the aerospace industry received a quarter of the £60 million, suggests to us that they might.**

[167] See Qq 164 and 116

[168] DTI/AeIGT, *An Independent Report on the Future of the UK Aerospace Industry*, June 2003, page 49

[169] Q 207

[170] Q 208

4 The dispute before the World Trade Organisation

78. During our inquiry, witnesses highlighted their concerns about the recent trade dispute between the US Government and the EU over the public sector support which had been given to the civil aerospace sector, and how the dispute would affect the UKAI.[171]

The 1992 EC/US Agreement on Trade in Large Civil Aircraft

79. A bilateral agreement between the EU and the US on financial support for large civil aircraft has been in existence since 1992 (EC-US Agreement on Trade in Large Civil Aircraft).[172] Signed under the auspices of the General Agreement on Tariffs and Trade (GATT), the agreement established: limits on, interest rates and repayment periods for, the public support given to all Airbus aircraft and aircraft with capacity of 100 or more seats manufactured in the US ;[173] a number of mutual commitments to monitor the agreement; and institutional arrangements for future dialogue between the two parties on this issue. More specifically:

— Restriction of launch aid to 33 percent of total development cost, with 25 percent to be repaid at the cost of government borrowing and the remaining eight percent to be repaid at the cost of government borrowing plus one percent;

— A maximum reimbursement period of 17 years, and 20 percent of the repayments to be made over the first 40 percent of aircraft deliveries (and 70 percent over the first 85 percent);

— An overall limit per annum on indirect support equivalent to three percent of the civil aircraft industry's annual commercial turnover in the country concerned and four percent of the annual commercial turnover of any one firm; and

— Controls on general purpose loans and sales inducements.[174]

80. The agreement outlined two forms of support: 'direct', such as RLI favoured by EU Member States' governments; and 'indirect' such as R&D support favoured by the US Government.

The current dispute

81. In recent negotiations on a renewed deal, the US (and Boeing) were looking to ban all new state aid to large civil aircraft, but these discussions broke down in September 2004. This prompted the US to initiate the first steps towards the WTO's Dispute Settlement

[171] For example see Appendix 14, para 6.3.1, Appendix 2 para 3.3 and Q 70 (Airbus UK)

[172] Appendix 2, para 3.3

[173] Appendix 10, section 1

[174] Trade and Industry Committee, *British Aerospace Industry*, para 97

Proceedings in October 2004, by requesting formal consultations with the EU and the governments of the UK, France, Germany and Spain. The US Government alleged that $15 billion in 'illegal aid' had been paid to Airbus, particularly for the new A380 'super-jumbo' programme.[175] Their objections focussed around EU levy-based investment programmes (such as RLI), which, the US claimed, were given at either zero or below market rates of interest, and the fact that RLI did not have to be repaid if a new model was not successful.[176]

82. On the same day, the EU retaliated by launching counter-proceedings against the US, alleging that Boeing had 'illegally' been given $23 billion by the US public sector.[177] The EU claimed that the US Government had subsidised Boeing mainly through R&D grants from NASA and Department of Defense programmes but also through individual US States offering tax breaks and grants to attract Boeing manufacturing plants.[178] Ambassador Robert Zoellick, the US Trade Representative, also announced that the US would terminate the 1992 agreement, exercising a right provided in the agreement itself, a move which was rejected by the EU.[179]

83. When we asked the Department for their views on the WTO negotiations, officials took pains to stress to us the political sensitivity involved: "this case is at a very sensitive stage at the moment so I would rather not speculate on what the outcomes might be".[180] Shortly after we heard the Department's evidence, the WTO Director-General, Supachai Panitchpakdi, announced that the EU and the US were "to negotiate a bilateral resolution to their ongoing dispute concerning aircraft subsidies rather than continue the cases they had brought in October to the WTO's Dispute Settlement Body".[181] We will continue to maintain a watching brief on developments in this highly sensitive case.

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[175] WTO, *European Communities and Certain Member States - Measures Affecting Trade in Large Civil Aircraft - Request for Consultations by the United States*, DS316, 12 October 2004

[176] The communication also claimed that a loan to EADS from the European Investment Bank for the A380 could be considered an export subsidy in breach of Articles 3.1(a) and 3.2 of the WTO Agreement on Subsidies and Countervailing Measures (SCM Agreement).

