



National Audit Office

MINISTRY OF DEFENCE
Major Projects Report 2008

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SUMMARY

1 The Major Projects Report 2008 covers cost, time and performance¹ data for military equipment projects in the year ended 31 March 2008. For the main report, we examined² 20 of the largest projects (shown in Figure 3 on page 8), where the main investment decision has been taken by the Ministry of Defence (the Department). The Report also covers ten projects, which are still in the Assessment Phase, where the main investment decision has not yet been taken (only limited performance data is reported for these projects, which are detailed in Appendix 2). Six projects are new to this year's Report. Future Lynx, Modernised Target Acquisition Designation Sight/Pilots Night Vision

Sensor, Naval Extremely High Frequency/Super High Frequency Satellite Communication Terminals and Typhoon Future Capability Programme projects are all new in the post-main investment decision population, as well as the Advanced Jet Trainer project, which has previously featured as an Assessment Phase project. Project Eagle, to upgrade the mission system of the E-3D Sentry aircraft, is new in the Assessment Phase project population. Project Summary Sheets, on which our analysis is based, are compiled by the Department and summarise progress to date for each of the 30 projects. These are contained in Volume II of this Report.

¹ Performance in this context refers to whether a piece of equipment is expected to meet all of its Key User Requirements, which are defined by the User, and are approved when the project receives the main investment decision.
² Our methodology is described in Appendix 1.

2 The Department has reported to Parliament on its delivery of major defence equipment projects for over 20 years. Over the last 10 years the Department has introduced a number of major reforms of defence acquisition. While progress has been made, performance remains variable, partly reflecting the complexity of defence acquisition and rapidly changing operational requirements. To deliver battle-winning advantage defence equipments are often based on advanced technologies and have complex delivery arrangements which bring together a range of commercial partners and/or involve co-operation with other countries. In part, the performance shown in the Major Projects Report also reflects the inclusion of some projects which pre-date these reforms and, therefore, do not fully reflect the improvements which the Department expects to achieve.

Findings

3 For the period of the Report, the forecast aggregate costs of the projects³ increased by £205 million⁴ and there was an additional 96 months aggregate slippage (Figure 1). The forecast cost increase is largely as a result of growth in the Beyond Visual Range Air-to-Air Missile project and Nimrod Maritime Reconnaissance and Attack Mk 4 aircraft, both of which were initiated before the most recent procurement reforms by the Department. Nine projects have experienced slippage over the past year with three, Terrier, Naval Extremely High Frequency/Super High Frequency Satellite Communications Terminals and Soothsayer, accounting for around two-thirds of this

delay. Of the 20 projects, 15 are currently forecasting to meet all of their Key User Requirements, compared to 17 last year. Sixteen individual Key User Requirements are reported as 'at risk' on six projects, compared to 12 Key User Requirements across seven projects last year, but there is mitigation action in place that is intended to address these risks.

4 The total forecast costs for all projects is £28 billion, an increase of 12 per cent (£3 billion) compared with the budgeted cost when the main investment decision was taken. Ninety three per cent of the £3 billion is historic cost growth and reported in previous Major Projects Reports, with £205 million added in-year. In aggregate the projects are now predicted to achieve their In-Service Dates 483 months later than predicted when first approved. This slippage represents a 36 per cent increase in their expected timescales since the main investment decision, four-fifths of that is historic slippage reported in previous Major Projects Reports.

Programme and project management decisions

5 Changes to the perceived threat, and the desire to achieve a more cost-effective integration on to the Typhoon aircraft, led the Department to review the Beyond Visual Range Air-to-Air Missile project. The Department has chosen to introduce the Beyond Visual Range Air-to-Air Missile capability for Typhoon three years later in July 2015, when the threat could be expected to have materialised. This decision is seeking to create a more cost-effective integration programme for the United Kingdom, by aligning the integration of the Beyond Visual Range Air-to-Air Missile and the Typhoon with both the planned delivery of a major enhancements package to the aircraft and the missile integration timescales of the other Eurofighter Nations. This rescheduling of the integration will, however, result in a number of additional short-term cost increases, contributing to an overall in-year cost growth of £111 million.

1 Headline figures for cost, time and performance

	Major Projects Report 2008	Major Projects Report 2007
In-year cost increase	£205 million	–
In-year slippage	96 months	38 months
Number of projects to meet all Key User Requirements	15 out of 20	17 out of 20
Key User Requirements "at risk"	16, across six projects	12, across seven projects

Source: National Audit Office analysis of Departmental data

NOTE

The Major Projects Report 2007 was unable to comment on the overall in-year cost changes because of the reallocations of budgets and costs which took place.

