



National Audit Office

**REPORT BY THE
COMPTROLLER AND
AUDITOR GENERAL**

**HC 1520-I
SESSION 2010–2012**

16 NOVEMBER 2011

Ministry of Defence

The Major Projects Report 2011

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National Audit Office

Ministry of Defence

The Major Projects Report 2011

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Amyas Morse
Comptroller and
Auditor General

National Audit Office

14 November 2011

The Major Projects Report 2011 analyses the cost, time and performance of the 15 largest military equipment projects by value for the year ending 31 March 2011.

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Contents

Key facts **4**

Summary **5**

Part One

Cost, time and performance
of projects **10**

Part Two

Cost analysis since 2000 **18**

Part Three

The impact of the Strategic
Defence and Security Review **26**

Appendix One

Methodology **37**

Appendix Two

Executive project summary
sheets **38**

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Key facts

£466m
(0.9%)

Increase in 2010-11 forecast costs to complete projects from original approval. This includes £113 million of capability enhancements which, if excluded, means in-year cost growth is £353 million.

£6.1bn
(11.4%)

Total increase in forecast costs to complete all 2011 projects since the Department approved the main investment decision.

£10.6bn
(11.4%)

Total increase in forecast costs since the Department approved the main investment decision for all Major Projects since 2000.

Major Projects 2011

15	Number of 'post-main-gate' projects covered by the Report
£53.5 billion	Total approved cost for all 2011 projects
£59.6 billion	Total forecast cost for all 2011 projects
30 months	Total in-year slippage to in-service dates (average two months)
£1 billion	Cost increase on the Astute programme over the past three years
28 months	Average delay to delivering each of Astute boats one to seven over the past three years
£3.4 billion	Total spent on the Nimrod maritime patrol aircraft, which was cancelled by the 2010 Strategic Defence and Security Review

Major Projects since 2000

16.8 per cent	Percentage increase in project costs on projects approved in or before 2001
2.8 per cent	Percentage increase in project costs on projects approved in or after 2002
£7.2 – £8.8 billion	Cost increases avoided by cutting equipment numbers from those originally planned

Summary

1 This report – *Major Projects Report 2011* – analyses the cost, time and performance of the 15 largest military equipment projects by value, when the main decision to invest funding (the main investment decision or main-gate) has been taken for the year ending 31 March 2011.¹ The Ministry of Defence (the Department) compiles project summary sheets for these projects, which the NAO validates but does not fully audit. The Department then submits this information to Parliament. These project summary sheets then form the basis for our analysis of the 15 largest projects.

2 In addition to these 15 projects, the Department also produces project summary sheets for the ten largest projects where the main investment decision has yet to be taken. Copies of the executive project summary sheets for all 25 projects are at Appendix Two of this report. Full project summary sheets, plus limited analysis of the ten pre-main-gate projects, are available in Volume II² of this report and on our website.³

In-year performance

3 During the financial year 2010-11, forecast costs for completing the 15 largest post-main-gate projects rose by £466 million (0.9 per cent). The forecast cost to complete these projects is now £6.1 billion (11.4 per cent) over the estimate of expected cost, from when the main investment decision was made. Macro-economic factors, such as adverse foreign exchange rates, accounted for £176 million of the in-year cost growth. Cost overruns from project-specific technical issues continued to decline, although they did account for £53 million of the increase. For the third successive year, central planning decisions taken by the Department had a significant impact, accounting for £237 million of the increase. Of this, £124 million resulted from decisions to delay spending on projects, and £113 million to enhance equipment capabilities. If the latter is excluded from the analysis, the total forecast cost increase reported in-year was £353 million (0.7 per cent).

4 During 2010-11, there was a total increase of 30 months (average two months per project) in the projected time to complete the 15 post-main-gate projects and bring them into service. The most significant changes were a 12-month delay in the timetable for the Watchkeeper unmanned aerial vehicle project, which was largely due to the contractor failing to deliver against the agreed schedule. There was also a 13-month deferral on the Astute Class submarine programme (paragraph 11).

¹ Our methodology is described in Appendix One and on our website.

² *The Major Projects Report 2011*, HC 1520-I, Session 2010–2012.

³ www.nao.org.uk/Major-Projects-2011

5 When the Department approves defence projects it uses a number of key performance measures, which specify and subsequently monitor how equipment should perform. It also measures eight capability components, including personnel, training, and logistic support, which are necessary for equipment to be effective. In-year, neither the key performance measures nor the wider capability indicators showed any significant changes.

Analysis indicates that cost increases are lower on newer projects

6 As well as assessing progress in-year, this report provides trend analysis of spending for all post-main-gate equipment projects covered in the annual report since 2000. The projects we examined represent around 90 per cent of the total value of post-main-gate equipment projects (with a value of over £200 million) currently being funded by the Department.

7 Our cost analysis in **Figure 1** shows that the difference between the approved and forecast cost of all projects since 2000 is £10.6 billion, which is an 11.4 per cent increase. Additional costs have been avoided by reducing the numbers of equipment the Department originally planned to buy. Had the Department not reduced equipment numbers, cost growth could have been between £18.2 – £19.4 billion, depending upon assumptions made on equipment costs – approximately 20 per cent over the originally approved costs.

Figure 1

Total cost growth on all projects since 2000 is £10.6 billion

Description	Projects approved in 2001 or before	Projects approved in 2002 or after	Total
Number of projects	33 projects	30 projects	63 projects
A. Approved cost	£57.2 billion	£35.5 billion	£92.7 billion
B. Forecast cost	£66.8 billion	£36.5 billion	£103.3 billion
C. Reported cost increase (B–A)	£9.6 billion	£1.0 billion	£10.6 billion
Percentage increase	16.8 per cent	2.8 per cent	11.4 per cent

NOTE

1 Analysis includes all projects reported in the post-main-gate population since the Major Projects Report 2000. Astute boats five and six are excluded from the above table as they have not yet achieved their main investment decision. Total approvals for these two boats are for initial build items only and total £1.1 billion, with only a marginal variation between approved and forecast costs.

Source: National Audit Office analysis of Departmental data

8 However, Figure 1 also illustrates that total cost growth on all post-main-gate projects approved before 2002 was, at 16.8 per cent, significantly higher than the 2.8 per cent total cost increase on all projects approved since 2002. Most of this latter cost growth has come on the Queen Elizabeth Class aircraft carrier. If this large project is excluded from the analysis, there would have been a net saving of £839 million from projects approved in or after 2002. More generally, larger projects have disproportionately suffered from cost increases. Almost all were approved before 2002, yet they still comprise the vast majority of the £10.6 billion (11.4 per cent) cost overrun, noted above. This indicates that the Department continues to live with the consequences of cost increases on projects approved before 2002, and particularly the legacy of significant cost overruns on larger projects.

9 Our wider analysis in Figure 8 on page 20 also indicates that cost growth was primarily driven by project-level difficulties, such as design and contracting issues, up to 2008; adding £7.5 billion to project costs. There have recently been relatively small increases in project-level costs, which point to continuing stable project performance. This is despite Departmental planning decisions having added £4.2 billion to forecast costs since 2009.

The Strategic Defence and Security Review has significantly affected several equipment projects

10 The most significant development for defence acquisition in-year was the October 2010 Strategic Defence and Security Review, the first full defence review since 1998. The Review was undertaken during a significant military commitment in Afghanistan and with a shortfall reported by the Department of up to £42 billion (which includes funding for the Successor nuclear deterrent programme) between the anticipated Defence budget and forecast spending over the coming decade.⁴ As the Review noted, such a shortfall made 'painful, short-term measures unavoidable', such as reducing or cutting military capability. Two of the most significant measures taken by the Review were extending the build programme of the Astute Class submarine and cancelling the Nimrod maritime patrol aircraft. The Review also changed the aircraft variant to be carried on the Queen Elizabeth Class aircraft carrier. This has been covered by a separate NAO study.⁵

⁴ House of Commons Defence Select Committee, *The Strategic Defence and Security Review and the National Security Strategy*, Rt. Hon. Liam Fox MP, 9 March 2011, Q134, www.publications.parliament.uk/pa/cm201012/cmselect/cmdfence/761/11030902.htm

⁵ *Carrier Strike*, HC 1092, Parliamentary Session 2010–2012.

11 As a result of the delay to Successor and to further save costs in the short-term, the Astute build programme was slowed to avoid a production gap in the submarine construction industry. The Review therefore extended the build time for the seven-boat Astute Class submarine programme by a further 96 months, including the 13-month deferral to boat four noted in paragraph 4. This has resulted in an average deferral to the Astute Class over the past three years of 28 months per boat. By extending the Astute build programme, the Department will have to use older boats beyond their out-of-service dates, work the smaller fleet of Astute submarines harder, or reduce scheduled activity for submarines. Therefore, the Department is currently reporting that the Astute Class submarines will not meet the Royal Navy's requirement for sufficient numbers of submarines to be available for operations over part of the next decade.

12 Extending construction time of the Astute Class submarines also added a further £200 million in-year to the forecast cost to complete the Astute programme for approved boats (boats one to four). In total, these decisions have added nearly £1 billion to forecast costs to complete all seven boats in the last three years. The cost increase rises to over £1.9 billion when technical difficulties and capability changes made since the original approval for boats one to three was taken in 1997.⁶ In procurement terms, this equates to substantially more than the cost of acquiring a further boat.

13 Although outside the scope of the Major Projects Report, the Department also announced in the Strategic Defence and Security Review plans with the main industrial partners to reduce the cost of the entire submarine business by £900 million over the next decade.⁷

14 The Nimrod maritime patrol aircraft project has had a long history of management, technical and commercial difficulties. By the time the Department cancelled Nimrod in 2010 for financial reasons, the project was 114 months late and £789 million over budget. Cancelling the Nimrod maritime patrol aircraft has avoided approximately £1.9 billion in forecast costs associated with running and maintaining the aircraft up to 2020. The Department has noted that cancelling Nimrod was a difficult decision, but was considered 'an acceptable risk and not a gamble'.⁸

⁶ The approval process for the Astute programme has been split into five parts. Astute boats one to three were approved together in 1997 and have a recorded forecast cost increase of £1.3 billion in the Astute project summary sheet. Astute boat four was approved in 2007 and has a recorded forecast cost increase of £0.1 billion. The remaining £0.5 billion is the forecast cost increase of boats five to seven (to be approved separately) which have yet to be approved. All figures are excluding cost of capital.

⁷ *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review 2010*: http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191634.pdf

⁸ House of Commons Defence Select Committee, *Appointment of the Chief of Defence Staff*, Oral and written evidence, HC 600-i, Session 2010-11, Q 38.

Conclusion on value for money

15 The underlying trend of the Major Projects is reduced cost growth at the project level, even though in 2011 the total forecast cost of Major Projects rose by nearly £0.5 billion. This includes £113 million of capability enhancements. As a result of this in-year cost growth and previous cost increases, the Major Projects are now in total more than £6.1 billion (11.4 per cent) over the forecast cost from when the main investment decision was made. As well as decisions taken to enhance capabilities, a significant part of this year's increase has been due to action by the Department to balance its overall budget by delaying the Astute project.

16 The Department had limited options to manage a legacy of poor planning and performance on some past projects. These circumstances were largely, however, of the Department's making and the resulting cuts and delays to capability are not value for money. The Department acknowledges that its budgetary position is serious and has taken steps to reduce its budget deficit over the longer term. Both a balanced budget and a continuing focus on improving project performance are necessary to create the conditions for effective and sustainable acquisition in the future.

Part One

Cost, time and performance of projects

1.1 In this Part we examine in-year changes to the cost, time and technical performance of the 15 largest projects, where the main decision to invest funding (the main investment decision or main-gate) has been made. Overall, the forecast cost to complete the Report's projects has increased in-year by £466 million (0.9 per cent) which includes £113 million of capability enhancements, and slipped a further 30 months (average two months per project) against their planned in-service date. **Figure 2** provides a detailed breakdown of time, cost and technical performance for each of the 15 post-main-gate projects.

Figure 2

The 15 largest projects where the Department has taken the main decision to invest

Project	Description	Expected cost to completion at approval (£m)	Current forecast cost to completion (£m)	Total cost variation (£m)	In-year change on costs to completion (£m)	Expected in-service date at approval	Current forecast in-service date	Total time variation (months)	In year change to in-service date (months)	Defence lines of development				Key performance measures				Number to be procured	
										To be met	To be met, with risk	Not to be met	In-year change, not to be met	To be met	To be met, with risk	Not to be met	In year change, not to be met	Approved	Current plan
A400M	Large transport aircraft	2,498	3,105	+607	+150	Feb 09	Mar 15	+73	0	4	4	0	No change	9	0	0	No change	25	22
Airseeker	Airborne electronic surveillance	659	681	+22	+23	Oct 14	Oct 14	0	0	4	4	0	No change	8	1	0	No change	3	3
Astute Class submarines	Attack submarine: boats one to three	2,233	3,480	+1,247	+179	Jun 05	Apr 10	+58	-3	6	1	1	+1	7	1	1	+1	3	3
	Attack submarine: boats four to six ¹	2,157	2,243	+86	+70	Aug 15	Jan 18	+29	+13					6	4	0	No change	3	3
Beyond Visual Range Air-to-Air Missile (Meteor)	Air-to-air missile: original in-service date	1,136	1,115	-21	+1	Sep 11	Aug 13	+23	0	7	1	0	No change	7	0	0	No change	***	***
	Air-to-air missile: in-service date one					Aug 12	Nov 12	+3	+3										
	Air-to-air missile: in-service date two					Jul 15	Jul 15	0	0										
Future Strategic Tanker Aircraft	Air-to-air refuelling and passenger aircraft	12,307	12,009	-298	+111	May 14	May 14	0	0	6	2	0	No change	9	0	0	No change	14	14
Joint Combat Aircraft	Fighter/attack aircraft	2,482	2,112	-370	-37	No date	No date	No data	No data	4	4	0	No change	7	0	0	No change		No data ²
Lynx Wildcat	Light helicopter: battlefield and naval variants	1,803	1,644	-159	+39	Jan 14	Jan 14	0	0	4	4	0	No change	12	6	0	No change	80	66 ³
Merlin Capability Sustainment Programme	Update of helicopter avionics	805	768	-37	-33	Feb 14	Feb 14	0	0	8	0	0	No change	10	0	0	No change	30	30
Puma Life-Extension Programme	Update of helicopter cockpit and avionics	339	326	-13	-13	Nov 13	Nov 13	0	0	8	0	0	No change	7	0	0	No change	28	24
Queen Elizabeth Class	Aircraft carrier	3,541	5,131	+1,590	-13	Jul 15	Oct 16	+15	+5	4	4	0	No change	8	0	1	+1	2	2
Specialist Vehicles	Armoured fighting vehicles	1,394	1,394	0	0	No date	No date	No data	No data	8	0	0	No change	11	0	0	No change		No data ⁴
Type 45 Destroyer	Anti-air warfare destroyer	4,757	5,664	+907	-30	May 07	Jul 10	+38	0	4	4	0	No change	5	4	0	No change	6	6
Typhoon	Fighter aircraft and Future Capability Programme	15,583	18,159	+2,576	+18	Dec 98	Jun 03	+54	0	3	5	0	No change	15	1	1	No change	232	160
United Kingdom Military Flying Training System	Flying training capability	928	900	-28	+5	May 09	Feb 10	+9 ⁵	0	8	0	0	No change	20 ⁵	8 ⁵	0 ⁵	No change	28	28 ⁵
Watchkeeper	Surveillance, target acquisition and reconnaissance unmanned aerial vehicle	847	839	-8	-4	Jun 10	Feb 12	+20	+12	4	4	0	No change	6	4	1	No change	54	54
Total		53,469	59,570	+6,101	+466			+322	+30	82	37	1	+1	147	29	4	+2		

NOTES

- Costs include some initial items for boats five and six, as these submarines have not received their main investment decision. In-service dates apply to boat four only.
- The number of Joint Combat Aircraft has yet to be determined. In last year's report we stated that up to 150 would be procured but this is now subject to negotiation following the Strategic Defence and Security Review.
- Numbers include eight Light Attack Helicopters which are modified Battlefield Reconnaissance Helicopters. Budgetary provision was made for these additional aircraft in the last planning round, but they are yet to be formally approved.
- The number of Specialist Vehicles to be procured will not be determined until the manufacture phase of the project.
- The dates specified for the United Kingdom Military Flying Training System relate to the Advanced Jet Trainer increment. The in-year change to in-service dates represents the total variation to the United Kingdom Military Flying Training System programme. The key performance measures shown are those for the full United Kingdom Military Flying Training System programme. The platform numbers specified for the United Kingdom Military Flying Training System programme relate to the Advanced Jet Trainer increment.

Source: National Audit Office analysis of Departmental data

Forecast costs have risen by nearly £0.5 billion

1.2 The current Major Projects have a total forecast cost value of £59.6 billion against an initial approved cost of £53.5 billion. The total cost increase is £6.1 billion, or 11.4 per cent. Of this, £466 million (0.9 per cent) is from 2010-11 and includes £113 million spent on capability enhancements.

1.3 The approval and forecast cost figures in this year's Report are not directly comparable with the figures in *Major Projects Report 2010* because they have been re-stated to remove cost of capital, in line with HM Treasury's 'clear line of sight' policy implemented on 1 April 2010.⁹ This has had the effect of removing some £3.8 billion from approved costs and £6.2 billion from the forecast cost of these projects.¹⁰

1.4 **Figure 3** shows the in-year cost variation for each of the 15 post-main-gate projects.