[177] WTO, *United States - Measures Affecting Trade in Large Civil Aircraft - Request for Consultations by the European Communities*, DS317, 12 October 2004

[178] Appendix 2, para 3.3

[179] See: US Trade Representative, *U.S. Files WTO Case Against EU Over Unfair Airbus Subsidies*, Press Release, 6 October 2004 and European Commission, *US-Boeing: EU rejects US unilateral abrogation of the 92 aircraft agreement*, Press Release, 8 October 2004

[180] Q 211 (Mr Scott)

[181] WTO, *Supachai welcomes EU–US decision on aircraft dispute, press notice 394*, 11 January 2005

5 Aerospace Innovation and Growth Team (AeIGT)

Background

84. In 2002 the Secretary of State asked Sir Richard Evans, former chairman of BAE Systems, to establish an Aerospace Innovation and Growth Team (AeIGT) to look at the future of the UKAI. The Team's brief was to draw on the expertise of the major stakeholders in the UKAI and look 20 years ahead to consider ways in which UK aerospace could continue to remain globally competitive, with the vision that by 2022: "the UK will offer a global Aerospace Industry the world's most innovative and productive location, leading to sustainable growth for all its stakeholders".[182] The AeIGT's first report, published in June 2003, contained a set of objective recommendations on how to make that vision a reality:

— **Research and Technology:** "The UK must sustain a level of focused Aerospace applied research and demonstration sufficient to maintain and enhance the UK's position in the global Aerospace market";

— **Process Excellence:** "The UK must systematically and continuously deliver productivity improvement at a rate faster than its competitors";

— **Skills and People Management:** "UK Industry must continuously develop a world-class workforce";

— **Environment, Safety and Security:** "The UK must be at the forefront of international sustainable development of the Aerospace Industry in the areas of safety, security, capacity and the environment"; and

— **Socio-economic environment:** "Deliver the macroeconomic conditions, the wider socio-economic environment and focused policies required to improve UK Aerospace's competitive advantage and its potential to thrive in world markets." [183]

85. Following the publication of the Report, the AeGIT programme moved into an initial implementation stage, running from August 2003 to July 2004. July 2004 onwards has been described as the second implementation stage. We previously took evidence on the work of the AeIGT in 2003.[184] This section of the Report looks at the progress which has been made towards the recommendations of the AeIGT since that time, in particular the establishment of a National Aerospace Technology Strategy (NATS), and measures to reduce the productivity gap with the UKAI's main competitors through Product Excellence.

[182] DTI/AeGIT, *An Independent Report on the Future of the UK Aerospace Industry*, June 2003, p 10

[183] *Ibid.*

[184] See: Trade and Industry Committee, *Minutes of Evidence for Tuesday 15 July 2003*, Session 2002-03, HC 1023-i

Research and technology (R&T)

86. The AeIGT Report recommended the establishment of a National Aerospace Technology Strategy (NATS) as a partnership between industry, government and academia.[185] This recommendation was based on the following grounds:

— The success of the UKAI depending on the ability to deploy world-class technology, which required long-term investment in research;

— Aerospace being a safety critical and highly regulated industry, which required focused research and validation before new technology could be applied. The strength of the UKAI stems from its history of R&D programmes, promoted by governments in collaboration with the UKAI, and aimed at bridging the gap between pure science and industrial exploitation; and

— The major UKAI companies having a global footprint. While prepared to invest in technology acquisition, they have tended to do so where the conditions are most favourable and, in particular, where they can work in partnership with government-funded R&D.[186]

87. Following acceptance of the AeIGT's recommendations, implementation of the NATS commenced in September 2003, under the leadership of the Aerospace Technology Steering Group (ATSG),[187] with Mr Ken Maciver, former President and Chief Executive Officer of TRW Aeronautical Systems, as Chairman. When giving evidence to us on behalf of the ATSG, Mr Maciver reiterated the basis for the AeIGT's recommendation for a NATS.[188]

National Aerospace Technology Strategy (NATS)

88. The *NATS - Implementation Report* was published in July 2004.[189] The Report defined the background, process and structures necessary for the implementation of the NATS. The ATSG told they believed that the NATS addressed the challenges faced by the UKAI, through the mechanisms of research and validation of 'key' and 'enabling' technologies,[190] supported by coordinated and balanced public and private sector investment.[191] The Strategy describes how the required research and validation must be realised through: "a phased programme involving industrial, university and research establishment partnerships, defined through Aerospace Innovation Networks (AINs) and Aerospace