3 Typhoon has been excluded from the analysis because the numbers are commercially sensitive.

4 The forecast costs for projects already include an assumption for inflation.

6 On two projects, the Department has worked with its industrial and international partners to deliver urgently needed operational capabilities:

- a** **Watchkeeper** is an unmanned aerial vehicle that is designed to provide significantly improved intelligence, surveillance, target acquisition and reconnaissance capabilities from 2010. With an urgent operational need in Iraq and Afghanistan, the Department worked with the Watchkeeper contractor, Thales, to deliver the Hermes 450 system by mid-2007. The air vehicle and sensors of Hermes 450 have similarities with those used for Watchkeeper and have delivered essential capability as well as helping mitigate risk to the final delivery of Watchkeeper. A six month in-year slippage on Watchkeeper has principally been caused by a delay in the availability of a suitable trials site.
- b** **Naval Extremely High Frequency/Super High Frequency Satellite Communications Terminals** is a communications project mainly designed for submarines. Satellite capacity and the necessary equipments are being sourced through the United States’ Department of Defense. The project is running 31 months behind schedule because of delays to United States’ projects still in development, which the Department cannot directly influence. The Department has developed low cost interim solutions for both the existing Trafalgar Class submarines and the new Astute Class submarines which will mitigate the most significant effects of the potential capability gap.

Problems on projects

7 Five projects have suffered significant cost or schedule problems in the last year. The specific issues affecting the Beyond Visual Range Air-to-Air Missile are covered in paragraphs 5 and 2.32-2.38. There are a number of issues related to the remaining four projects – the Nimrod Maritime Reconnaissance and Attack Mk4 aircraft, Terrier armoured engineering vehicle, Soothsayer electronic warfare system, and Naval Extremely High Frequency/Super High Frequency Satellite Communications Terminals. Some examples are outlined below and summarised in **Figure 2**:

- a** **Industry project management shortcomings and the Department acting as an intelligent customer (four of the four projects).** On Soothsayer the technical immaturity and late delivery of components, together with problems identified during trials, have resulted in 16 months slippage with five Key User Requirements “at risk”. The problems reflect shortcomings in Lockheed Martin’s management of the project, in particular underestimating its scale and technological complexity. The Department could have done more to monitor progress and work in concert with Lockheed Martin when problems were identified.

2 Common issues emerging from our analysis of four projects with significant cost or schedule developments

Theme	Nimrod Maritime Reconnaissance and Attack Mk4	Terrier	Soothsayer	Naval Extremely High Frequency/Super High Frequency Satellite Communications Terminals
Industry project management shortcomings and the Department acting as an intelligent customer	X	X	X	X
A lack of realism from the outset		X	X	
Failure to identify the key dependencies			X	X
Under-estimating costs and timescales to resolve emerging problems	X			

Source: National Audit Office analysis of Departmental data

b A lack of realism at the outset (two of the four).

In response to normal competitive pressures and to keep costs down, industry bidders for the Terrier contract included only one prototype vehicle. When the steering was shown to be unreliable on the prototype it took four months to resolve and meant that the later demonstrator vehicles had to be used more intensively to demonstrate reliability. The overall effect of these problems and quality issues with components has been to delay the forecast In-Service Date by 27 months.

c Failure to identify the key dependencies (two of the four).

Significant elements of the Naval Extremely High Frequency/Super High Frequency Satellite Communications Terminals project are sourced from the United States. On the Soothsayer project, as agreed with the Department, the project managers for the contractor were originally based in the United States, which compounded the difficulties involved in resolving technical problems when they emerged. In both cases this dependency has caused slippage. The Department has a long experience of the risks associated with having very little real power to influence United States' projects. This key dependency was not identified as one of the top risks when the main investment decision was taken for the Naval Extremely High Frequency/Super High Frequency Satellite Communications Terminals project. Similarly the difficulty of managing a project from a distance was not recognised when the main investment decision was taken for Soothsayer.

d Under-estimating costs (one of the four).

On the Nimrod Maritime Reconnaissance and Attack Mk4 aircraft project, the cost of bringing the trials aircraft up to full production standard was under-estimated, resulting in additional conversion costs which have been provisionally estimated at £50 million. Similarly, the Department made a provision of £5 million to address the impact of an issue that emerged during the flight test programme on the production aircraft. This amount proved to be an under-estimate, with a £20 million cost increase being identified this year.

8 We have analysed the projects in the current Major Projects Report population to identify the main causes of cost increases and time delays in these. This analysis is against four broad categories – changed customer requirements, associated projects, procurement management and technical factors. The analysis only includes projects on which the main investment decision has been taken, the point at which the Department considers risk has been reduced to the extent that the project should be delivered within narrowly defined time, cost and performance parameters.

9 For the projects analysed, procurement management issues and changed customer requirements are the principal causes of both slippage and cost growth in the earlier period after the main investment decision has been taken. From the middle half of the procurement lifecycle, technical factors become the main reason for cost increases and slippages to In-Service Dates. The impact of these problems suggests that the risks associated with the technical challenges of these projects are under-estimated when the main investment decisions are being made. From 2009 it is planned that the Major Projects Report will analyse in more detail the level of project maturity at the point at which the main investment decision is taken.