1.5 Of the £466 million cost increase:

- £237 million was from central planning decisions made by the Department and capability enhancements to equipment above that originally planned.
 - Short-term decisions to save money have added £124 million. The most significant of these was on the Astute Class submarine programme, which is examined further in Part Three of this Report.
 - £113 million has been added through increases to capability requirements including: an increase in the numbers of Lynx Wildcat helicopters from 62 to 66 (+£37 million net increase);¹¹ investment on the Future Strategic Tanker Aircraft to address platform protection issues and increase the utilisation of the aircraft (+£124 million); and a change in the Joint Combat Aircraft programme requirements (-£71 million).
- £176 million has been added by macro-economic factors, primarily exchange rate changes on the A400M aircraft (classified), Typhoon aircraft (+£91 million) and the Joint Combat Aircraft (-£35 million).
- £53 million from project-level difficulties such as design and contracting issues, most notably on the Joint Combat Aircraft (+£72 million) though savings were realised on the Typhoon aircraft (-£63 million).

⁹ Cost of capital was a notional opportunity cost from using money in capital expenditure projects instead of alternative investment opportunities. The clear line of sight policy aims to simplify financial reporting to Parliament ensuring that it reports in a more consistent fashion.

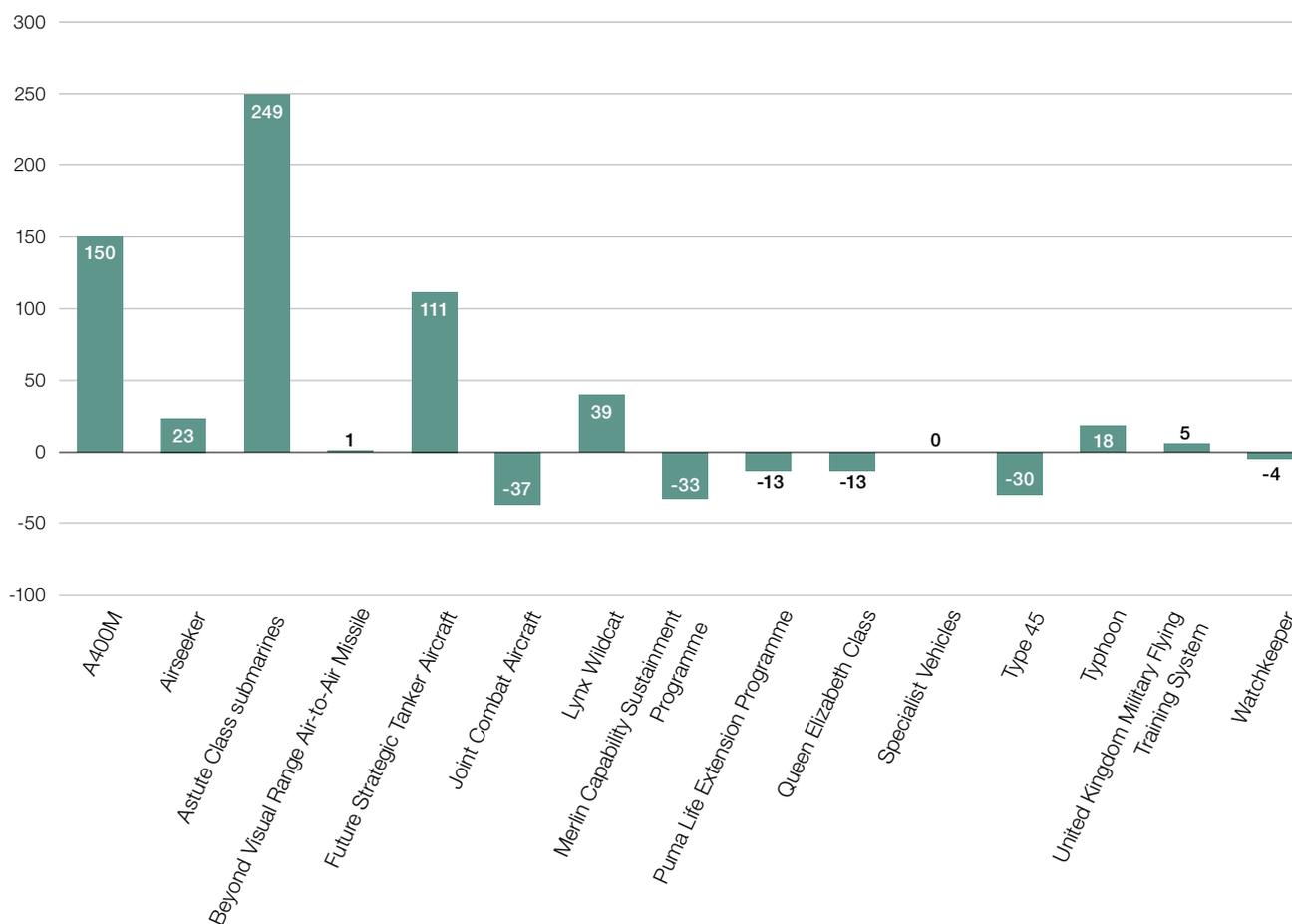
¹⁰ Appendix Three has a full reconciliation between last year's approved costs and revised approved costs after cost of capital was removed.

¹¹ There are two types of Lynx Wildcat helicopters: the Battlefield Reconnaissance Helicopter of which 38, (a net increase of four in 2010-11), are now being procured with eight of these to be subsequently modified to Light Attack Helicopter standard; and the Surface Combatant Maritime Rotorcraft of which 28 are being procured.

Figure 3

In-year cost variation for the largest 15 projects

In-year cost variation (£m)

**NOTES**

- 1 The variation shown for Astute Class submarines includes changes against the main investment decision for boats one to four as well as variation against some initial purchases approved for boats five and six.
- 2 The variation shown for Typhoon includes both Typhoon and the Typhoon Future Capability Programme.
- 3 The variation shown for United Kingdom Military Flying Training System includes: Advanced Jet Trainer; Advanced Jet Trainer Operational Capability 2; Advanced Jet Trainer Ground Based Training Environment; and Rear Crew Stage 1.

Source: National Audit Office analysis of Departmental data

Projects were delayed by a total of 30 months

1.6 The 13 projects, for which overall time performance can be reported, showed a combined slip of 30 months (average two months per project) against approved in-service dates (27 months in 2010).

1.7 Two projects, Specialist Vehicles and the Joint Combat Aircraft projects, are excluded from the analysis as they do not yet have approved in-service dates. Specialist Vehicles currently only has an assumed date for service entry, which has been deferred by nine months during 2010-11; and the Joint Combat Aircraft is being approved in stages. Therefore, we are unable to report on the progress of these projects towards their entry-into-service dates and, therefore, they are not subject to the same level of Parliamentary scrutiny as the other projects.

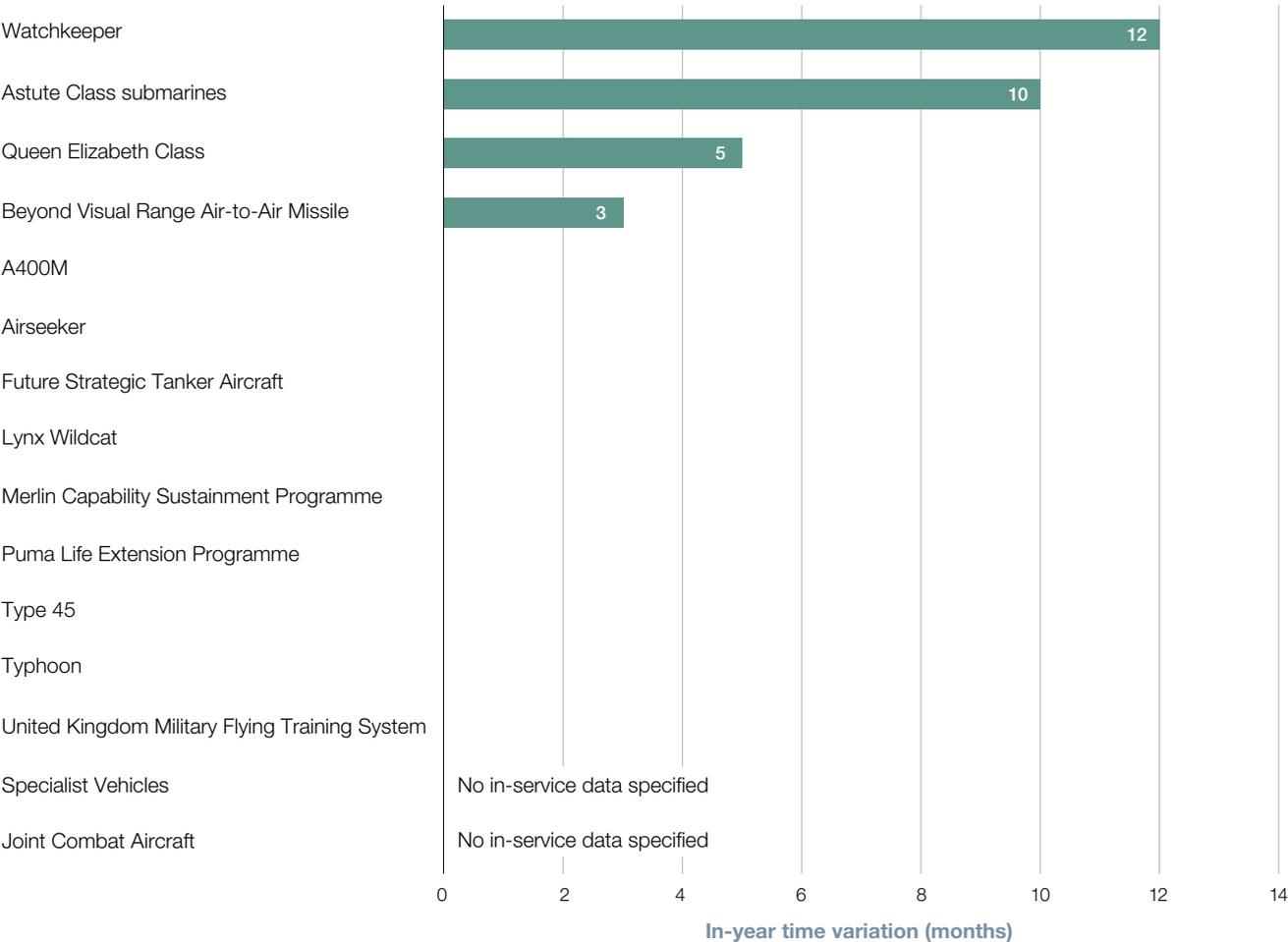
1.8 **Figure 4** shows the in-year time variation for each of the 15 post-main-gate projects.

1.9 In-year, the Watchkeeper unmanned aerial vehicle project reported a 12-month slip, of which ten months was due to the contractor failing to deliver against the agreed schedule. The Department has since renegotiated the contract with industry ensuring that support for operations is maintained at no extra cost.

1.10 The Astute Class submarine programme met its in-service date for boat one in April 2010 – three months earlier than forecast in *Major Projects Report 2010*. Astute boat four, however, was deferred by 13 months to extend construction times for the Astute submarines. This delay was to avoid a gap in submarine production, caused by a Government decision to delay building the next class of submarines. See Part Three for further details.

1.11 Queen Elizabeth Class aircraft carriers reported a five-month slip against schedule following an independent review of the programme in July 2010. The Beyond Visual Range Air-to-Air Missile project slipped three months against schedule because of a supplier design change.

Figure 4
 In-year time variation against approved in-service date for the largest 15 projects



NOTES

- 1 The Joint Combat Aircraft and Specialist Vehicles do not yet have an in-service date specified (see paragraph 1.7).
- 2 The variation shown for Astute is the net variation for boats one to four. Boats five and six do not yet have an approved in-service date as they are yet to pass their main investment decision.

Source: National Audit Office analysis of Departmental data

Performance remained consistent with last year

Key performance measures

1.12 When the Department decides to invest in a project, it approves a number of key performance measures to define the required capability of the equipment.

Figure 5 shows the status of the key performance measures across the 15 post-main-gate projects.

1.13 In-year, 147 key performance measures across 15 projects are reported as 'Met/Forecast to be met' by the specified in-service date. An additional 29 across seven projects are reported as 'Forecast to be met with risk'. The Department remains confident that these will be met by the forecast in-service date, as plans are in place to manage the risks.

1.14 Four key performance measures across three projects are reported as 'Not met/Forecast not to be met'. Two of these are reported for the first time this year:

- Queen Elizabeth Class is forecast to not meet its 'availability' key performance measure, because of the 2010 Strategic Defence and Security Review decision to only have one carrier in service.¹²
- The Astute Class programme has not yet demonstrated its 'top speed' key performance measure as trials had not completed by the in-service date as originally planned. Further trials are planned before the submarine is ready for military operations; currently scheduled for December 2012.

Defence lines of development

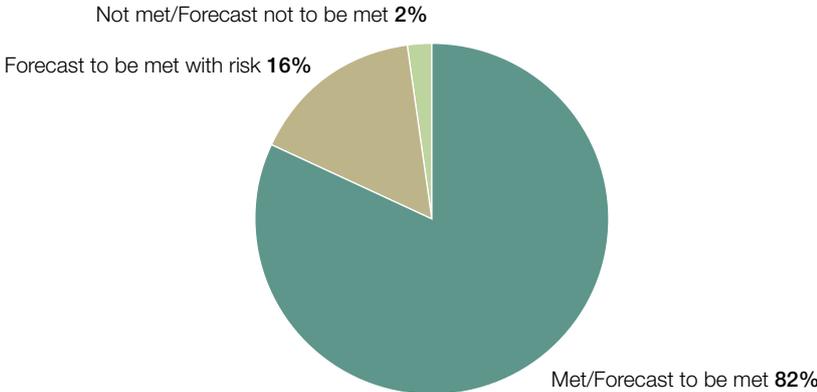
1.15 To turn this equipment into a useful military asset, the Department also measures eight components of capability, including personnel, training and logistic support. These components are known as defence lines of development. **Figure 6** shows the status of the defence lines of development across the 15 post-main-gate projects.

1.16 During 2010-11, 82 out of 120 defence lines of development across the 15 projects were reported as 'Met/Forecast to be met'. A further 37 across 11 projects were reported as 'Forecast to be met with risk'. The Department remains confident that these will be met by the projects' in-service date, as plans are in place to manage the risks.

1.17 Only one defence line of development (Organisation) is reported as 'Not met/Forecast not to be met'. This is on the Astute Class submarine programme and is because of the Department's annual budgeting plan decisions over the last three years to slow delivery of the seven boats. Therefore, the Department will not be able to consistently achieve the planned readiness of the boats over part of the next decade. Further details are provided in Part Three of this Report.

¹² *Carrier Strike*, HC 1092, Parliamentary Session 2010–2012.

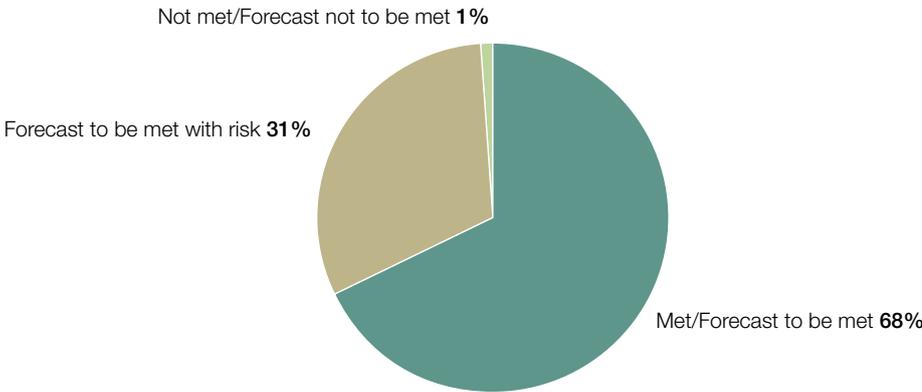
Figure 5
Status of key performance measures for the largest 15 projects



NOTE
1 The chart includes all key performance measures across all projects within the Major Projects Report population.

Source: National Audit Office analysis of Departmental data

Figure 6
Status of defence lines of development for the largest 15 projects



NOTE
1 Each of the 15 projects has eight defence lines of development. The eight defence lines of development are: equipment, training, logistics, infrastructure, personnel, doctrine, organisation and information.

Source: National Audit Office analysis of Departmental data

Part Two

Cost analysis since 2000

2.1 In this Part we analyse cost variations since 2000 by providing analysis for all 63 projects that have featured in our annual Report since that date. In performing this analysis, cost of capital¹³ has not been removed from projects approved before 2010. This is because these projects had cost of capital included within their approvals and forecast costs, as reported in the Major Projects Reports. Specialist Vehicles, Airseeker and the Puma Life Extension Programme, which only recently received their main investment decision, do not include cost of capital. This analysis, therefore, is not comparable with Part One of this Report, where cost of capital has been removed for all projects.

2.2 To date, projects included in the Report over the past twelve years have a total approval value of £92.7 billion, with a combined total forecast cost of £103.3 billion. This represents an increase of £10.6 billion, or 11.4 per cent. **Figure 7** shows how this increase has changed from year-to-year over this period.