[185] DTI/AeGIT, *An Independent Report on the Future of the UK Aerospace Industry*, June 2003

[186] Appendix 1, para 2

[187] *Ibid*., para 4

[188] Q 161

[189] AeIGT, *National Aerospace Technology Strategy - Implementation Report*, 2 August 2004

[190] Q 162

[191] Appendix 2, para 3.2

Technology Validation Programmes (ATVPs)",[192] which build upon a number of existing mechanisms.[193]

Aerospace Innovation Networks (AINs)

89. AINs are based on Defence Technology Centres (DTCs),[194] a model of a group of companies and technology providers, with a focus on a specific research theme. However, DTCs serve only the MoD's technology requirements and the defence industry. AINs will provide a similar mechanism to serve the civil aerospace sector (with some possible dual defence/civil aerospace applications).[195] Unlike DTCs, the facilities and research of the AINs will be open to any company willing to make the required financial commitment. [196]

90. Individual AINs will be focused on a 'core' research theme[197] over a rolling five-year period, led by industry but jointly-funded by government, regions, industrial partners, selected universities and research establishments. They are expected to be a set of networked research institutions with distributed research facilities (rather than occupying a single location). So far, 12 potential AINs have been identified:

— Aerodynamics and Computational Fluid Dynamics;

— Environmental Technology;

— Advanced Aerospace Materials & Structures;

— High Temperature Materials;

— Advanced Electrical Power Systems;

— Systems Engineering;

— Sensor Technologies;

— Interactive Network Systems;

— Health Management & Prognostics;

— Through-Life Support;

— Electro-Magnetic Interaction & Effects; and

— Synthetic Environments and Systems Simulation.[198]

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[192] ATSG website (11 March 2005): www.aeigt.co.uk/workinggroup1.shtml

[193] See: AeIGT, *National Aerospace Technology Strategy - Implementation Report*, 2 August 2004, para 21

[194] DTCs are formal collaborative arrangement between industry and academic experts in a particular technology, funded jointly by participants and the MoD. More information on DTCs can be found on the MoD website (11 March 2005): www.mod.uk/dtc/index.html

[195] AeIGT, *National Aerospace Technology Strategy - Implementation Report*, 2 August 2004, para 22

[196] *Ibid.*, para 27

[197] Appendix 2, para 3.2

[198] AeIGT, *National Aerospace Technology Strategy - Implementation Report*, 2 August 2004, para 25

91. The NATS Implementation Report suggested that DTI support for establishing the AINs would be drawn from the Department's Technology Programme, through the Knowledge Transfer Networks (KTNs) programme,[199] and support for specific projects through the Collaborative R&D programme.[200]

Aerospace Technology Validation Programmes (ATVPs)

92. ATVPs are based on a US model, which has recently been adopted by the European Commission for its Framework Programme for R&D and will: "make a major contribution to risk reduction in down-stream product programmes, as well as generating valuable experience and capabilities in technology integration".[201] Each ATVP will be led by a single UKAI company and jointly funded by central Government, regions and industry but involving a group of industrial partners and selected universities and research establishments, jointly undertaking one of the specified ATVPs.

93. The NATS Implementation Report suggested that there would be six ATVPs required, which it identified as:

— Civil Powered Wing;

— Environmentally Friendly Engine;

— More Electric Aircraft;

— Autonomous Systems;

— Future Air Battlespace; and

— Air Traffic Management.[202]

94. ATVP funding will be sought from similar sources to that of the AINs. It is expected that the DTI will provide support through the Collaborative R&D programme and through overall co-ordination of public sector funding streams. This will be matched by UKAI support and supplemented by funds from the EC Framework Programme for R&D, Research Councils (primarily the Engineering and Physical Sciences Research Council (EPSRC) for underpinning research), and the Regional Development Agencies (RDAs). Which RDAs would be approached to support each ATVP project depends on the siting of facilities, the location of prime suppliers of components, or the prime integrator.[203]

95. AINs and ATVPs are expected to start in 2005 and all the programmes are required to have started by 2008. Priority has been given to establishing AINs and ATVPs in aerospace