Overall conclusion

10 The Department has taken reasonable decisions to either accelerate the delivery of urgently needed capabilities or re-programme individual projects to reflect current defence priorities: we address some examples in this Report. While progress has been made, it is too early to judge whether the lessons from past projects are feeding through into consistently improved performance. The Department has worked closely with commercial partners on the delivery of Urgent Operational Requirements, and needs to examine what lessons might be applied to the more demanding projects that feature in the Major Projects Report. Meanwhile, best value for money is still not consistently being achieved on the Department's most complex equipment. Figure 2 identifies some of the underlying issues emerging from our review, on which the Department and its commercial partners need to increasingly focus if the performance of newer projects is to provide a more affordable and timely enhancement of capability than has been the case in the past.

3 Major Projects Report Summary of Post Main Gate Projects

Project	Description	In-year change on costs to completion (£m)	In-year change on In Service Date (months)	In-year change in Key User Requirements	Current forecast cost to completion (£m)
A400M	Heavy transport aircraft	+3	+9	No change	2,632
Advanced Jet Trainer	Fast Jet element of the wider UK Military Flying Training System programme	+3	+4	-1	467
Astute Class Submarine	Attack submarine	+8	+6	No change	3,806
Beyond Visual Range Air-to-Air Missile (Meteor)	Air to air missile	+111	In-Service Date re-defined	No change	1,279
Falcon	Deployable communication system	-1	0	No change	291
Future Lynx	Small helicopter	+2	-3	No change	1,911
Future Joint Combat Aircraft	Fighter/attack aircraft	-24	In-Service Date excluded from analysis	No change	1,834
Merlin Mk 1 Capability Sustainment Programme	Update of helicopter avionics	0	0	No change	832
Modernised Target Acquisition Designation Sight/Pilots Night Vision Sensor	Update of Apache Army Helicopter Mark 1 systems	0	0	No change	228
Naval Extremely High Frequency/Super High Frequency Satellite Communications Terminals	Highly protected, high data rate satellite communication capability	-9	+19	No change	200
Next Generation Light Anti-Armour Weapon	Short range anti armour weapon	-8	+9	No change	310
Nimrod Maritime Reconnaissance and Attack Mk 4	Reconnaissance and attack patrol aircraft	+102	+3	No change	3,602
Soothsayer	Integrated land electronic warfare system	+7	+16	No change	202
Sting Ray Life Extension and Capability Upgrade	Life extended and enhanced lightweight torpedo	-1	In service	No change	576
Support Vehicle	Cargo and recovery vehicles and trailers	+9	0	No change	1,272
Terrier	Armoured engineering vehicle	+14	+27	No change	313
Typhoon	Fighter aircraft	Commercially sensitive	In service	No change	Commercially sensitive
Typhoon Future Capability Programme	Enhancements to Typhoon aircraft	-8	0	No change	436
Type 45 Destroyer	Anti-air warfare destroyer	0	0	No change	6,464
Watchkeeper	All weather 24-hour intelligence, surveillance, target acquisition and reconnaissance capability	-3	+6	-1	898
Totals		£205 million	+96 months	-2	£27.55 billion

Source: National Audit Office analysis of Departmental data

Budgeted cost to completion at Approval (£m)	Total (historic plus in-year) Variation (£m)	Current forecast In-Service Date	Expected In-Service Date at Approval	Total (historic plus in-year) Variation (months)	Main Gate approval	Key Developments in 2007-08
2,628	+4	December 2011	February 2009	+34	May 2000	Contractor delay to aircraft delivery
490	-23	November 2009	July 2009	+4	August 2006	First year that progress on project is reported
2,578	+1,228	May 2009	June 2005	+47	March 1997	Delay due to technical problems
1,240	+39	In-Service Date redefined	September 2011	-	May 2000	Significant in-year cost growth In-Service Date definition redefined
307	-16	June 2010	June 2010	0	March 2006	Increment C approved
1,901	+10	January 2014	January 2014	0	June 2006	First year that progress on project is reported
2,034	-200	-	-	-	January 2001	-
837	-5	February 2014	February 2014	0	March 2006	-
245	-17	April 2009	December 2008	+4	September 2004	First year that progress on project is reported
269	-69	May 2012	October 2009	+31	August 2003	First year that progress on project is reported. Significant delay to In-Service Date
377	-67	April 2009	November 2006	+29	May 2002	Delay due to problems with final design qualification
2,813	+789	December 2010	April 2003	+92	July 1996	Significant in-year cost growth, delay to In-Service Date and six Key User Requirements 'at risk'
142	+60	June 2009	December 2006	+30	August 2003	Significant delay to In-Service Date and five Key User Requirements 'at risk'
727	-151	Met In-Service Date June 2006	December 2002	+42	May 1995	
1,367	-95	Met In-Service Date February 2008	September 2005	+29	November 2001	Project met In-Service Date in February 2008
295	+18	December 2011	September 2008	+39	July 2002	Significant delay to In-Service Date
(16,671) Excluded from Totals below	Commercially sensitive	Met In-Service Date June 2003	December 1998	+54	November 1987	-
444	-8	June 2012	June 2012	0	January 2007	First year that progress on project is reported
5,000	+1,464	November 2010	May 2007	+42	July 2000	-
907	-9	December 2010	June 2010	+6	July 2005	Slippage due to delay in selecting a suitable trials site
£24.6 billion	£2.95 billion	-	-	+483 months	-	