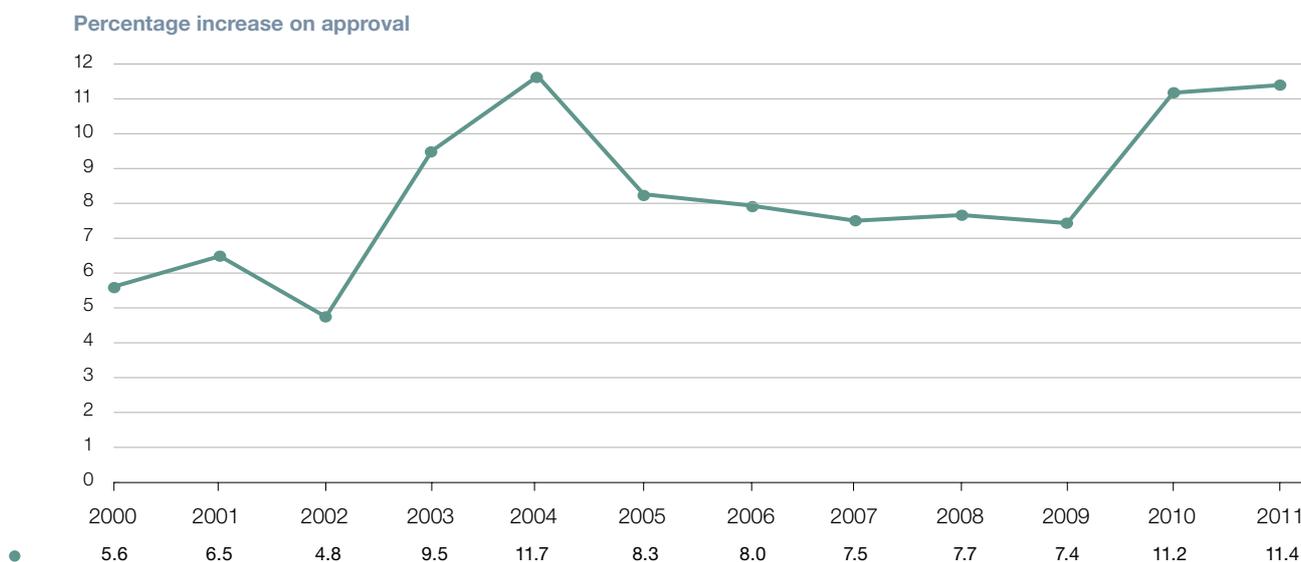
2.3 We have analysed this cost increase over the past 12 years by four methods:

- a** Dividing the 12 years **into three distinct phases** and assessing the causes of cost growth in each period (paragraph 2.4).
- b** Assessing the additional **impact of cutting equipment numbers** and impact on the Defence budget if the Department had kept the original levels of equipment required when the main investment decision was taken (paragraphs 2.5–2.9).
- c** Analysing **cost variation by date of approval**. We divided the 63 projects into two groups: those that received their main investment decision in 2001 or earlier and those approved more recently (paragraphs 2.10–2.12).
- d** Analysing **cost variation by size of project** (paragraph 2.13).

¹³ Cost of capital was a notional opportunity cost from using money in capital expenditure projects instead of alternative investment opportunities.

Figure 7

Major projects have increased by 11.4 per cent against approved costs since 2000

**NOTE**

1 All projects that have passed their main investment decision are included in the analysis. The only exceptions being for Multi-Role Armoured Vehicles and Extended-Range Ordnance/Modular Charge System, which have been excluded in the year they were cancelled.

Source: National Audit Office analysis of Departmental data

Cost growth splits into three distinct phases

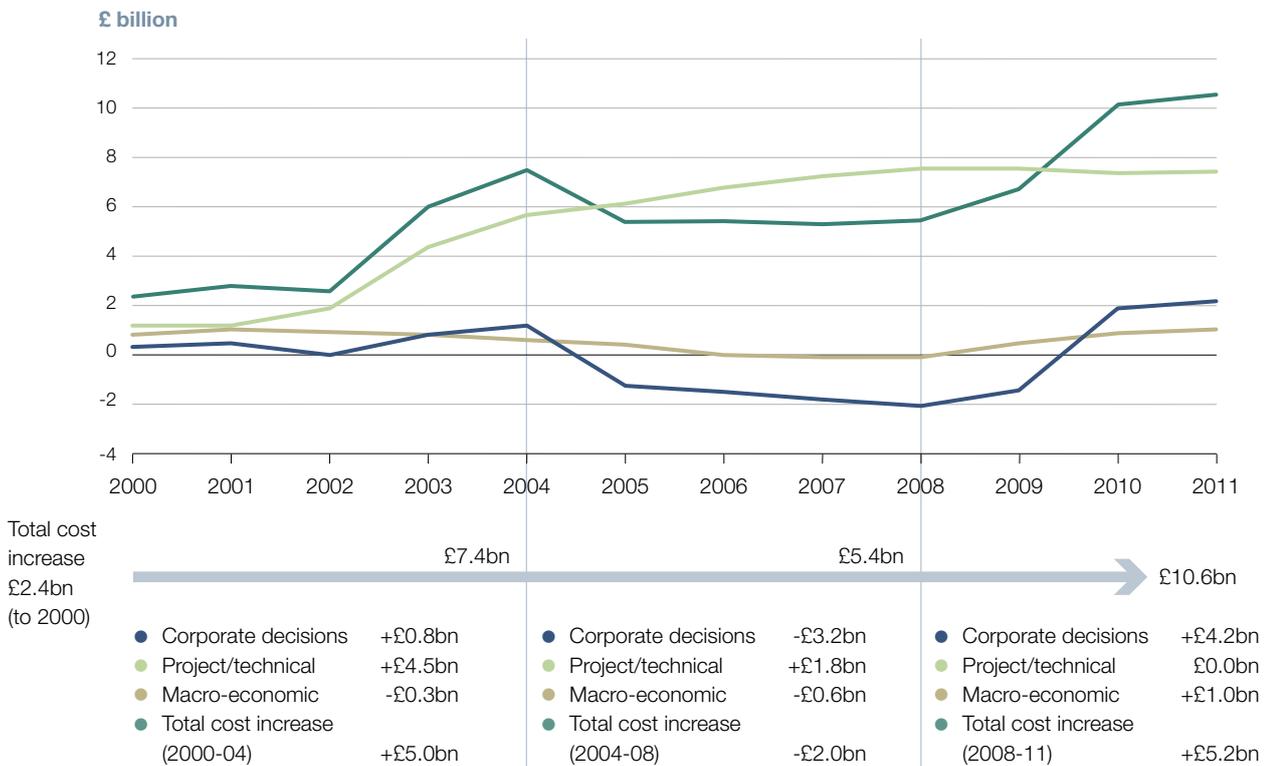
2.4 In our annual Reports we have recorded and categorised all variations in total forecast cost of the projects we have reviewed. By grouping these causes of cost growth into three broad categories: corporate decisions; project/technical issues; and macro-economic/accounting adjustments, **Figure 8** overleaf shows that there have been three distinct phases in cost variation across the total project population over the last 12 years.

The impact of cutting equipment numbers

2.5 As discussed, the Department undertook a strategy to reduce the number of units being purchased, compared with the numbers the Department said it required when the main investment decision was taken. The Department can reduce equipment numbers in response to changes in military requirements, such as reducing numbers to enhance performance in the remaining fleet, but most often it is done to avoid cost increases.

2.6 **Figure 9** on page 21 shows the potential effect on total forecast cost since 2000, had numbers being purchased not been reduced. If the Department had purchased the numbers it originally intended at the time of the main investment decision, an extra £7.6-£8.8 billion would have been spent. This would have been in addition to the £10.6 billion noted in paragraph 2.2, theoretically increasing the total overspend to between £18.2-£19.4 billion – depending upon assumptions of the unit production cost of some equipment. This would have increased the total cost growth on projects from 11.4 per cent (**Figure 7**) to 19.6-20.9 per cent, above the level at which they were approved.

Figure 8
Cost growth can be split into three distinct phases



Cost growth on large projects

Technical issues designing and implementing equipment, as well as contractual problems with industry, during the production phases on some of the larger projects led to significant cost growth. Technical problems on Typhoon (+£1.2bn), Astute (+£0.9bn), Nimrod (+£0.8bn) and Type 45 (+£0.8bn) were mainly responsible for total net cost growth of £5bn. These cost increases are explained in detail in our Reports from 2003 and 2004. The forecast costs of the Major Projects increased to £7.4bn above the level at which they were approved.

Reducing numbers

To try and reduce the overspend, over the following four years the Department engaged in cost saving measures, including reducing the number of units bought across projects. The Department saved some £3.2bn between 2004 and 2008 from these decisions, as well as other corporate decisions. With smaller cost increases from technical problems partly offset by exchange rate gains there was a total saving during this period of £2bn as total cost growth stabilised. We examine the effect of reducing numbers in paragraphs 2.5-2.9.

Slowing down projects

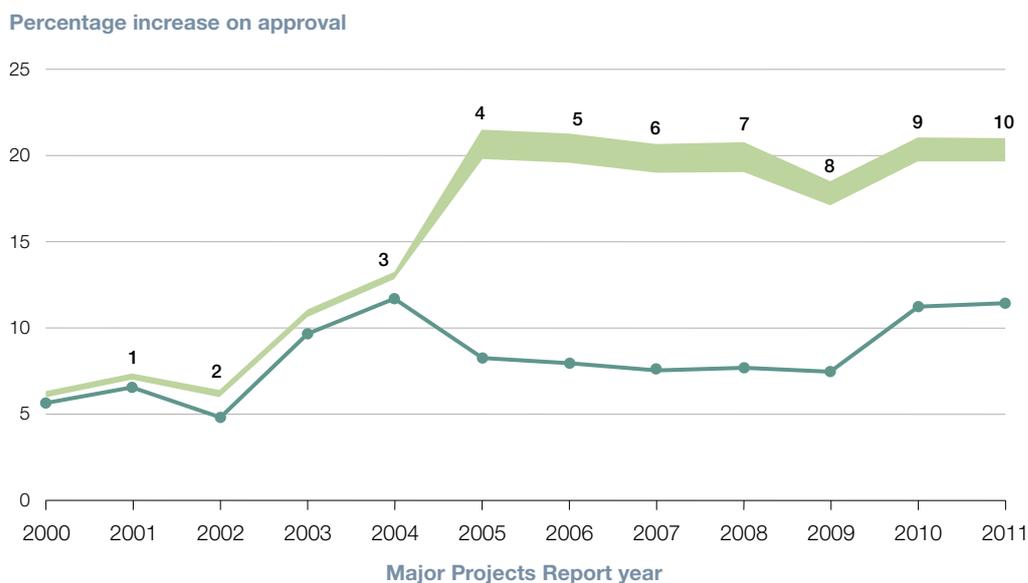
With the Defence budget deficit under increasing scrutiny the Department decided to slow down projects to save money in the short-term. This added significant long-term project costs. Decisions to constrain spending on Queen Elizabeth Class aircraft carriers (+£1.6bn) and slow down production on the Astute Class submarines (+£0.4bn) contributed to total cost growth of £5.2bn during this period. We examine the decision on Astute Class submarines in Part Three. Cuts in equipment numbers continued but at a much reduced rate, while technical problems on projects showed no net increase.

NOTES

- 1 The decision to slow down production on the Queen Elizabeth Class aircraft carriers was examined in Major Projects Report 2010.
- 2 Costs have been calculated by grouping the variation causal factors as reported in project summary sheets. A summary of these and details as to how they have been classified can be found in Appendix Four.
- 3 All projects that have passed their main investment decision are included in the analysis. The only exceptions being for Multi-Role Armoured Vehicles and Extended-Range Ordnance/Modular Charge System which have been excluded in the year in which they were cancelled.
- 4 The cost increase of £2.4billion relates to cost increases before 2000 and is part of the total cost increase of £10.6 billion.

Figure 9

By cutting equipment numbers the Department has avoided further cost increases



● Range of cost variation without cutting numbers	6.3	7.3	6.4	11.0	13.2	21.4	21.1	20.6	20.7	18.4	21.0	20.9
● Total cost variation	5.9	7.0	6.0	10.6	12.8	19.8	19.6	19.0	19.1	17.1	19.7	19.7
● Total cost variation	5.6	6.5	4.8	9.5	11.7	8.3	8.0	7.5	7.7	7.4	11.2	11.4

Key Equipment Cuts

- 1 Tornado Mid-Life Update
- 2 Nimrod, Sting Ray Lightweight Torpedo
- 3 Bowman
- 4 Typhoon, Support Vehicles, Nimrod, Sting Ray Lightweight Torpedo, Guided Missile Long Range System, Beyond Visual Range Air-to-Air Missile
- 5 Bowman, Panther, Guided Missile Long Range System
- 6 Guided Missile Long Range System
- 7 Beyond Visual Range Air-to-Air Missile
- 8 Nimrod, Lynx Wildcat
- 9 A400M, Typhoon
- 10 Puma Life Extension Programme

NOTES

- 1 The cost of projects, had the original numbers of units been bought, has been estimated using the 'unit production cost' from the project summary sheets. The lower estimate is based on the unit production cost when the equipment numbers were cut. The higher value is based on the unit production cost in the year the project was last covered by the Report. Where this is not available the unit production cost has been taken from the latest asset delivery schedule from when the project was last covered by the Report.
- 2 The effect of decisions is shown when it was reported in the *Major Projects Report*. This may not necessarily be the year in which the decision was made. For example, *Major Projects Report 2009* reported that numbers were reduced on the Nimrod maritime patrol aircraft (12 to nine) but the decision was taken in the spring of 2008.
- 3 The projects shown are where significant numbers were cut. There are further projects where numbers were cut, which are not shown.
- 4 The decision to reduce the United Kingdom's buy by 88 aircraft and remove funding (£978 million) from the Typhoon aircraft project was reported in 2005. However, in 2010, the Department decided to purchase 16 of the 88 aircraft as part of an additional £2.65 billion commitment to the Typhoon programme. Both these decisions are reflected in the above chart.

Source: National Audit Office analysis of Departmental data

2.7 As noted by the Public Accounts Committee in 2005, cutting equipment numbers is an inevitable consequence of poor performance in controlling costs.¹⁴ The Department has also made decisions to cut equipment numbers as the military requirement or capability priorities have changed. Although Figure 9 illustrates how the Department has avoided further cost growth through these decisions, this can be at the expense of value for money, demonstrated through our unit cost analysis.

2.8 Defence projects tend to include significant development costs and the effect of reducing numbers is to share these non-recurring costs across a smaller number of production units. Therefore, reductions in numbers after the main investment decision has been made tend to be economically inefficient as this may include significant development costs. A unit production cost, which excludes these development costs, is an alternative measure preferred by the Department which generally remain stable following reductions in numbers.

2.9 **Figure 10** shows the impact on unit cost of reducing numbers across projects where numbers have been cut. For example, numbers reduced by 57 per cent on the Nimrod maritime patrol aircraft while unit cost increased by 199 per cent. Had the project not been cancelled in 2010 each Nimrod would therefore have cost, on average, £266 million more than originally intended at the main investment decision.¹⁵

Projects approved over the past decade have shown lower cost growth

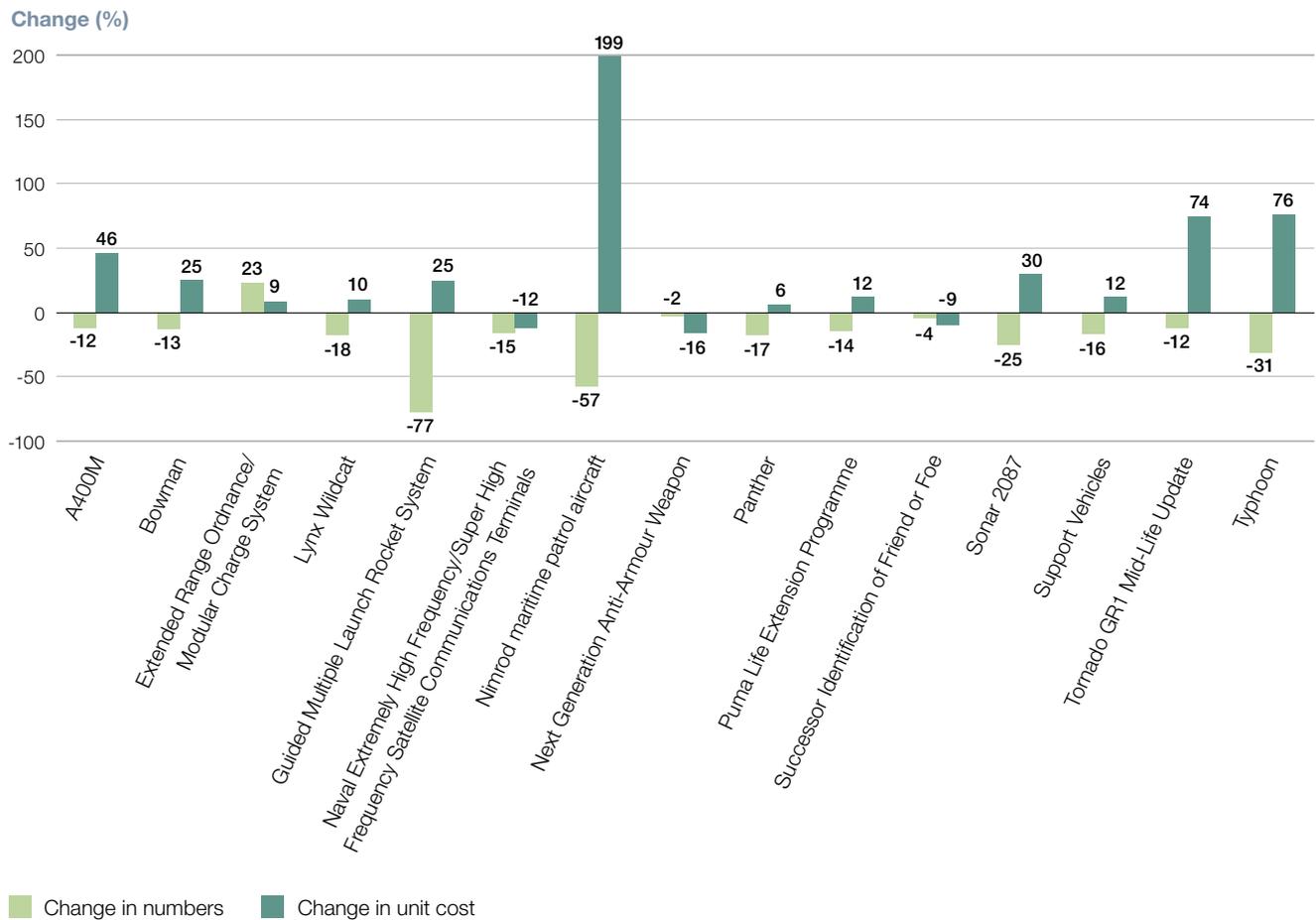
2.10 Across all projects, our analysis shows lower cost growth on projects approved over the past decade (since 2002) than those approved before this date. **Figure 11** on page 24 shows the total cost increase for projects approved in or after 2002 is 2.8 per cent. However, those projects approved in or before 2001 show a bigger cost increase of 16.8 per cent.