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[199] Appendix 10, section 2

[200] AeIGT, *National Aerospace Technology Strategy - Implementation Report*, 2 August 2004, para 28

[201] *Ibid.*, para 31

[202] *Ibid.*, para 33

[203] *Ibid.*, para 36

sectors where there is currently little activity, or where funding may be due to end, for example project funding from the now defunct CARAD programme.[204]

Funding the NATS

96. The AeIGT estimated that the level of funding required for each AIN will rise to around £10 million per annum,[205] while the funding required for each major ATVP will cost between £20 million and £200 million.[206] The NATS Implementation Report estimated the total cost of NATS would be in the region of £300 million per annum.[207] For this to be provided, the report identified the need for an additional £50 million of public sector support per annum for civil and dual use (civil and defence) applied research and technology validation.[208]

97. The termination of the Civil Aircraft Research and Technology Demonstration (CARAD) programme has left the UK as the only country with a major aerospace sector which does not have a dedicated publicly-funded civil aerospace research programme.[209] In consequence the NATS will have to compete for DTI innovation funding on a non-sectoral basis.[210] The ATSG told us: "it is already clear [to them] that the innovation funding available from the DTI is inadequate to support the NATS on the basis originally envisaged and that the public share of funding for the NATS will have to come from Regional Development Agencies (RDAs), Devolved Administrations and Research Councils as well as the traditional DTI and MoD Sources".[211]

98. The ATSG also told us that the Government had already recognised the challenge it faced in co-ordinating the funding streams which would be required to enable the NATS to be put into action.[212] In February 2004, the Prime Minister assigned the task of co-ordinating public funding for the NATS to the Minister for Science and Innovation, Lord Sainsbury, who convened a National Aerospace Strategy Group (NASG) for this purpose.[213] We asked the DTI if they could tell us about the role and remit of the NASG. They told us that Lord Sainsbury: "chairs this group, which brings together all those departments: the MoD, ourselves [the DTI], representatives of the RDAs and EPSRC, that have a potential interest as either funders or as interested in the technology strategy. That group has the particular remit to help deliver the strategy […] Lord Sainsbury holds meetings with industry and attends those meetings. We take stock of progress and say, 'How did this call go? How are we getting on in developing the detailed programmes and projects' that we were talking about earlier? Once they have been identified, how can these

[204] *Ibid.*, para 39

[205] *Ibid.*, para 29

[206] *Ibid.*, para 38

[207] Q 159

[208] Appendix 14, para 11

[209] Appendix 13, para 4

[210] Appendix 1, para 5

[211] *Ibid.*

[212] *Ibid.*

[213] *Ibid.*

be funded?".[214] And later: "the onus is on us to coordinate the various public sector bodies that are potentially able to fund this".[215]

99. We were interested to find out how the progress towards the implementation of NATS and the work of the NASG was being reported. The DTI told us that the formal reporting process was through the executive of the AeIGT and through themselves: "we track it ourselves because we are trying to act as the co-ordinators. There will be milestones. Given that this is tending to revolve around the DTI technology strategy calls and those are made every six months, one significant milestone is how successful are the projects that are put into that call, because it is a competitive bidding process, in terms of securing funding. That will be pretty clear and pretty public. Whether, for instance, the Aerospace Technology Group that produced the implementation report will want to have an annual report on how it is going I do not know. That is something that maybe they would want to do. I do not think we have discussed that with them particularly".[216]

100. **We are content that the DTI holds a 'watching brief' over the implementation of the National Aerospace Technology Strategy (NATS) by the Aerospace Technology Steering Group (ATSG) and the co-ordination of funding for the NATS by the National Aerospace Strategy Group (NASG). However, we believe that there is a wider public interest which needs to be addressed. We therefore recommend that a report be made to Parliament annually by the Government on the progress that has been made towards the NATS. This should, as a minimum, include a report on the work of the ATSG and the progress that has been made by the NASG.**

101. **Aerospace is a technology-intensive industry and the benefits from public sector investment in aerospace R&D are not confined solely to the industry itself. This is witnessed by the number of 'technology spill-overs' into the wider economy, which has allowed other sectors, such as the UK motor racing industry, to be world beaters. We recommend that the work of the National Aerospace Strategy Group should be prioritised and the public funding requirements of the NATS be granted so that the vision of the Aerospace Innovation and Growth Team, that the UK will continue to be recognised as one of the world's most innovative and productive locations, can be realised.**