¹⁴ House of Commons Committee of Public Accounts, *Ministry of Defence Major Projects Report 2005*, Fiftieth Report of Session 2005-06, HC 889, Part One.

¹⁵ The Department was not able to provide a comparison for the change in unit production cost of the Nimrod aircraft, although it is likely it would not have changed substantially.

Figure 10

Percentage variation in unit cost and number of items being purchased on projects where equipment numbers have been cut

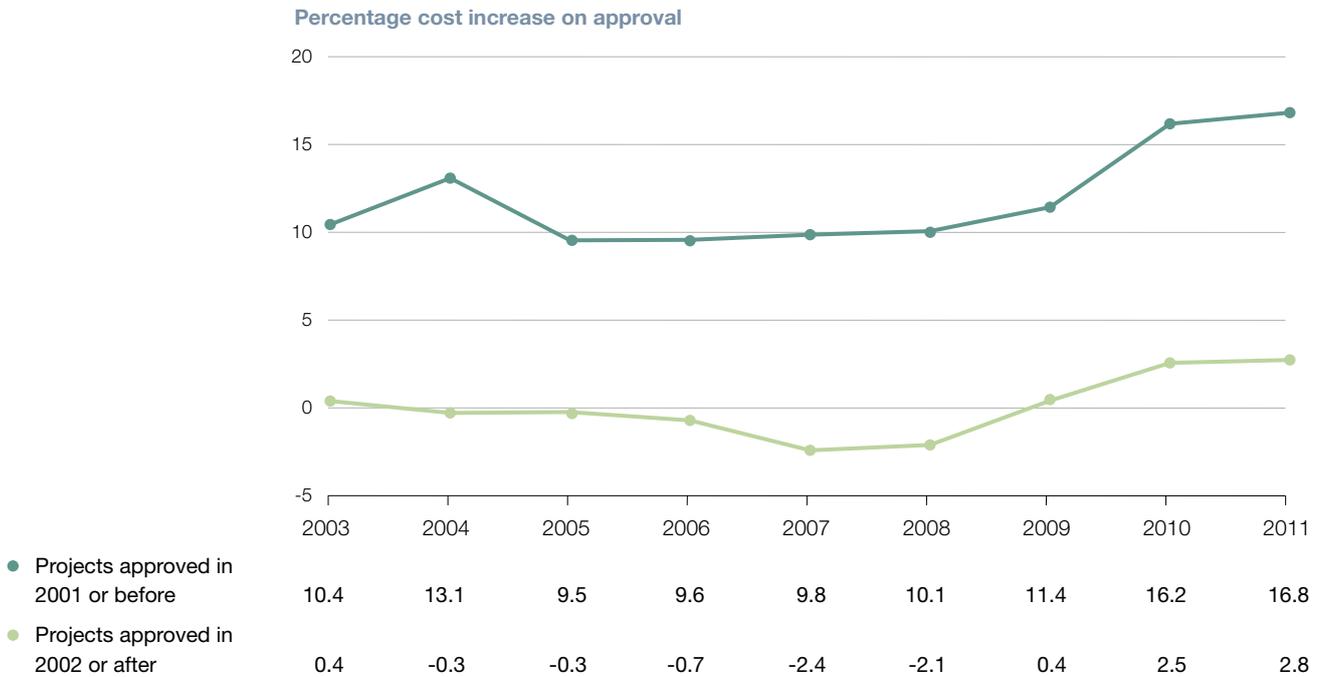
**NOTES**

- 1 Chart only shows projects where numbers being purchased have changed between 2000 and 2011.
- 2 The unit cost of equipment is calculated by dividing the total forecast cost by the number of units to be procured. This includes all sunk and development costs of a project. However, if the Department makes real savings to a project this may still result in an increase in unit cost. Consequently, action taken by the Department to generate savings generally results in increases to unit cost.
- 3 The numbers of missiles being procured for Beyond Visual Range Air-to-Air Missile and for Advanced Short Range Air-to-Air Missile, as well as the number of Sting Ray torpedoes, have reduced during this period. These numbers have been excluded from the chart as they are classified.
- 4 Further analysis of the Nimrod maritime patrol aircraft can be found in Part Three of this Report.
- 5 Appendix Three shows the effect of reducing numbers on the current population of projects in the *Major Projects Report 2011*.

Source: National Audit Office analysis of Departmental data

Figure 11

Projects approved over the past decade show lower cost growth than those approved earlier



NOTES

- 1 The chart starts in 2003 as projects approved in 2002 do not appear in the *Major Projects Report* until 2003.
- 2 The projects have been split by the year in which they were approved, resulting in a near 50/50 split of projects.

Source: National Audit Office analysis of Departmental data

2.11 The increases in 2009 and 2010, in projects approved in or after 2002, are mainly due to the £1.8 billion¹⁶ increase reported on the Queen Elizabeth Class.¹⁷ This project is the fourth largest to feature in the Report since 2000 and is covered in Figure 12. If this project is excluded from the analysis there would have been a net *saving* of £839 million from projects approved in or after 2002. This would have reduced the total cost increase from 2.8 per cent to a *saving* of 2.4 per cent against approved budgetary levels.

2.12 As older projects have had more time to accumulate cost growth, we might expect to see greater cost growth in projects that were approved in 2001 or earlier, compared with later projects. However, our analysis shows that the largest cost growth generally occurs in the early years after a project’s approval. Therefore, it is reasonable to conclude that cost growth on more recently approved projects has reduced.

¹⁶ £1.6 billion of this was the result of a Departmental decision in 2008 to delay spending. The remainder is a mixture of inflation and technical factors.

¹⁷ Details of this cost increase have been reported in *Major Projects Report 2009 and 2010*.

Larger projects have shown greater cost growth

2.13 Projects approved before 2002 were, on average, nearly 50 per cent larger by value than those approved after 2002. **Figure 12** shows that the largest ten projects, representing nearly 60 per cent of the total approval value of all projects, have a total cost overrun of £10.7 billion, or 19.2 per cent against their approved level. Consequently, the Department continues to suffer from the legacy of significant cost overruns on these older, larger projects.

Figure 12

The ten largest projects have a total cost overrun of £10.7 billion

Project	Main-gate year	Approved cost (£bn)	Forecast cost (£bn)	Increase/decrease (£bn)	Percentage variation (%)
Typhoon	1987	16.7	20.2	+3.5	+21.0
Future Strategic Tanker Aircraft	2007	12.3	12.0	-0.3	-2.4
Type 45 Destroyer	2000	5.0	6.4	+1.4	+28.0
Queen Elizabeth Class	2005	4.1	5.9	+1.8	+43.9
Skynet 5	2002	3.3	3.2	-0.1	-3.0
Merlin HM Mk 1 Helicopter	1983	3.2	4.2	+1.0	+31.3
Attack Helicopter WAH 64 Apache	1995	3.0	3.2	+0.2	+6.7
Nimrod maritime patrol aircraft	1996	2.8	3.8	+0.8	+28.6
A400M	2000	2.6	3.4	+0.8	+30.8
Astute: boats one to three	1997	2.6	4.2	+1.6	+61.5
Total		55.6	66.5	+10.7	+19.2

NOTES

- Forecast cost and variations for Skynet 5 (2009), Merlin HM Mk1 Helicopter (2001), Attack Helicopter WAH 64 Apache (2003) and Nimrod maritime patrol aircraft (2010) are taken from the year they were last included in the *Major Projects Report* (shown in brackets). Forecast cost and variations for the remaining projects are taken from *Major Projects Report 2010*, with the *Major Projects Report 2011* variation added due to the cost of capital being removed for the 2011 Report. These figures are, therefore, not comparable with Figure 2 where cost of capital has been removed completely.
- If cost of capital is excluded from projects in the above table that were part of the *Major Projects Report 2011* population, the increase in forecast cost would reduce from £10.7 billion to £8.5 billion.
- Skynet 5's approved cost has been adjusted by removing £0.4 billion as money provided for the build of a fourth satellite was not required. See *Major Projects Report 2009* for further details.
- Of the ten projects shown, three were approved in 2002 or later. Two of these, Skynet 5 and Future Strategic Tanker Aircraft, are private finance initiative projects and are currently funded to include all support and through-life costs as well the initial manufacture of the equipment. Queen Elizabeth Class aircraft carriers are the only large project in Figure 12 to be approved after 2002 that includes only the development and manufacturing costs.

Source: National Audit Office analysis of Departmental data

Part Three

The impact of the Strategic Defence and Security Review

3.1 The October 2010 Strategic Defence and Security Review had a number of consequences for the Department's equipment programme. A key issue was to address the long-term imbalance between the anticipated Defence budget and forecast expenditure. To address this challenge the Department cancelled the Nimrod maritime patrol aircraft, and also delayed introducing the Successor nuclear deterrent submarine by four years to 2028. To ensure that a gap in submarine construction did not arise as a consequence of this delay and to further reduce short-term costs, the Department slowed the build programme of the Astute Class submarine. In addition to the financial consequences, these decisions have affected the Department's ability to undertake a number of defence tasks.

3.2 **Figure 13** outlines the key impacts on the Major Projects from the Strategic Defence and Security Review.

The Requirement for the Astute Class submarine

3.3 As part of planning, to ensure sufficient military forces are ready for operations, the Department has had a requirement since at least 2004 for a classified number of submarines to be available to deploy at short notice. To meet this requirement the Department had 11 Trafalgar and Swiftsure Class submarines in service in 2004 – the oldest of which had entered service in 1974. To replace these submarines, the Department planned to purchase up to eight Astute Class submarines, but in 2007 this was revised to seven.

3.4 **Figure 14** on page 28 provides a summary of the Astute Class submarine programme to date.

Figure 13

Key impacts on the Major Projects from the Strategic Defence and Security Review

Project	Strategic Defence and Security Review impact
Astute Class submarines	The Review delayed the Successor nuclear deterrent submarine in-service date to 2028, so the Astute build programme was slowed to avoid a production gap in the submarine construction industry. The Department is also planning to deliver savings over the whole submarine business over the next decade, through the Submarine Enterprise Performance Programme (SEPP). Figure 14 provides a summary of the Astute Class submarine programme to date.
Nimrod maritime patrol aircraft	The programme was cancelled. Figure 16 provides a summary of the Nimrod maritime patrol aircraft to date.
Joint Combat Aircraft	Aircraft type to be purchased changed from the short take off, vertical landing aircraft to the carrier type.
Queen Elizabeth Class aircraft carrier	Both carriers will be completed, but only one will become operational. The operational carrier will be fitted with catapults and arrestors, delaying entry into service from 2016 to 2020.
Tornado GR4	Fleet to be reduced.
Sentinel surveillance aircraft	To be withdrawn from service, once no longer required for operations in Afghanistan.

NOTES

- 1 Analysis of changes to the Joint Combat Aircraft and the Queen Elizabeth Class aircraft carriers are covered in our report *Carrier Strike*, published in July 2011.
- 2 Tornado and Sentinel are already in-service and therefore not included in the Major Projects' population.

Source: *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review 2010*: www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191634.pdf

Figure 14

Background to the Astute Class submarine programme

Original date of the main investment decision

Boats one to three	March 1997
Boat four	May 2007
Boats five to seven	Not yet approved

Original approved cost

Boats one to three	£2.23 billion (with an additional £0.6 billion approved in both 2003 and 2007)
Boat four	£1.28 billion
Boats five and six	£0.88 billion (initial items only)
Boat seven	Not yet approved

Total programme approvals are currently expected to be £9.75 billion for all seven boats.

Total increase in forecast cost

	£1.9 billion
Technical problems and design changes	Boats one to four: £0.9 billion
Delaying the build programme	Boats one to four: £0.4 billion
	Boats five to seven: £0.6 billion

Total spend to 31 March 2011

	£4.3 billion
--	--------------

Original approved in-service date	Boats one to three: June 2005
Total delay to in-service date since original approval	Boats one to three: +58 months
Additional delay to initial operating capability through delaying the build programme	average of 28 months per boat

Programme history

For the first six years the programme experienced technical difficulties, which were reported in *Major Projects Report 2003*. These arose because the Astute Class was the first United Kingdom submarine programme to use computer aided design techniques, and the complexities were underestimated. This contributed to a cost increase of £886 million and a time delay of 43 months to the programme.

In 2009, £139 million was removed from the Astute budget for the period 2009–2013, as part of the Department's 2008 Equipment Examination to reduce short-term budget pressures. This was done by slowing down production of boats two to four and deferring boats five to seven. This increased total programme costs in the longer term by a net £400 million.

In 2010, an option was taken to defer introducing Successor and delay the Astute programme to maintain steady production. This added another £330 million to the total programme costs and delayed the in-service date for boat four by 16 months.

This year, the Department decided to further defer introducing Successor and to slow down the build programme of Astute. This added £266 million to the Astute Class submarines programme, bringing the total to nearly £1 billion from delaying the build programme. This also caused a 13-month delay to the in-service date for Astute boat four, bringing the total delay on this boat to 29 months.

NOTES

- 1 Astute boat one achieved its in-service date in April 2010.
- 2 Additional average delay of 28 months is measured between initial operating capability before the Equipment Examination in 2008 and the initial operating capability at 31 March 2011. Initial operating capability is when the boat is available to the Royal Navy for operations.

Slowing the build programme

3.5 The Strategic Defence and Security Review supported the political, military and industrial need for seven submarines. The Review also slowed the Astute Class build programme to reduce short-term costs and to compensate for a four-year delay to the in-service date of the follow-on Successor nuclear deterrent submarine programme to avoid a production gap in the submarine construction industry. The need to align with the Successor submarine production stretched out the seven-boat Astute build programme by a further 96 months in 2010-11. This resulted in an average delay of 28 months to each of the Astute Class submarines over the past three years. **Figure 15** overleaf indicates that, under current plans, it will take over ten years to complete each of the latter boats. For example, work is due to start on boat seven in early 2014 and the vessel is not currently planned to be ready to deploy until mid-2024.

3.6 Building seven Astute boats and slowing the build programme risks having insufficient submarines to undertake the number of tasks envisaged by defence plans. Since 2004 there have been periods when the Department has not had enough submarines ready to meet the classified availability requirement. As noted in this year's Astute project summary sheet the Department is currently reporting that the fleet will not meet the availability requirement for submarines over part of the next decade. If the classified availability requirement is to be met with fewer submarines, then the Department will need greater availability of the new Astute Class than has been the case with the previous fleet.

Costs have increased by more than the unit price of a submarine

3.7 Forecast costs over the past three years can be used to demonstrate that nearly £1 billion has been added to the cost to complete the seven Astute boats because of slowing down the build programme.¹⁸ Of this, £266 million¹⁹ was added during 2010-11 including £200 million on the approved boats (boats one to four). Other cost increases since the main investment decision was taken currently total £914 million,²⁰ indicating that there has been over £1.9 billion of total cost growth in the past 14 years. The additional pre-2009 costs for Astute boats four to seven has not been calculated by the Department.

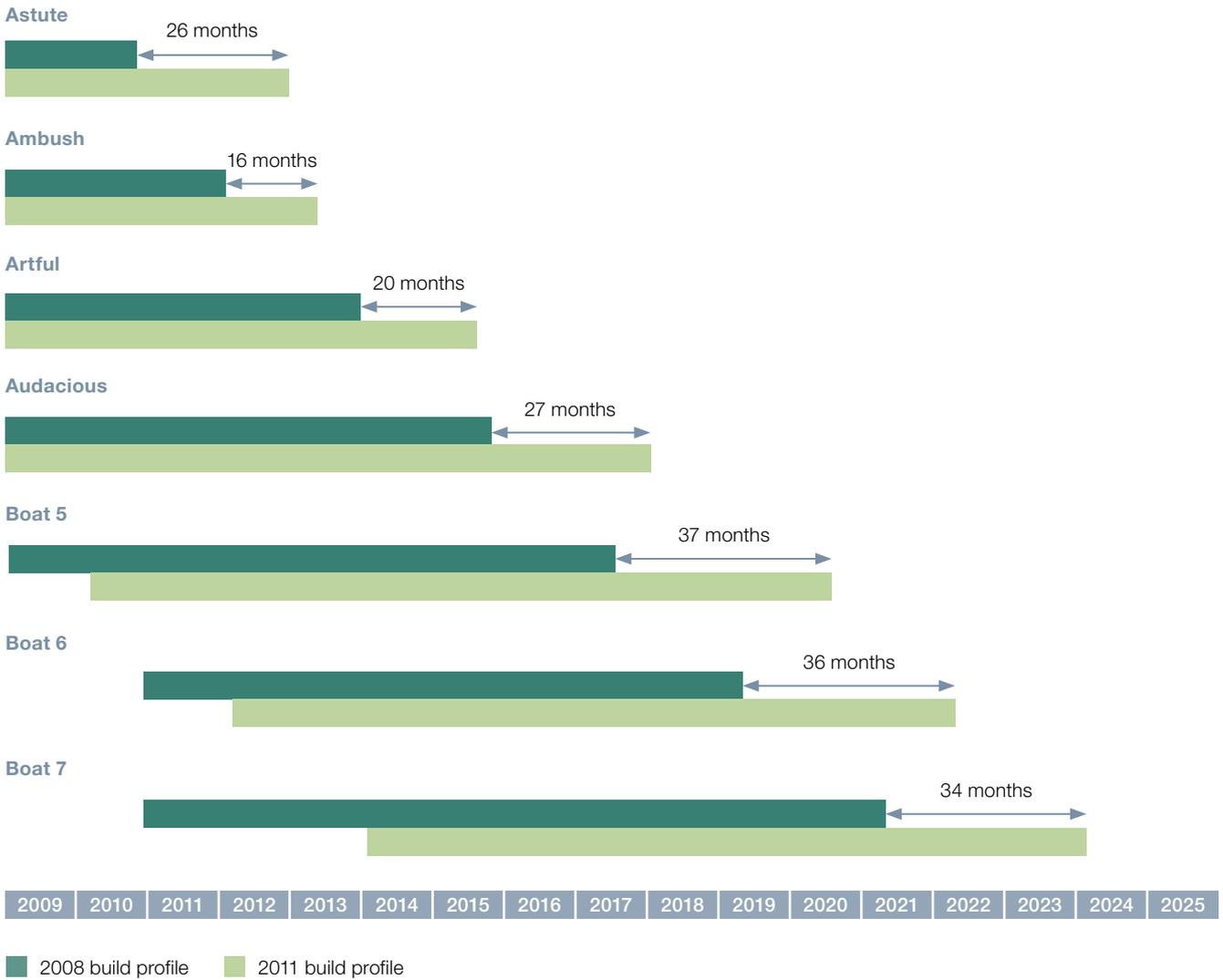
¹⁸ The *Major Projects Report* only measures the detailed cost increases of projects that have received their main investment decision. For the Astute Class programme, this has covered only the first four vessels of the seven-boat Class. This figure includes the cost impact across all seven Astute boats.

¹⁹ This includes £144 million recorded on the project summary sheet for boats one to three and £56 million for boat four. The remaining £66 million relates to boats five to seven but as these boats have not yet passed their main investment decision this is not shown on the project summary sheet.

²⁰ The Astute project summary sheet records the total cost increase at £1,333 million. Recorded within this are cost variations specific to the decision to slow the build programme of £419 million. All figures are exclusive of cost of capital.

Figure 15

The Astute Class submarines have been delayed on average by 28 months each over the past three years



NOTE

1 This graphic shows the total time taken to construct an Astute Class submarine from when construction first starts to when the submarine is ready for operational deployment. Note that this is not the same as the in-service date as recorded in the project summary sheet.

Source: National Audit Office analysis of Departmental data.

3.8 As the reported forecast unit cost of Astute boat four is £1.4 billion, a programme cost increase of £1.9 billion amounts to substantially more than the cost of acquiring a further Astute Class submarine. Had the Department avoided cost increases on the Astute Class described above it could have built an additional submarine for less than the cost the Department is currently forecasting to build seven boats. The original Defence requirement for 'up to eight' Astute Class boats would have been more closely met. Eight boats of comparable availability would generate less pressure than seven boats in achieving the classified availability requirement.

3.9 Although outside the scope of the *Major Projects Report*, the Department also announced in the Strategic Defence and Security Review plans with the main industrial partners to reduce the cost of the entire submarine business by £900 million over the next decade.²¹

The Nimrod maritime surveillance aircraft

Background and capability of the Nimrod aircraft project

3.10 The Nimrod Maritime Reconnaissance and Attack Mk4 aircraft (the Nimrod maritime patrol aircraft) was planned as an upgrade of the existing Nimrod maritime reconnaissance Mk2 aircraft. The Department placed a contract in 1996 to upgrade 21 existing Nimrod Mk2 aircraft to the enhanced standard, although the ultimate design was 95 per cent new build. The new aircraft was to provide enhanced anti-surface and anti-submarine warfare; maritime reconnaissance and strategic intelligence collection; search and rescue; and an attack capability. **Figure 16** overleaf outlines the background for the Nimrod maritime patrol aircraft project.

3.11 The Nimrod maritime patrol aircraft project has had a long history of delays and cost increases reflecting a mixture of technical problems, resourcing shortfalls and the need to incorporate the cost increase within the constrained Defence budget. After main-gate approval in 1996, the Department renegotiated the contract with BAE Systems in 1999, 2002 and 2003. The last renegotiation was mostly responsible for total forecast cost growth of £789 million by the time the project was cancelled in October 2010. Programme difficulties stemmed from 'the design challenge being hugely underestimated by industry' compounded by a weak programme management culture which lacked transparency, neglected or overrode project control systems and disciplines, and produced forecasts that 'lacked depth and reality'.²²

21 Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review 2010: http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191634.pdf

22 *Major Projects Report 2003*: HC 195, Parliamentary Session 2003-04.

Figure 16

Background to the Nimrod Maritime Patrol Aircraft

Background to the Nimrod Maritime Patrol Aircraft programme

Date of main-gate decision	July 1996
Original approved cost	£2.8 billion
Total increase in forecast cost since original approval	£789 million
Total spend to 31 March 2011	£3.4 billion (not including cancellation costs)
Original approved in-service date	April 2003
Delay to in-service date since original approval	+114 months

Programme history

The majority of the problems occurred on Nimrod in the first seven years following its main investment decision. Technical and commercial difficulties were eventually resolved in 2003 after the Department renegotiated the contract with BAE Systems. It was this period that primarily caused the £789 million cost increase, with time delays to this date of 74 months. The number of aircraft to be purchased was reduced from 21 to 18 to stem the cost increases. In 2004 this was reduced further to 12 and a further delay of six months was reported.

In 2005 the in-service date slipped a further 12 months due to short-term budget constraints within the Department, and three years later the number of aircraft to be purchased was reduced to nine. Finally, in 2009 the Department further delayed the in-service date, this time by 22 months, again to save money in the short term.

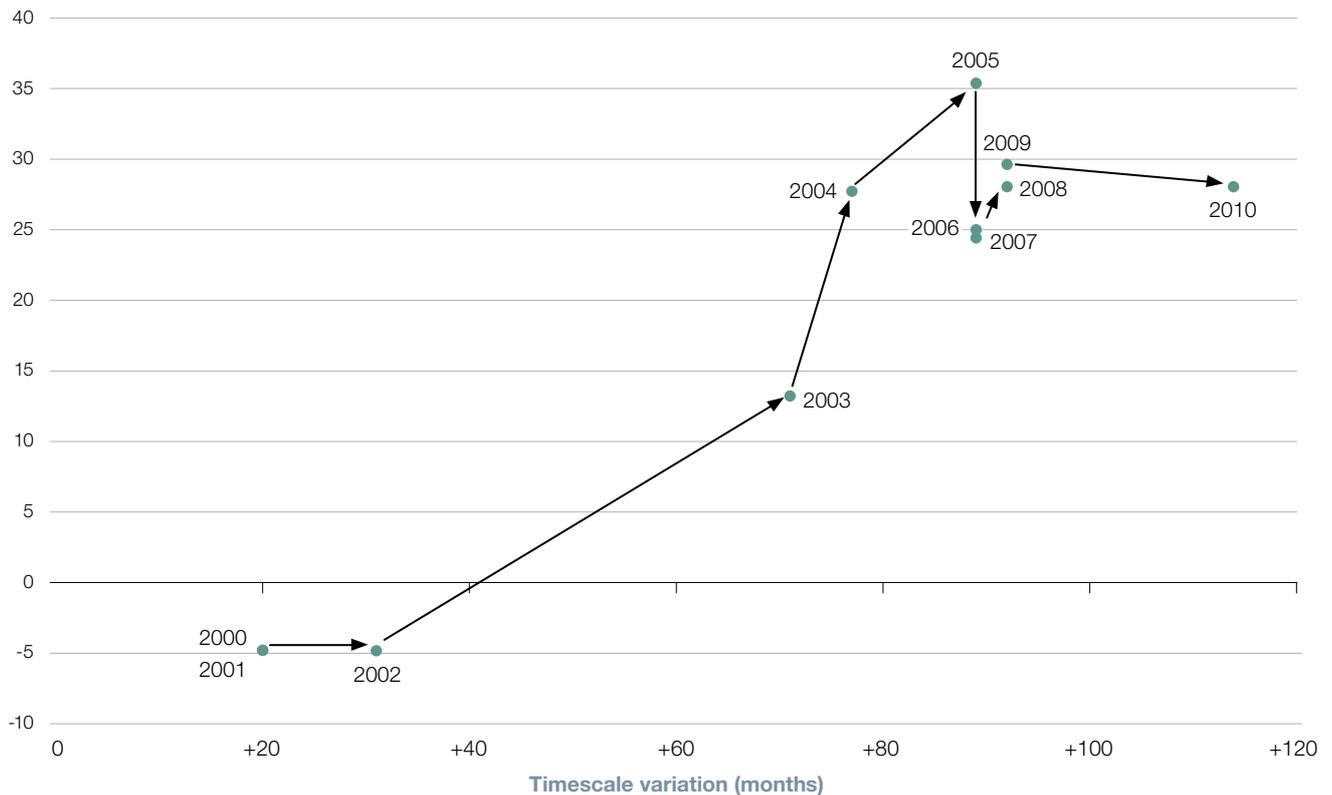
In 2010, the Nimrod maritime patrol aircraft was cancelled bringing to an end a 14-year procurement history having spent over £3.4 billion.

Source: Project summary sheets 2000–2011

3.12 The forecast in-service date of the Nimrod maritime patrol aircraft was successively delayed from April 2003 to the final estimate of October 2012; creating a 114-month slippage. There were two main reasons for these delays: Departmental funding constraints, leading to resources being re-prioritised in the short term; and industry underestimating the design challenge and technical complexity in their initial forecast schedule. **Figure 17** illustrates the repeated cost increases and delays to the in-service date of the Nimrod maritime patrol aircraft.

Figure 17

Cost increases and delays to the Nimrod maritime patrol aircraft

Percentage cost variation**NOTES**

- 1 Graph shows the respective positions and movements of the Nimrod maritime patrol aircraft in each year between 2000 and 2010.
- 2 Nimrod was not part of the population in *Major Projects Report 2011* and so is not shown in the above graphic.
- 3 Figures are all inclusive of cost of capital and are as reported in *Major Projects Reports 2000–2010*.

Source: National Audit Office analysis of Departmental data

3.13 Ongoing technical difficulties created risks to achieving the aircraft's key performance measures. In 2005 two of the ten key performance measures were put 'with risk'. By 2009 the 'Operations in hostile environment' key performance measure had changed to 'Not to be met' and all but one of the remaining measures were reported 'with risk'. In that year a further set of metrics also reported all but one of the eight defence lines of development, which measure the other aspects of military capability such as training and logistics, as 'with risk'.

3.14 To address cost overruns on the project, the number of Nimrod maritime patrol aircraft was reduced from 21 to 18 aircraft in 2002, to 12 aircraft in 2004, and further reduced to nine in 2008. The Department reported that each reduction in aircraft numbers still allowed the defence requirement to be met, but only after adjusting down the requirement on each occasion, as the reductions were financially driven.

Cancellation strategies

3.15 The October 2010 Strategic Defence and Security Review announced that the Nimrod maritime patrol aircraft would not be brought into service, but that other aircraft, ships and helicopters could contribute to the tasks planned for Nimrod. This decision was taken to balance the Defence budget. The Department noted that, to achieve this, equipment projects would need to be prioritised and some cancelled.²³ In the case of the Nimrod maritime patrol aircraft, the financial benefits would come from avoiding future costs associated with running and supporting the Nimrod maritime patrol aircraft up to 2020.

3.16 The Department considered several options for cancelling the Nimrod maritime patrol aircraft, including completing production of all nine aircraft, or just the three that were largely complete. Completed aircraft could be kept for future sale or storage. The Department judged continuing production as risky because it could involve further difficulties and cost increases of the type that had already been encountered on the project to date. The Department also assessed that there could have been issues with retaining key staff at the production site, when the future of the site was known to be limited.

3.17 Storing any finished aircraft was also discounted because the Department assessed that it would be too expensive to recover the aircraft, such as upgrading and re-establishing training facilities. It could take two to three years from the date of any decision to do so.

3.18 Consequently, the Department opted to immediately cancel contracts and scrap the aircraft, as the other options were deemed to be more expensive and more risky.

Cost impact of cancellation

3.19 A total of £3.4 billion²⁴ was spent on the Nimrod maritime patrol aircraft programme on the assessment, demonstration and manufacture phases up to the 31 March 2011. When the Department decided to cancel Nimrod, around 95 per cent of forecast spend for completing the nine aircraft had been used, leaving around £200 million to spend. The Department has confirmed that there will be some termination costs. These are currently under negotiation with BAE Systems and therefore cannot yet be published for commercial reasons.

3.20 The Department estimates that £1.9 billion of costs will be avoided over the next ten years by not bringing the aircraft into service. These are the costs associated with running and supporting the Nimrod maritime patrol aircraft up to 2020.

²³ Peter Luff, Minister for Defence Equipment Support and Technology, Parliamentary Question 28 October 2010: Column 451W.

²⁴ This and all subsequent figures relating to Nimrod includes cost of capital.

Capability impact of cancellation

3.21 The Department has assessed that the Nimrod maritime patrol aircraft contributed to eight of the 15 *security priority risks* described in the National Security Strategy.²⁵ Nimrod was uniquely able to rapidly search large maritime areas, a capability relevant to long-range search and rescue, maritime counter terrorism, gathering strategic intelligence, and protecting the nuclear deterrent.

3.22 In the months leading up to the Strategic Defence and Security Review, studies were carried out by the Department to assess the capability gap from cancelling the Nimrod maritime patrol aircraft. The Department assessed that cancelling Nimrod would have consequences for the military tasks that the aircraft was expected to undertake, some of them severe. The Department, however, determined that compared to other options this was the most effective means of reducing cost whilst minimising the loss of capability.

3.23 Some limited analysis was carried out on how specific military tasks could be covered by a combination of Sentry surveillance aircraft, Hercules transport aircraft and the Merlin maritime helicopters. However, the Department noted that there would be 'significant shortfalls without significant investment, and the co-ordination of such assets at the right place and the right time might prove to be very risky'. **Figure 18** overleaf summarises the military tasks, the capability gap and an explanation of the possible mitigation strategies currently being assessed by the Department.

Risks of diverting existing assets to fill the gaps

3.24 Using other existing assets would provide a reduced capability compared with Nimrod, and diverting resources from existing tasks would have wider implications for defence. The Sentry surveillance aircraft is already at minimum crew and aircraft numbers to cover NATO commitments. Using helicopters, such as the Merlin or Lynx, would affect national commitments or training of crews for other tasks. Other alternatives are fully committed to current operations.

Strategy for a future maritime patrol capability

3.25 In the short term, the Department has deployed a small number of trained service personnel to operate alongside Canadian forces to preserve the United Kingdom's maritime patrol skill sets. The Department also has plans to deploy other personnel to the United States, New Zealand and Australia. Although this is currently being funded through money committed within the Defence budget, in the longer term further investment would be required to maintain this training investment.

3.26 The Department is looking at longer term solutions to fully address the maritime patrol capability gap, due to the short-comings of many of the proposed options discussed above, such as using helicopters and ships. There remain, however, affordability challenges given the over-stretched Defence budget.

²⁵ A Strong Britain in an Age of Uncertainty: National Security Strategy, October 2010, page 27 http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191639.pdf

Figure 18

Capability gaps from cancelling the Nimrod maritime patrol aircraft with possible mitigation strategies

Task	Capability gap with no mitigation	Possible mitigation strategy
Strategic intelligence tasks	Department would be unable to conduct an element of rapid maritime strategic intelligence gathering, as only Nimrod has the required speed and geographical range.	Very limited capability could be provided by the Sentry surveillance aircraft, but with no ability to gather underwater intelligence on submarines.
Long-range anti-submarine warfare	Extent to which a capability gap is acceptable depends on assumptions made about future threats, which could be affected by the decision to cancel Nimrod. This includes protection of the nuclear deterrent.	Gap could be partially mitigated by funding additional, or redeploying existing, maritime helicopters, ships and submarines to provide appropriate geographical coverage
Support to long-range search and rescue and maritime security	Only Nimrod offered speed of response, reach, life raft deployment and long-range communications capability for long-range search and rescue and security operations. The United Kingdom will find it more difficult to meet its international commitments under the Chicago Convention to cover the area to the 30°W line of longitude. Also impacts on search and rescue for military operations, exercises, submarines in distress, assisting helicopter search and rescue operations and other security tasks.	The Hercules transport aircraft can cover the area to the 30°W line, but does so more slowly with limited endurance, and has inferior search capability. Merlin, Lynx, and Sea King airborne surveillance and control helicopters, Type 23 frigates and Type 45 destroyers could also be used. In all cases, the Department judges the mitigation would be 'sub-optimal' because none have the range, speed and surveillance capabilities of Nimrod.
Power projection	Nimrod provided a unique ability to rapidly search large maritime areas, including anti-submarine and anti-surface warfare. Could deploy worldwide at short notice and with minimal initial support.	The Merlin Mk1 and the Sea King airborne surveillance and control helicopters could provide similar capabilities, but speed and range are restricted as the helicopter can only deploy as fast as the ship it is based on.