Process Excellence

102. Despite improvements over the past ten years, the UKAI continues to lag behind other countries in terms of aerospace industry productivity. For example, in 2001, UKAI productivity was 75 percent that of the US aerospace industry (table 4).[217] In response to the UKAI's continuing productivity ranking, the AeIGT Report called for the wider use and take up of Process Excellence techniques within the UKAI supply chain.[218] Although

[214] Q 226

[215] *Ibid.*

[216] Q 229

[217] See page 10 above

[218] The AeIGT define Process Excellence as: "the continuous pursuit of perfection in all business processes. It eliminates business process failure and removes non-value adding activities". Source: AeIGT website.

the report acknowledged that Process Excellence techniques were already used within the UKAI supply chain, the AeIGT advocated that there was a need for their wider adoption to improve the UKAI's productivity ranking: "by 2022, UK Aerospace must exhibit world-class Process Excellence across complete businesses and extended enterprises, and throughout entire supply chains".[219] The AeIGT Process Excellence Working Group (PEWG) has been leading on the implementation of the Process Excellence objective. However, this working group has now been amalgamated with the SBAC's Enterprise Excellence Board (EEB). The new EEB, chaired by Dr John Ferrie (Managing Director of Smiths Aerospace), held its first meeting in November 2004.[220]

103. Prior to its amalgamation with the EEB, the PEWG launched a number of Product Excellence pilot programmes to: "provide a catalyst for productivity improvement across entire supply chains, and the promotion of initiatives such as the UK Lean Aerospace Initiative and Supply Chain Relationships In Action (SCRIA)".[221] In the autumn of 2003, three pilots were launched to demonstrate Process Excellence:

— **Pilot 1:** The A318/319/320 Fuel Quantity Indication System. Led by Smiths Aerospace;

— **Pilot 2:** The Meteor Missile Fin Actuation System Supply Chain. Led by Claverham Limited; and

— **Pilot 3:** The Tornado Tactical Data Link Supply Chain, Tactical Information Exchange Capability (TIEC). Led by BAE Systems.[222]

104. The pilots adopted an untraditional approach in that they were not led in a 'top-down' method by a 'prime' aerospace manufacturer, as had traditionally been the case, but by the next layer down (a 'tier 1' aerospace company). Each pilot considered a specific supply chain, its constituent components and how those companies in the supply chain could work collaboratively to improve their business performance. This focus on the supply chain enabled proven improvements to be disseminated within other supply chains across the participant companies.[223]

105. The pilot programmes are now complete and 'step change' improvements against quality, cost and delivery targets have been achieved.[224] For example, a 15 percent price reduction in Pilot 1 was achieved, as was a two-year lead time reduction in Pilot 3. The EEB is expected to launch further pilots in the near future. The results from all these pilots will create the basis for a Directory of Learning, which will act as an evolving industry resource, as new experience is gained.[225] The prototype Directory of Learning is expected to be available by May 2005, at which point the EEB will consult with stakeholders within the UKAI, for feedback and validation.[226]

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[219] DTI/AeGIT, *An Independent Report on the Future of the UK Aerospace Industry*, June 2003, page 73

[220] EEB Pilots Paving Way for Process Excellence, *AeIGT News*, February 2005

[221] *Ibid.*

[222] AeIGT website (14 March 2005): www.aeigt.co.uk/workinggroup2.shtml

[223] EEB Pilots Paving Way for Process Excellence, *AeIGT News*, February 2005

[224] *Ibid.*

[225] Appendix 9

[226] EEB Pilots Paving Way for Process Excellence, *AeIGT News*, February 2005

Skills and People Management

106. The AeIGT Report concluded that it was necessary for the UKAI to develop a world-class workforce to 'drive through' R&D from innovation to production and: "must take action to quantify its skills requirements and to ensure that they are met by continuous training and development of its world class workforce".[227] The Science, Engineering and Manufacturing Training Agency (SEMTA) is currently working with the AeIGT and academia to produce an Aerospace Sector Skills Agreement.[228] The DTI told us there was already a clear view of the current and future skills need, which would be covered by such an agreement. These were:

— Software systems, modelling and simulation;

— Systems design and modelling, advanced manufacturing design and simulation, advanced electrical systems design;

— Advanced materials engineering;

— Diagnostic and prognostic techniques; and

— Skills to support emerging technologies, particularly in relation to environmental impact.[229]

107. The DTI also told us that the UKAI was working on a "gap analysis and costed action plan", which would be fed into the work of the Department of Education and Skills. The Government was also funding a study by Templeton College, Oxford, into the practices and constituents of a High Performance Work Organisation (HPWO),[230] a plan being delivered by the SBAC in conjunction with Amicus.[231] In order to spread and capture best practice from HPWOs, the SBAC's People Management Board (PMB) and EEB are collaborating to increase the awareness and engagement of the UKAI through a consolidated regional roll-out programme.[232] The DTI told us that the final results of the HPWO study are expected to be available towards the end of 2005. [233]

Safety, Security and Environment

108. The AeIGT Report concluded that the UKAI must be at the forefront of ensuring safety and security in aerospace and aviation, as well as setting and meeting environmental standards.[234] The SBAC told us that the activities of the Safety, Security & the Environment Working Group (SSE) were moving forward with the National Aerospace Technology Strategy (NATS), of which sustainability was a central theme. Further, the programme of

[227] AeIGT, *Skills and People Management: Implementation Plan*, 15 December 2003

[228] Appendix 14, para 5.3.1

[229] Appendix 9

[230] *Ibid.*

[231] Appendix 14, para 5.3.1

[232] Group Synergies Progressing Well, *AeIGT News*, February 2005

[233] Appendix 9

[234] AeIGT, *Safety, Security and the Environment: Implementation Plan*, 15 December 2003

the SSE was aligned to meeting EU aerospace industry environmental emissions targets: "hence the need to look at reduced emission combustion technologies in aircraft design".[235] Research under the SSE programme will initially be focused on the need to have a better understanding of the impact of aircraft emissions (contrails) on the upper-atmosphere, and the role which future air traffic management might play in diminishing that impact. The AeIGT is currently talking to the Natural Environment Research Council (NERC) and EPSRC about a jointly-funded research project into the impact of aircraft on the environment and others were already discussing plans for a new national institute for aviation and the environment.[236]

109. The SBAC told us that an UKAI-wide sustainability strategy, the Commercial Aviation Sustainability Strategy (CASS), would be published sometime during 2005.[237] The Strategy will be "a blueprint for achieving sustainable aviation, which requires consolidated support from the major UK industrial stakeholders including airports, airlines and Air Traffic Management operators. Currently these stakeholders are making progress towards achieving a consensus of agreement and in signing-up to the commitments set out in the CASS".[238]

Socio-Economic Environment

110. The AeIGT Report recommended that the UKAI should develop an aerospace market observatory to create: "a single analysis and intelligence system for the benefit of industry, government and universities, and a [online] portal to inform companies of all the sources and forms of support and advice that were available to them".[239] The Market Observatory and Aerospace Portal concept 'demonstrators' were launched at Farnborough International 2004.[240] The Aerospace Portal is intended to inform UKAI companies of the sources and forms of support and advice which are available to them. The Market Observatory, by contrast, looks at the sources of fact-based information and analysis. The SBAC told us that, eventually, the Observatory "will generate its own research for stakeholders in the industry".[241]

111. The AeIGT's Aerospace Finance Working Group (continued from the original AeIGT team) is currently drawing together a report to summarise the investigations it has carried out into the productivity of the UKAI, the economic benefits of externalities (the economic benefits to the wider economy from spill-overs from the aerospace industry), and the role of capital markets with respect to the provision of development capital for UKAI.[242]

112. **The work of the Aerospace Innovation and Growth Team (AeIGT) is a prime example of what can be achieved for an industry through the willing collaboration of all**

[235] Appendix 14, para 5.4.1

[236] *Ibid.*

[237] *Ibid.*

[238] The CASS Concept, *AeIGT News*, February 2005

[239] Appendix 9

[240] Appendix 14, para 5.5.1

[241] *Ibid.*

[242] Appendix 9

of its stakeholders. The UKAI is one of the most important sectors of the UK economy and we believe that, through its support for the AeIGT, this has been recognised by the Government.