NOTES

- 1 Search and rescue is the responsibility of the Maritime Coastguard Agency.
- 2 The Sentry E-3D surveillance aircraft was primarily procured as an airborne early warning aircraft but has been extensively employed in the Airborne Warning and Control System (AWACS) role.
- 3 The Hercules C130J transport aircraft are used primarily to carry troops, passengers or freight.
- 4 Sea King helicopters are currently used for short-range search and rescue in both the United Kingdom and the Falkland Islands.
- 5 Type 23 frigates were originally designed for the principal task of anti-submarine warfare but also undertake embargo operations using boarding teams inserted from the ship's boats or helicopter, disaster relief work and surveillance operations. They are to be replaced by the Type 26 Global Combat Ship.
- 6 Type 45 Destroyer, Lynx Wildcat and Merlin helicopters are described in detail in the project summary sheets in Volume II.

Source: National Audit Office analysis of Departmental data

Appendix One

Methodology

The *Major Projects Report 2011* is the twenty-eighth to be produced by the Department. The Committee of Public Accounts originally requested the Report after their 9th Report, Session 1981-82, which noted the absence of any requirement for the Department to inform Parliament about the costs of its major military projects.

The Major Projects Report is not a statutory account, and we do not offer a formal audit opinion on the accuracy of the data contained within it.

Selected Method	Purpose
<p>1 Evaluation of individual projects</p> <p>We examined 25 projects (15 of which have passed the main investment decision and ten of which have not) to assess cost, time and technical performance. The Department attribute any variations in cost, time or performance to agreed factors, and compile project summary sheets on each project according to agreed guidelines. These are then validated by the NAO, but are not subject to a full audit.</p>	<p>To confirm that the project summary sheets conform to the guidance and that it has been accurately and consistently applied. We do not question forecasts or assumptions of the Department's long-term costings unless better information becomes available.</p>
<p>2 Review of key documents</p> <p>Our review included key Departmental planning documents, contracts, project plans, contractor reports, and assessments of performance by the Director of Capability and front-line commands.</p>	<p>To validate the information provided by the project teams in the project summary sheets.</p>
<p>3 Analysis of cost, time and technical performance</p> <p>Using the qualitative and quantitative data collected above, we considered whether the Department is forecasting to deliver to the budget, time and technical performance expected when the main investment decision was made.</p>	<p>To identify the greatest cost and time variances and the factors that cause them, with particular attention to trends in the Department's overall performance.</p>
<p>4 Historic trend analysis</p> <p>Review of published project summary sheets from 2000–11 covering all projects that have featured in our Reports.</p> <p>It is not possible to perform the same analysis before Major Projects Report 2000, as the basis for the reporting significantly changed in this year mainly due to the Department introducing SMART procurement and resource accounting and budgeting.²⁶</p>	<p>To identify trends in cost of the projects and highlight areas where value for money has not been achieved.</p>

²⁶ *Major Projects Report 2000*, Appendix Two for more detailed information on the changes made to reporting in 2000: www.nao.org.uk/publications/9900/major_projects_report_2000.aspx

Appendix Two

Executive project summary sheets

Post-main-gate projects **39**

Assessment phase projects **61**

A400M

The Capability

A400M is planned to provide tactical and strategic mobility to all three Services. The required capabilities include: operations from airfields and semi-prepared rough landing areas in extreme climates and all weather conditions by day and night; carrying a variety of equipment including vehicles and troops over extended ranges; air dropping paratroops and equipment; and being unloaded with the minimum of ground handling equipment. The 1998 Strategic Defence Review confirmed a requirement for an airlift capability to move large single items such as attack helicopters and some Royal Engineers' equipment and concluded that this would be met, in the latter part of the first decade of the 21st Century, by Future Transport Aircraft. The A400M was selected to meet this requirement. It will replace the remaining Hercules C-130K fleet.



Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£2m	£1m	-£1m	-
Cost of Demonstration & Manufacture Phase	£2,498m	£3,105m	+£607m	-£150m
Duration of Assessment Phase		34 months		
In-Service Date	February 2009	March 2015	+73 months	0 months

In-year Cost and Time Variation Detail

In October 2010, the Strategic Defence and Security Review confirmed A400M as one of the components of the future RAF air transport fleet. It also announced that the Hercules C-130J tactical air transport aircraft would be withdrawn from service in 2022 rather than at the previously declared Out of Service Date of 2030.

In March 2010, agreement between A400M Partner Nations and Airbus Military on re-baselining the programme set the framework for negotiations to amend the development and production contract. The negotiations, led by officials from each Partner Nation, examined all aspects of the revised programme and continued until November 2010 when the A400M Programme Board (the senior multi-national governance body of the programme) indicated that they were content with the outcome of the negotiations and recommended that the tabled

contract amendment be ratified by Partner Nations. A period of national staffing and approvals then commenced, which ended with the signature of the amended Design and Production Phase contract on 7 April 2011. As reported in the Major Projects Report 2010, the contract amendment means that the UK will receive 22 A400M, rather than the 25 expected under the original contract.

Positive achievements on the A400M development programme have included the addition of three more prototype aircraft to the flight trials fleet (making their maiden flights respectively on 8 April, 9 July and 20 December 2010). Together the trials fleet had amassed over 1404 flying hours by 27 March 2011. The A400M made its first visit to the UK, landing at its future Main Operating Base RAF Brize Norton on 16 July 2010.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Airseeker

The Capability

Project Airseeker (formerly known as Helix) seeks to sustain the UK's airborne electronic surveillance capability provided by the Nimrod R1 aircraft and associated ground elements, against an evolving and increasingly complex target set up to 2025. It will provide a rapidly deployable capability to support operations where it will be able to collect, analyse, fuse and disseminate a coherent and readily interpretable electronic surveillance picture in support of national, joint and coalition operations. This information will support targeting and combat identifications.

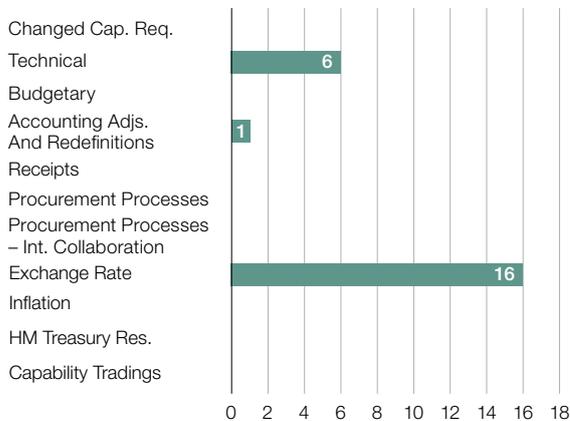


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£44m	£38m	-£6m	-
Cost of Demonstration & Manufacture Phase	£659m	£681m	+£22m	+£23m
Cost of Support Phase	£680m	£641m	-£39m	+£11m
Duration of Assessment Phase		79 months		
In-Service Date	October 2014	October 2014	0 months	0 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



A Letter of Offer and Acceptance was signed on behalf of the UK government on 19 March 2010 which included a request for the US government to prepare and submit a revision to that letter reflecting the Planning Round 2010 settlement. Their formal response was received on 28 October 2010. Investment Approvals Board approval to sign the revised offer letter was received on 24 March 2011. The revision to the offer letter has been augmented by additional information on how the US Government Program Office, known as Big Safari, intends making contractual commitments on behalf of the UK. The US Government has been implementing the initial stages of the Foreign Military Sales agreement in accordance with a plan that is consistent with the Planning Round 2010 settlement. A major milestone was achieved on 14 December 2010 when the first donor aircraft for conversion to become the first UK Rivet Joint aircraft was taken into work at the USA facility in Texas.

In September 2010, Royal Air Force Headquarters Air Command signed an agreement known as the Co-manning Memorandum of Understanding with the operational wing of the US Air Force that operates the Rivet Joint aircraft and ground systems. This agreement makes provision for UK crews to be trained by the US Air Force, funded under the Foreign Military Sales case that is managed by the Airseeker Project Team, and then allocated to operational duties by the US Air Force Rivet Joint Commander. The first of the RAF personnel started training in January 2011, with the first graduates ready for operational Rivet Joint deployments in June 2011. This conversion training and operational experience will provide the required quantity of trained manpower to meet the Initial Operating Capability whilst significantly de-risking the Training Defence Line of Development.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Astute Class Submarines

The Capability

The military requirement is for up to eight Astute Class Submersible Ship Nuclear to replace the existing Swiftsure and Trafalgar Classes of nuclear powered attack submarine. Astute Class submarines are required to perform a range of military tasks; these unique requirements are combined within the Astute design to provide global reach, endurance, covertness, sustained high speed and the ability to conduct unsupported operations in hostile environments.

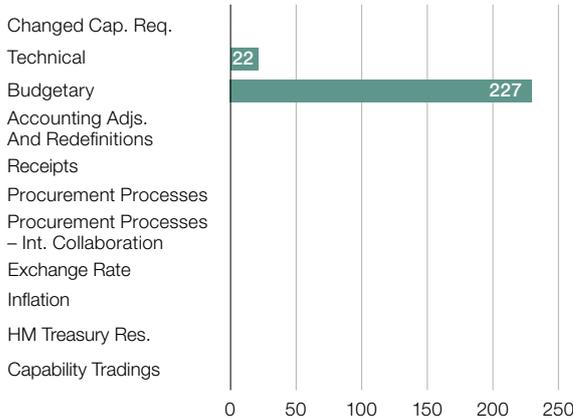


Overview of Cost, Time and Performance

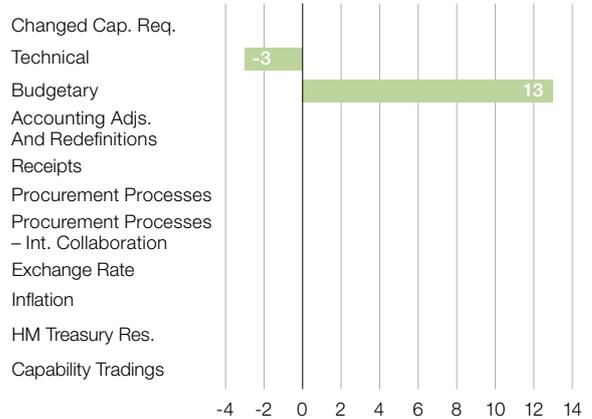
	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£33m	£29m	-£4m	
Cost of Demonstration & Manufacture Phase Boats 1-3	£2,233m	£3,480m	+£1,247m	+£179m
Cost of Demonstration & Manufacture Phase Boat 4	£1,279m	£1,404m	+£125m	+£71m
Cost of Demonstration & Manufacture Phase Boat 5	£623m	£586m	-£37m	£0m
Cost of Demonstration & Manufacture Phase Boat 6	£255m	£253m	-£2m	-£1m
Cost of Support Phase – Initial Support Solution	£315m	£272m	-£43m	£0m
Cost of Support Phase – Astute Class Training Service Boats 1-3	£151m	£648m	+£497m	+£60m
Cost of support Phase – Astute Class Training Service Boat 4	£260m	£318m	+£58m	+£51m
Duration of Assessment Phase		69 months		
In-Service Date Boats 1-3	June 2005	April 2010	+58 months	-3 months
In-Service Date Boat 4	August 2015	January 2018	+29 months	+13 months
Support Contract Go-Live – Initial Astute Support Solution	May 2007	May 2007	0 months	0 months
Support Contract Go-Live – Astute Class Training Service Boats 1-3	January 2004	March 2008	+50 months	0 months
Support Contract Go-Live – Astute Class Training Service Boat 4	December 2013	May 2015	+17 months	+35 months
Support Contract End – Initial Astute Support Solution	December 2012	December 2012	0 months	0 months
Support Contract End – Astute Class Training Service Boats 1-3	September 2026	September 2037	+132 months	0 months
Support Contract End – Astute Class Training Service Boat 4	September 2039	September 2039	0 months	0 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



Boat 1, First of Class, successfully completed first dive and initial series of dived trials during February and March 2010, and successfully completed full power trials and deep dive on 30 April 2010. Boat 1 was commissioned into the Royal Navy on 27 August 2010. On 22 October 2010, Boat 1 was involved in a grounding and collision incident whilst on sea trials. The submarine was repaired on the Faslane Ship Lift and left the facility on 24 November 2010. Boat 1 reached Contract Acceptance Stage 1 Platform Demonstration on 29 November 2010, (from which point it is managed as an In-Service Submarine under MOD rather than contractor direction) before returning to the sea in December 2010. Boat 2 reactor core load was completed in November 2010 with the submarine

named on 16 December 2010 and launched on 6 January 2011. It continues systems commissioning and prepares for Power Range Testing planned for late 2011, and sailing on sea trials is anticipated for Spring 2012. During 2007 to 2010 Boats 3 to 7 have been delayed due to Boat 1 holding on to scarce resource for longer to deal with the technical issues, and also due to the MOD slowing the programme down to realise early year savings.

In October 2010 the Strategic Defence and Security Review endorsed a revised build plan for the Astute class programme extending timeframes by an average of 14 months per boat. This is to sustain industry leading up to the Successor Deterrent Programme.

Risk Assessment against Defence Lines of Development

- Equipment ● Training ● Logistics ● Infrastructure
- Personnel ● Doctrine ● Organisation ● Information

Beyond Visual Range Air-to-Air Missile

The Capability

The Beyond Visual Range Air-to-Air Missile system will provide Typhoon with the capability to combat projected air-to-air threats and sustain air superiority throughout the life of the aircraft. The integration of Meteor onto Typhoon forms part of the project, with a current Initial Operating Capability of 2015. Key features of the Beyond Visual Range Air-to-Air Missile requirement include stealthy launch, enhanced kinematics (giving increased stand-off and disengagement ranges, a better ability to engage and destroy highly agile manoeuvring targets), a large no-escape zone and robust performance against countermeasures. This is a collaborative programme with: Germany; Spain; Italy; Sweden; and France.

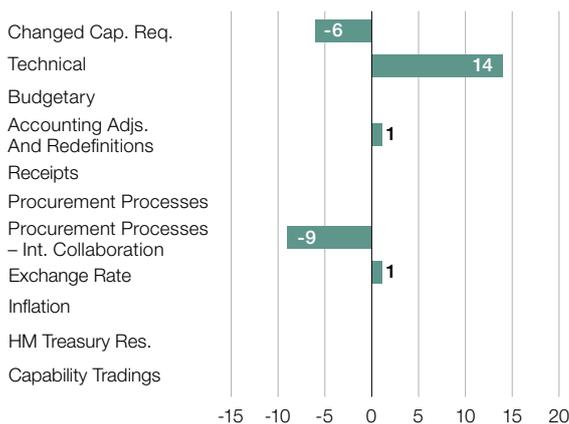


Overview of Cost, Time and Performance

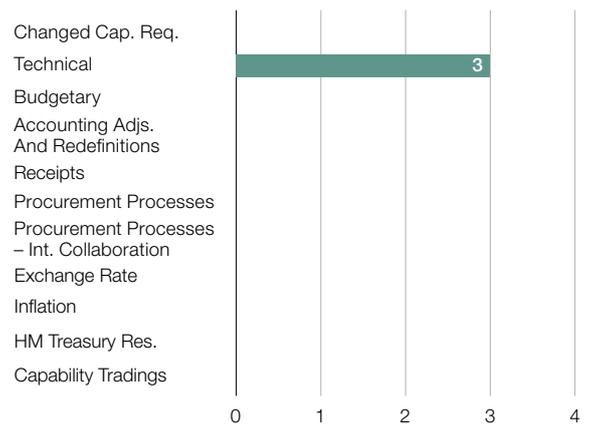
	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£14m	£20m	+£6m	-
Cost of Demonstration & Manufacture Phase	£1,136m	£1,115m	-£21m	+£1m
Cost of Support Phase	-	-	-	-
Duration of Assessment Phase		55 months		
Original In-Service Date	September 2011	August 2013	+23 months	0 months
In-Service Date 1	August 2012	November 2012	+3 months	+3 months
In-Service Date 2	July 2015	July 2015	0 months	0 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



There has been a three-month in-year slippage in Development outturn date owing to technical issues identified during pre-qualification activities, including the impact of a unilateral decision by one sub-contractor to change a component design for ease of production. This has delayed the start of the full qualification programme.

The programme of early integration work on Typhoon (CP270),

which began in July 2009, is proceeding on schedule, and has been expanded to mitigate delays in getting the main integration activity on contract. These latter delays represent a threat to the achievement of In-Service Date 2. Further mitigation actions are under review.