113. **With a target date of 2022 for the implementation of the recommendations of the AeIGT's Report on the future of the UKAI, we believe it will be some time before a meaningful assessment of progress towards the vision of the AeIGT can be made with any degree of confidence. However, the progress which has been reported to us suggests that a 'good start' has already been made. We have no doubt that our successors will wish to investigate the competitiveness of the UKAI before 2022. The progress made towards the AeIGT's vision, that by 2022 "the UK will offer a global Aerospace Industry the world's most innovative and productive location, leading to sustainable growth for all its stakeholders", would doubtless be one of the main areas that they would wish to look at.**

Conclusions and recommendations

1. The UK aerospace industry (UKAI) requires Government help to reduce barriers to trade in terms of technology transfer, especially in the US. We recommend that the UK Government should continue to press the US Administration to support increased access to US technology for UKAI companies through an International Traffic in Arms Regulations (ITAR) waiver for UKAI companies. (Paragraph 48)

2. We conclude that the challenge from the emergent competitors, be they lower-cost economies or other developing economies, is growing. Subcontracting abroad is increasing as a result of lower cost or more favourable incentives, such as public R&D investment. As far as we can see, there has been no official study into the 'threat' from emerging competitors to the UKAI. Research which has been carried out has tended to focus only on UKAI's developed competitors. We recommend that the UK Government should undertake a study of these emerging aerospace industries as soon as possible to gauge the future challenge to the UKAI. (Paragraph 53)

3. We believe that the development of aerospace equipment has become increasingly complex, risky and expensive and in some cases these investments may represent a proportionally larger financial commitment by the companies concerned than investments which are currently supported by repayable launch investment (RLI). We recommend that the DTI adopts a more positive attitude towards applications by equipment makers for RLI, and that it takes into account the size and resources of equipment companies when assessing whether or not projects require RLI to go ahead. (Paragraph 73)

4. We recommend that the Government conducts a study into the subsidies which are available to other aerospace industries within the EU. If such a study suggests that our European competitors are giving aid to their aerospace industries which could infringe state aid rules, this should be reported to the European Commission at the earliest opportunity. If other EU Member States appear uncooperative, the UK Government should ask the European Commission to carry out its own investigation of assistance given to the aerospace industry across the EU. (Paragraph 76)

5. We conclude that Government support for UKAI R&D has fallen over the last few years. The recent re-organisation of DTI funding programmes has opened new opportunities for aerospace R&D funding through the Technology Programmes, such as the Collaborative Research & Development grants and Knowledge Transfer Networks programmes. Aerospace companies are also able to benefit from R&D tax credits. There is, as yet, little evidence as to whether these new funding streams will compensate the UKAI for the loss of the Civil Aircraft Research and Technology Demonstration (CARAD) programme. However, evidence from the distribution of latest round of Technology Programme funding, where the aerospace industry received a quarter of the £60 million, suggests to us that they might. (Paragraph 77)

6. We are content that the DTI holds a 'watching brief' over the implementation of the National Aerospace Technology Strategy (NATS) by the Aerospace Technology

Steering Group (ATSG) and the co-ordination of funding for the NATS by the National Aerospace Strategy Group (NASG). However, we believe that there is a wider public interest which needs to be addressed. We therefore recommend that a report be made to Parliament annually by the Government on the progress that has been made towards the NATS. This should, as a minimum, include a report on the work of the ATSG and the progress that has been made by the NASG. (Paragraph 100)

7. Aerospace is a technology-intensive industry and the benefits from public sector investment in aerospace R&D are not confined solely to the industry itself. This is witnessed by the number of 'technology spill-overs' into the wider economy, which has allowed other sectors, such as the UK motor racing industry, to be world beaters. We recommend that the work of the National Aerospace Strategy Group should be prioritised and the public funding requirements of the NATS be granted so that the vision of the Aerospace Innovation and Growth Team, that the UK will continue to be recognised as one of the world's most innovative and productive locations, can be realised. (Paragraph 101)

8. The work of the Aerospace Innovation and Growth Team (AeIGT) is a prime example of what can be achieved for an industry through the willing collaboration of all of its stakeholders. The UKAI is one of the most important sectors of the UK economy and we believe that, through their support for the AeIGT, this has been recognised by the Government. (Paragraph 112)

9. With a target date of 2022 for the implementation of the recommendations of the AeIGT's Report on the future of the UKAI, we believe it will be some time before a meaningful assessment of progress towards the vision of the AeIGT can be made with any degree of confidence. However, the progress which has been reported to us suggests that a good start has already been made. We have no doubt that our successors will wish to investigate the competitiveness of the UKAI before 2022. The progress made towards the AeIGT's vision, that by 2022 "the UK will offer a global Aerospace Industry the world's most innovative and productive location, leading to sustainable growth for all its stakeholders", would doubtless be one of the main areas that they would wish to review. (Paragraph 113)

Glossary

AeIGT	Aerospace Innovation and Growth Team
AIN	Aerospace Innovation Network
ATVP	Aerospace Technology Validation Programme
CARAD	Civil Aircraft Research and Technology Demonstration
CASA	Construcciones Aeronáuticas S.A.
CASS	Commercial Aviation Sustainability Strategy
CR&D	Collaborative Research & Development grant
DTC	Defence Technology Centre
EADS	European Aeronautic Defence and Space Company N.V.
EEB	Enterprise Excellence Board
EPSRC	Engineering and Physical Sciences Research Council
ETW	European Transonic Windtunnel
FSTA	Future Strategic Tanker Aircraft
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GVA	Gross Value Added
HPWO	High Performance Work Organisation
IAE	International Aero Engines
ITAR	International Traffic in Arms Regulations
JSF	Joint Strike Fighter
KTN	Knowledge Transfer Network
NASG	National Aerospace Strategy Group
NATS	National Aerospace Technology Strategy
NERC	Natural Environment Research Council
OEF	Oxford Economic Forecasting
PEWG	Process Excellence Working Group
PFI	Private Finance Initiative
PMB	People Management Board
R&D	Research and Development
R&T	Research and Technology
RDA	Regional Development Agency
RLI	Repayable Launch Investment
SCRIA	Supply Chain Relationships In Action
SEMTA	Science, Engineering and Manufacturing Training Agency
SSE	Safety, Security & the Environment Working Group
UKAI	UK Aerospace Industry
VTOL	Vertical Take-Off and Landing

Formal minutes

Tuesday 22 March 2005

Members present:

Mr Martin O'Neill, in the Chair

Mr Roger Berry
Mr Richard Burden
Mr Nigel Evans
Judy Mallaber
Linda Perham

The Committee deliberated.

Draft Report (UK aerospace industry), proposed by the Chairman, brought up and read.

Ordered, That the Chairman's draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 113 read and agreed to.

Summary read and agreed to.

Resolved, That the Report be the Fifteenth Report of the Committee to the House.

Ordered, That the Chairman do make the Report to the House.

Several papers were ordered to be appended to the Minutes of Evidence.

Ordered, That the Appendices to the Minutes of Evidence taken before the Committee be reported to the House.—(*The Chairman*)

[Adjourned *sine die*.

Witnesses

Tuesday 14 December 2004

Dr Sally Howes, Mr Kevin Smith and Mr Colin Green, **Society of British Aerospace Companies**

Mr Iain Gray, **Airbus UK**

Mr John Wall, **Amicus**

Tuesday 11 January 2005

Sir John Chisholm, **QinetiQ Group plc**

Mr Ken Maciver, Mr Colin Smith and Mr Lambert Dopping-Hepenstal, **Aerospace Technology Steering Group**

Mr John Alty, Mr Malcolm Scott, Mr David Way and Mr Christopher Moir, **Department of Trade and Industry**

Tuesday 18 January 2005

Sir Michael Jenkins, Mr George Hibbard and Mr Steve Ford, **Boeing Company**

List of written evidence

1 Aerospace Technology Steering Group
2 Airbus UK
3 Air League Council
4 Amicus
5 BASIC UK
6 Boeing Company
7 Bombardier Aerospace
8 Campaign Against Arms Trade
9 Department of Trade and Industry
10 DTI (supplementary)
11 QinetiQ Group Plc
12 Rolls-Royce
13 Royal Aeronautical Society,
14 Society of British Aerospace Companies
15 Society of British Aerospace Companies (supplementary)
16 South-West of England RDA
17 Unmanned Aerial Vehicle Systems Council
18 West of England Aerospace Forum

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