The industrial proposal for full integration (SRP14) first submitted by EF GmbH in 2009 was revised by industry in December 2010.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Future Strategic Tanker Aircraft

The Capability

The Future Strategic Tanker Aircraft Service will replace the air-to-air refuelling and the passenger air transport capability currently provided by the Royal Air Force's fleet of VC10 and TriStar aircraft. Air-to-air refuelling is a key military capability that significantly increases the operational range and endurance of front line aircraft across a range of defence roles and military tasks.

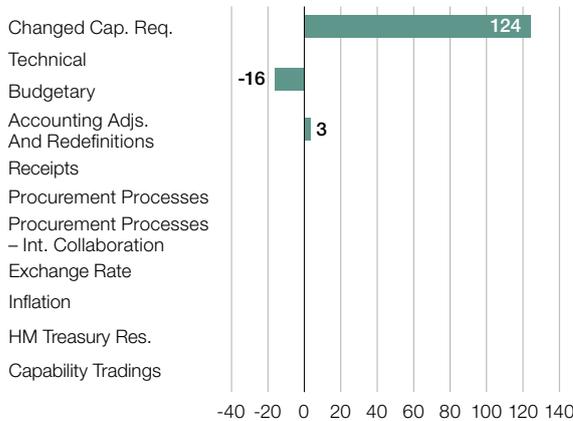


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£13m	£38m	+£25m	-
PFI Costs	£12,307m	£12,009m	-£298m	+£111m
Duration of Assessment Phase		77 months		
In-Service Date (Air-to-air refuelling)	May 2014	May 2014	-	-
Support Phase PFI Contract Go-Live	March 2008	March 2008	-	-
Support Phase PFI Contract End	March 2035	March 2035	-	-

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



Both aircraft have moved into the Certification and Qualification Programme. A significant amount of the aircraft development risk has now diminished with the issue of the Final Technical Certification for the Royal Australian Air Force A330 Multi Role Tanker Aircraft (MRTT).

The Main Operating Base will be located at RAF Brize Norton and AirTanker held an official opening on 31 March 2011. The construction of the training facility building has been completed ahead of schedule. The fit-out is progressing well with the primary activity being the installation of the wiring and equipment, furnishings and decoration.

The AirTanker Services elements of the Future Strategic Tanker Aircraft programme continue to be delivered to schedule and remain on course to satisfy their obligations for planned Introduction To Service including the achievement of their operating licences. In 2011 funding was made available to provide enhanced protection of Future Strategic Tanker Aircraft; AirTanker are currently progressing with a technical feasibility study for this enhancement.

In 2011 funding was made available to provide enhanced protection of Future Strategic Tanker Aircraft; AirTanker are currently progressing with a technical feasibility study for this enhancement.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Joint Combat Aircraft

The Capability

Joint Strike fighter was selected to meet the UK's Joint Combat Aircraft requirement for a survivable multi-role expeditionary air capability, able to operate from land and sea. Joint Strike Fighter is a 5th Generation aircraft programme comprising nine partner nations led by the US. The UK's Level 1 partner status, alongside with the United States Navy, Marine Corps and Marine Corps, has enabled significant influence throughout the System Design and Demonstration phase of the programme. The UK has an incremental Main Gate strategy and is planning to officially release an in-service date after the purchase of training aircraft, currently planned for early 2011.

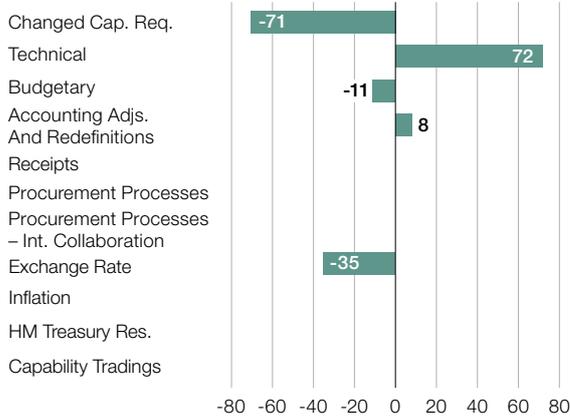


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£150m	£144m	-£6m	-
Cost of Demonstration & Manufacture Phase	£2,482m	£2,112m	-£370m	-£37m
Cost of Support Phase	-	-	-	-
Duration of Assessment Phase	-	-	-	-
In-Service Date	-	-	-	-
Support Contract Go-Live	-	-	-	-
Support Contract End	-	-	-	-

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



The 2010 Strategic Defence and Security Review confirmed the requirement for the Joint Strike Fighter as part of the future fast jet fleet. The MOD now plan to buy the Carrier Variant of Joint Strike Fighter, which offers advantages in terms of range, payload and through-life costs over the Short Take Off and Vertical Landing variant. It also offers greater interoperability with the UK's allies. Although the MOD has decided to acquire the Carrier Variant it remains supportive of the Short Take Off and Vertical Landing programme and is still committed to the purchase of this variant of aircraft as part of the UK's contribution to a joint Initial Operational Test and Evaluation programme that is being conducted in conjunction with the US military.

On the 6 January 2011 US Defense Secretary Gates announced the conclusion of the Technical Baseline Review of the Joint Strike Fighter programme.

It should be noted that whilst the overall cost of the System Development Demonstration phase of the Joint Strike Fighter programme has been increased, the UK's contribution will not change and is fixed by the Memorandum of Understanding the MOD jointly signed with the US in 2001. Increases in the forecast against current approvals reflects additional studies that now need to be conducted to fully understand the wider capabilities of the Carrier Variant and to ensure coherence with the UK's specific operational sovereignty, safety and airworthiness requirements.

As a result of the switch to the procurement of the Carrier Variant the Key Performance Measures reported against Short Take Off and Vertical Landing as "at risk" in *Major Projects Report 2010* (Range and Mission Performance) are now reported as "forecast to be met."

Risk Assessment against Defence Lines of Development

- Equipment ● Training ● Logistics ● Infrastructure
- Personnel ● Doctrine ● Organisation ● Information

Lynx Wildcat

The Capability

The Lynx Wildcat capability was developed to meet the requirements for a dedicated small helicopter for use in both the land (Battlefield Reconnaissance Helicopter requirement) and maritime (Surface Combatant Maritime Rotorcraft requirement) environments to replace the current Lynx fleet which is reaching its life end. Lynx Wildcat is a single-source, combined helicopter procurement programme with Westland Helicopters Ltd which follows More Effective Contracting principles. Project approval is for 80 aircraft, with funding for 62 held by the Integrated Project Team.

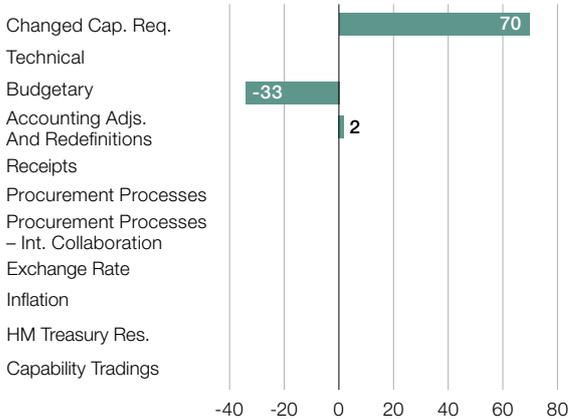


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£59m	£57m	−£2m	–
Cost of Demonstration & Manufacture Phase	£1,803m	£1,644m	−£159m	+£39m
Duration of Assessment Phase – Battlefield Reconnaissance Helicopter		54 months		
Duration of Assessment Phase – Surface Combatant Maritime Rotorcraft	–	45 months	–	–
In-Service Date – Battlefield Reconnaissance Helicopter	January 2014	January 2014	0 months	0 months
In-Service Date – Surface Combatant Maritime Rotorcraft	January 2015	January 2015	0 months	0 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



The first airframe was delivered to the Westland build line in November 2008 and a successful 'first flight' was achieved in November 2009 in accordance with the schedule contracted in June 2006. A 2010 Planning Round Option was run to address the legislative and safety requirement to fit all combat aircraft including helicopters with fuel system survivability measures. A Review Note was submitted to the Investment Approvals Board in December 2008 and approved in January 2009, detailing a new strategy to explore a single source, integrated Support Solution and Training Delivery Service through the aircraft manufacturer, AgustaWestland. Work continues towards approvals and contract let. The training capital equipment contract was let in February 2011. Due to challenges in achieving a value for money and affordable solution, the combined training and support service is now expected to proceed to the Investment Approvals Board in the 2nd quarter of 2011-12 with a contract award to support the Logistic Support Date. Logistic Support and Ready for Training dates remain unchanged and are planned for December 2011 and January 2013, respectively.

Based on the current assumptions within the Rotary Wing Strategy the quantity of Wildcat aircraft to be procured comprises 34 Battlefield Reconnaissance Helicopters with a further eight Light Assault Helicopter role variants of the Battlefield Reconnaissance Helicopter, together with 28 Surface Combatant Maritime Rotorcraft. The Light Assault Helicopter role requirement will be subject to appropriate requirement approvals. Planning Round 2011 Options introduce funding for the Light Assault Helicopter role equipment as well as de-scoping the Battlefield Reconnaissance Helicopter requirement by four aircraft, resulting in a total fleet of 66 aircraft. A further Planning Round 2011 Option was run to revise the profile of the resources available for the Wildcat project between financial year 2014-15 and financial year 2015-16.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Merlin Capability Sustainment Programme

The Capability

The Merlin Capability Sustainment Programme will update 30 Merlin Mk1 aircraft to overcome existing and forecast obsolescence within the Weapon System Avionics to ensure sustainment of the required capability until the planned Out of Service Date (2029). The converted aircraft will be known as Merlin Mk2.

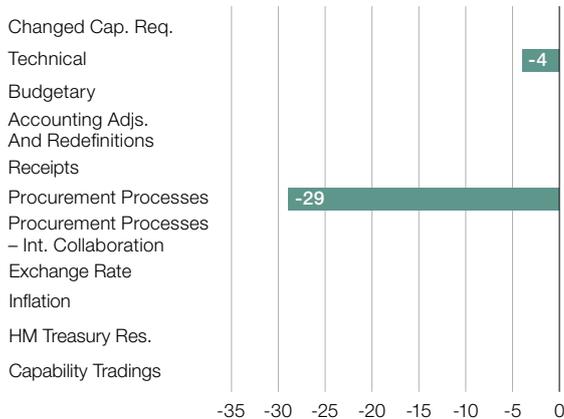


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£29m	£27m	-£2m	-
Cost of Demonstration & Manufacture Phase	£805m	£768m	-£37m	£-33m
Duration of Assessment Phase		34 months		
In-Service Date	February 2014	February 2014	0 months	0 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



Successful achievement of first flight ahead of schedule in November 2010. The first two production aircraft are in the factory at Yeovil (aircraft 5 & 6) and conversion is underway. Initial Provisioning (IP) spares have now been contracted. Programme remains on schedule.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Puma Life Extension Programme

The Capability

Puma currently provides one third of the Department's medium support helicopter fleet. The Out of Service Date for the Puma HC Mk1 Helicopter fleet is December 2012, driven by the obsolescence of components, safety issues and changed legislative requirements. The life extension programme will address these issues by the installation of a glass cockpit, modern avionics, including a digital automatic flight control system and new engines addressing obsolescence and safety issues. This will deliver a step-change in performance, particularly in hot and high environments (such as those seen in Afghanistan) and high and dusty conditions. It is also the only helicopter in our current fleet which allows Special Forces insertion/extraction in urban environments such as operations in Baghdad and potential support to the 2012 Olympics. The life extended platform will be known as the Puma HC Mk2 and sustain this capability up to 2025.

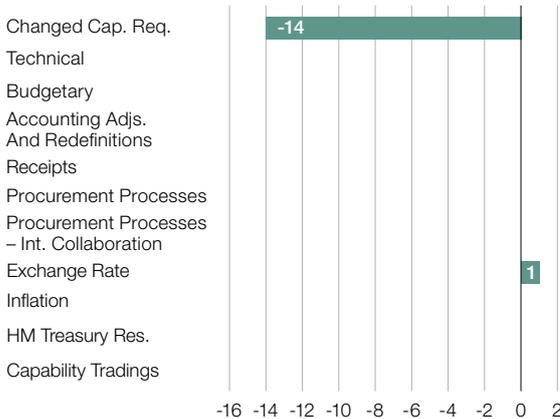


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£6m	£16m	+£10m	-
Cost of Demonstration & Manufacture Phase	£339m	£326m	-£13m	-£13m
Duration of Assessment Phase		30 months		
In-Service Date	November 2013	November 2013	0 months	0 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



The programme remains on track and within budget. The delivery of the first aircraft into the Programme to become the Trial Installation Aircraft took place on 1 October 2009. The Ground Testing 'Power On' of the Trial Installation Aircraft started on 24 September 2010. The first production aircraft, fourth into the programme, was delivered to Brasov, Romania, on 14 January 2011.

The flight clearance of the Trial Installation Aircraft will be completed by 29 April 2011 to allow the first flight of the Puma HC Mk2 to take place. This will be followed by the issue of Letter of Qualification for the Puma HC Mk2 by 30 November 2011 and delivery of the Trial Installation Aircraft to Boscombe Down is contracted for January 2012.

As part of the Department's 2011 Planning Round an Option was taken to reduce the number of aircraft within the Programme from 28 to 24.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Queen Elizabeth Class Aircraft Carriers

The Capability

The platform element of the Carrier Strike capability will be provided by the Queen Elizabeth Class aircraft carriers. A staged approval to Main-Gate in 2007 led to the formation of the Aircraft Carrier Alliance (comprising MOD and Industry) and contract award in 2008 to deliver the programme with In-Services Dates originally planned for 2014 and 2016. The continuing need for the Carrier Strike capability was confirmed in the 2010 Strategic Defence and Security Review.

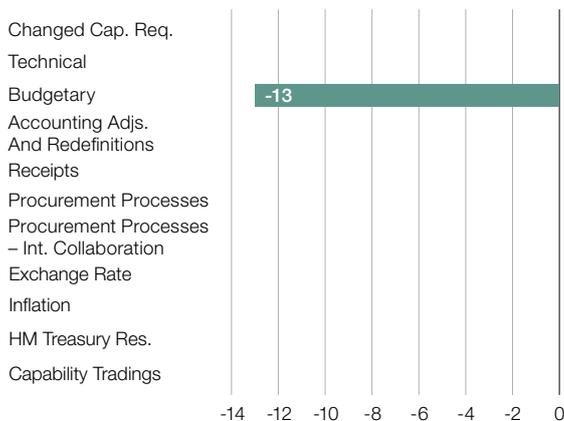


Overview of Cost, Time and Performance

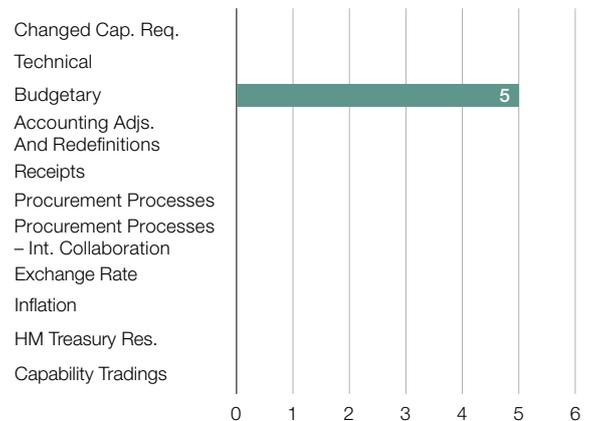
	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£120m	£288m	+£168m	–
Cost of Demonstration & Manufacture Phase	£3,541m	£5,131m	+£1,590m	-£13m
Duration of Assessment Phase		84 months		
In-Service Date	July 2015	October 2016	+15 months	+5 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



The Aircraft Carrier Alliance acknowledged that there was a requirement to reduce costs at the time of the contract award on the basis that concerted management action in the early years of the project would allow this to reduce. In the event, the disruption caused by initial re-costing activity and then the Equipment Examination prevented successful delivery of the originally planned cost reduction – as this would not be achieved, MOD considered it prudent to formally recognise this in its revised estimate.

During 2010 Diesel Generators were installed in Lower Block 2 (Portsmouth) and in March 2011 in Lower Block 04 (Govan) on HMS Queen Elizabeth. In early 2011, the Goliath Crane, which will be used to assemble the carriers, arrived at Rosyth and is now undergoing preparations for erection and commissioning in the summer.

The Investment Approvals Board approved the Queen Elizabeth Class Final Target Cost for the pre-Strategic Defence and Security Review programme on 31 January 2011 to £5,242 million, which has provided a stable cost and schedule baseline for the programme going forward. Long-lead equipments for HMS Prince of Wales have been ordered over the last four years, with many of the major components already in-build or delivered (e.g. Diesel Generators).

The Strategic Defence and Security Review concluded that the Carrier Strike capability would be based around the Carrier Variant of the Joint Strike Fighter, which would fly from an operational Queen Elizabeth Class carrier converted to a Carrier Variant configuration. It also confirmed that both carriers would be built, with one to be operational and the second kept in extended readiness or sold.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Specialist Vehicles

The Capability

Specialist Vehicles will be more fightable, survivable, lethal, and have a greater find capability than the obsolescent legacy Combat Vehicle Reconnaissance (Tracked) fleet that is overmatched by even the most likely threat. Specialist Vehicles will contribute to a combined arms capability of modern, medium-weight, strategically deployable, tracked vehicles. As part of the Department's 2011 Planning Round, the requirement for Medium Armour has been removed from the Specialist Vehicles Programme.



Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£109m	£130m	+£21m	–
Cost of Demonstration and Manufacture Phase	£1,394m	£1,394m	–	–
Duration of Assessment Phase	–	Continuous	–	–
In-Service Date	–	–	–	–

In-year Cost and Time Variation Detail

Main Gate 1 – Demonstration Recce Block 1 only: As part of the Main Gate 1 Approval, the Office of Government Commerce conducted a Gateway Review in September 2009, followed by a full Major Projects Review Group examination, which confirmed that Specialist Vehicles was in a position to proceed to its planned Demonstration phase with General Dynamics UK as the Prime contractor.

The Strategic Defence and Security Review and the Department's 2011 Planning Round removed the Medium Armour and Manoeuvre Support elements and recast the delivery profile to aspire to the emerging Army restructuring under Strategic Defence and Security Review (Five Multi-Role Brigades). Final size and shape of the Specialist Vehicles fleet will not be set until Main Gate 2.

An Information Note and a Review Note are currently planned later in 2011 in order to capture the programme changes arising from the Department's Planning Round 2011 and the Strategic Defence and Security Review.

Further Approvals: It should be noted that Specialist Vehicles does not have a single Main-Gate Approval. The size of the programme, together with previous lessons learned in other programmes, determined that an approach of two Main Gates (one for demonstration and one for manufacture) with further sub Main-Gates, used for further variants.

Risk Assessment against Defence Lines of Development

- Equipment ● Training ● Logistics ● Infrastructure
- Personnel ● Doctrine ● Organisation ● Information

Type 45 Destroyer

The Capability

The Type 45 is a new class of six Anti-Air Warfare Destroyers, to replace the capability provided by the Royal Navy's existing Type 42's. The warship is being procured nationally. The Type 45 will carry the Principal Anti-Air Missile System which is capable of protecting the vessels and ships in their company against aircraft and missiles, satisfying the Fleet's need for area air defence capability into the 2030s. The Principal Anti-Air Missile System is being procured collaboratively with France and Italy. The Destroyers Team is responsible for providing the Principal Anti-Air Missile System to the warship Prime Contractor.

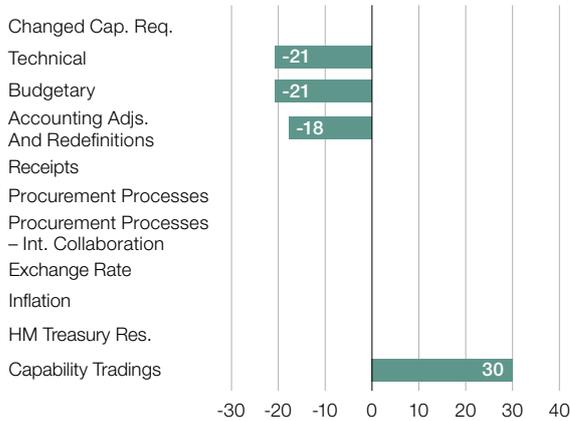


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£213m	£232m	+£19m	-
Cost of Demonstration & Manufacture Phase	£4,757m	£5,664m	+£907m	-£30
Cost of Support				
– Initial Spares	14m	14m	0	0
– Full Support	£804m	£742m	-£62m	-£58m
Duration of Assessment Phase	-	108 months	-	-
In-Service Date	May 2007	July 2010	+38 months	0 months
Support				
– Initial Spares Contract Go-Live	June 2008	June 2008	0 months	0 months
– Full Support Contract Go-Live	April 2009	September 2009	+5 months	0 months
– Initial Spares Contract End	-	-	-	-
– Full Support Contract End	November 2017		-	-

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



The past year has seen significant progress across the Type 45 programme with two ships now declared in-service. The first ship, HMS Daring was accepted into service with the Royal Navy on 31 July 2010, with the second ship, HMS Dauntless, being similarly accepted on 16 November 2010. Good progress continues to be achieved across the build programme with the third ship, HMS Diamond being accepted off contract on 22 September 2010 and the fourth ship, HMS Dragon completing her first contractor sea trials in December 2010. The final Type 45, HMS Duncan, was launched in October 2010. The Principle Anti-Air Missile System development test firing programme was successfully completed in June 2010, with a Salvo firing from the Longbow barge at a French test range in the Mediterranean. The High Seas Firing programme from Type 45 platforms commenced with a successful firing from HMS Dauntless in September 2010 at the UK Hebrides test range.

The contract for up to seven years of support for Type 45, awarded to BAE Systems Surface Ships Ltd in September 2009, has delivered the required availability to enable those ships declared in-service to achieve their programmed activities.

During the Department's 2011 Planning Round savings measures were implemented as a result of the combination of: forecast Terms Of Business Agreement savings; risk retirement following successful completion of the Sea Viper development firing programme; early In-Service Date of the first two ships and early acceptance off-contract of the third ship against their 50 per cent confidence dates. As a result of these savings, which amounted to some £34 million, the decision was taken to reverse a Cost Capability Trade made in 2006 that proposed to reduce the spend on Aster missiles by some £30 million. The overall effect of these decisions is a forecast decrease of £30 million in the overall cost of the programme.

Risk Assessment against Defence Lines of Development

- Equipment ● Training ● Logistics ● Infrastructure
- Personnel ● Doctrine ● Organisation ● Information

Typhoon

The Capability

Typhoon is an agile, multi-role combat aircraft, which is being developed, produced and supported in a collaborative project with Germany, Italy and Spain. Typhoon entered service with the RAF in 2003 and commenced operational duties in June 2007 when it assumed Quick Reaction Alert responsibility for defence of UK airspace. The air-to-air missile capability on the first tranche of aircraft has been complemented by the integration of an initial precision air-to-surface capability, which was declared combat ready by the RAF in July 2008. The Typhoon Future Capability Programme will provide enhancements to the Typhoon aircraft, both in the air-to-air and air-to-surface roles, to sustain the RAF's Typhoon fleet's multi-role capabilities.

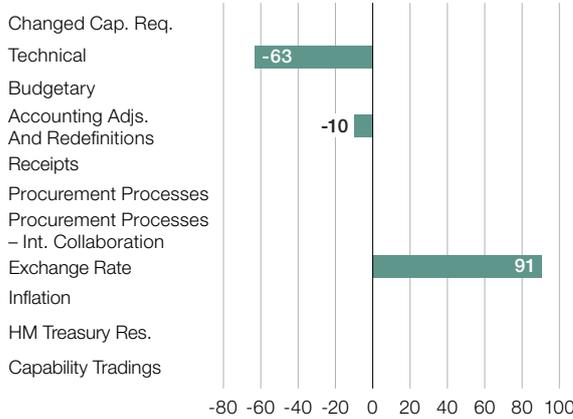


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£126m	£117m	£9m	–
Cost of Demonstration & Manufacture Phase	£15,583m	£18,159m	£2,576m	+£18m
Cost of Support Phase	£13,100m	£13,100m*	£0m	£0m
In-Service Date – Typhoon	December 1998	June 2003	+54 months	0 months
In-Service Date – Typhoon Future Capability Programme	June 2012	June 2012	0 months	0 months
Support Contract Go-Live	–	–	–	–
Support Contract End	–	–	–	–

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



Deliveries of Tranche 2 aircraft commenced in October 2008. The original Typhoon fleet numbers required (232 aircraft) were established in the 1990s. Current fleet planning and assumptions to meet defence requirements have determined the aircraft numbers and capabilities required now (160 aircraft). The UK has retained the option to order further aircraft. Deliveries of Tranche 3 aircraft are scheduled to start in 2013.

The Typhoon Availability Service contract with BAE Systems, signed in March 2009, formally commenced in September 2009. The Engine Availability Service Contract with Rolls-Royce was signed in December 2009. These contracts are part of the

strategy to transform support arrangements through partnering with UK industry.

In March 2011, Typhoon aircraft were deployed overseas for the first time on contingent operations in support of the coalition plan to enforce United Nations Resolution 1973 (Libya).

* The forecast support cost of £13,100 million includes two elements; Typhoon Project Team costs of £10,783 million which have been validated by the NAO and Air Command Costs of around £2,300 million which have not been validated by the NAO.

Risk Assessment against Defence Lines of Development

- Equipment ● Training ● Logistics ● Infrastructure
- Personnel ● Doctrine ● Organisation ● Information

United Kingdom Military Flying Training System

The Capability

The United Kingdom Military Flying Training System will deliver a coherent, flexible and integrated flying training capability catering for the needs of the Royal Navy, the Royal Air Force and the Army Air Corps. The flying training system takes aircrew from initial training through elementary, basic and advanced flying training phases to their arrival at their designated operational aircraft. The focus for United Kingdom Military Flying Training System is to achieve a holistic system based on capability and service delivery; it is not solely about the provision of aircraft platforms. It also offers an opportunity to modernise the flying training processes for all three Services, realise efficiencies and, since training is currently spread across several organisations, take advantage of potential economies of scale.

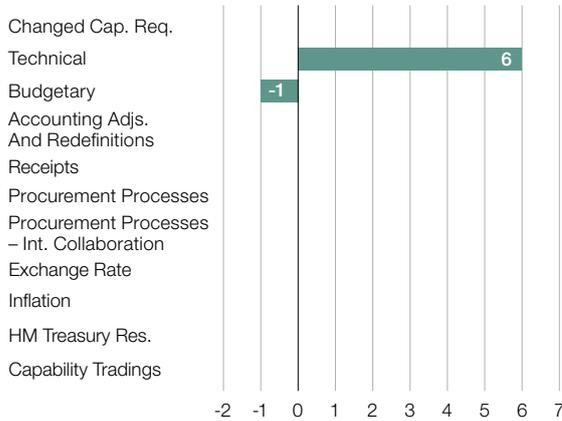


Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£116m	£111m	-£5m	-
Cost of Demonstration & Manufacture Phase – Advanced Jet Trainer	£471m	£445m	-£26m	+£2m
Cost of Demonstration & Manufacture Phase – Advanced Jet Trainer Operational Capability 2	£40m	£38m	-£2m	+£1m
Cost of Demonstration & Manufacture Phase – Rear Crew Stage 1	£73m	£73m	£0m	+£2m
Cost of PFI/Support Phase – Advanced Jet Trainer Ground Based Training Environment	£344m	£344m	£0m	£0m
Cost of PFI/Support Phase – Advanced Jet Trainer (Support)	£173m	£152m	-£21m	-£12m
Cost of PFI/Support Phase – Training System Partner and Headquarters	£307m	£293m	-£14m	-£13m
In-Service Date – Advanced Jet Trainer	May 2009	February 2010	+9 months	0 months
In-Service Date – Rear Crew Stage 1	July 2011	September 2011	+2 months	0 months
PFI/Support Contract Go-Live – Advanced Jet Trainer (Support)		July 2008	-	-
PFI/Support Contract Go-Live – Training System Partner and Headquarters	March 2008	November 2008	+8 months	0 months
PFI/Support Contract Go-Live – Advanced Jet Trainer Ground Based Training Environment Ready for Training Use 1	July 2010	January 2011	+6 months	0 months
PFI/Support Contract Go-Live – Advanced Jet Trainer Ground Based Training Environment Ready for Training Use 2	September 2010	February 2011	+5 months	0 months
PFI/Support Contract End – Advanced Jet Trainer (Support)	-	-	-	-
PFI/Support Contract End – Training System Partner and Headquarters	March 2013	November 2013	+8 months	0 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



Advanced Jet Trainer

The Advanced Jet Trainer at Operational Capability 0 was released to service in April 2009. The Operational Capability 2 upgrade (introducing in-cockpit simulations of sensors and weapons across a network of Hawk T2 aircraft) is now progressing to plan. The ground-based Mission Planning and Debriefing System has been made compatible with Operational Capability level 2 aircraft and development continues to provide full Operational Capability level 2 debriefing functionality by the end of 2011.

Advanced Jet Trainer Infrastructure and Ground-Based Training Environment

Advanced Jet Trainer Fast Jet Initial Course Capability date is on schedule for November 2011, when the first ab-initio student training course commences. The first phase to upgrade the Ground-Based Training Environment devices to Operational Capability level 2 standard has been contracted via Ascent.

The work, involving the development of a set of requirements and a technical solution for the upgrade of the devices, is due to complete in July 2012. The work will include delivery of the first engineering release of the re-targeted Operational Capability level 2 Operational Flight Programme software for use in the Ground-Based Training Environment.

Rear Crew Stage 1

Ready for Training Use 1 and Ready For Training Use 1a were achieved on 1st March 2011; all Training Service Enablers, with the exception of the KingAir 350ER Aircraft fitted with the Tactical Mission Trainer-Air, are ready for training to commence. This includes; Information and Communications Technology, Infrastructure, Ground-Based Training Environment together with Instructors and Pilots for both RAF Barkston Heath and RNAS Culdrose. This was a key milestone to the provision of the overall training system.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Watchkeeper

The Capability

Watchkeeper will provide the operational commander with a 24-hour, all weather, intelligence, surveillance, target acquisition and reconnaissance capability supplying accurate, timely and high quality imagery to support decision making. The system will consist of unmanned air vehicles, sensors, data links and ground control stations. Watchkeeper is planned to be delivered through an incremental programme to allow the system to benefit from both existing and developing sensors and air vehicle technology.

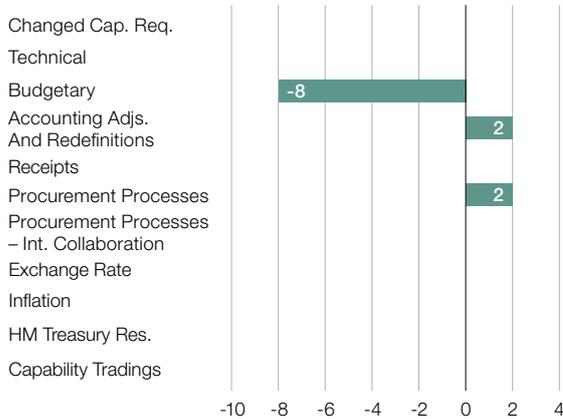


Overview of Cost, Time and Performance

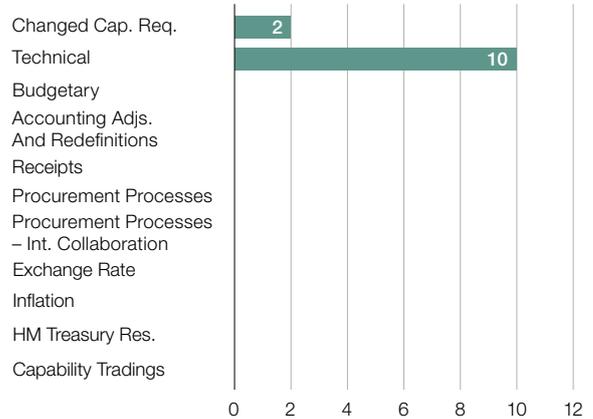
	Approved	Forecast/Actual	Variation	IY Variation
Cost of Assessment Phase	£52m	£65m	+£13m	–
Cost of Demonstration & Manufacture Phase	£847m	£839m	-£8m	-£4m
Cost of Support Phase	£55m	£53m	-£2m	+£3m
Duration of Assessment Phase		68 months		
In-Service Date	June 2010	February 2012	+20 months	+12 months
Support Contract Go-Live	January 2010	January 2010	0 months	0 months
Support Contract End	May 2013	September 2014	+16 months	+16 months

In-year Cost and Time Variation Detail

In Year Costs (£m)



In Year Time (months)



The first UK flight took place on 14 April 2010, signalling the start of the UK flight trials programme. Flight trials also continued in parallel in Israel during 2010 to reduce risk by providing additional system and software testing.

2010 started on a positive note with the Watchkeeper Initial Contractor Logistic Support contract signed in January and also saw the Watchkeeper Training solution continue to develop. In June 2010, a contract was awarded to QinetiQ, through the exploitation of the Long Term Partnering Agreement, to deliver Steady State UK training facilities, infrastructure and airspace at Boscombe Down for Watchkeeper. This contract minimises capital investment costs, maximises airfield operational flexibility as the runway at Boscombe Down already exists and is the correct length and width and is situated in the Restricted Airspace. The Facility was handed over to MOD in December 2010.

However, the challenging development programme was by now also experiencing severe technical integration issues. Thales declared that it was unable to meet the main equipment delivery Anchor Milestone of June 2010 (50 per cent date), and forecast a revised delivery schedule reflected in the current delivery dates. Contract negotiations to account for the technical issues and optimise delivery of the system for deployment to Afghanistan have now concluded. The MOD has reached a settlement to remedy the situation and mitigate risk to operations at no further cost. An Information Note informed the Investment Approvals Board of the situation in October 2010. A Review Note was subsequently submitted to the Investment Approvals Board in March 2011 to endorse the accepted position and to approve the revised project schedule, which “reset” the In-Service Date.

Risk Assessment against Defence Lines of Development

- Equipment
- Training
- Logistics
- Infrastructure
- Personnel
- Doctrine
- Organisation
- Information

Chinook New Buy

The Capability

The UK currently has a fleet of 46 Chinook, delivered between 1981 and 2001. The new Rotary Wing Strategy, announced by the Secretary of State in December 2009, established that the Future Heavy Lift capability would be provided by the Chinook helicopter. The Rotary Wing Strategy set out the intention to buy an additional 22 new Chinook, in addition to the replacement for the two aircraft destroyed on operations in Afghanistan in August 2009 (for which approval will be sought through the HM Treasury Reserve), that would take the Chinook fleet up to 70 Aircraft.



Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase	£67m	£97m	+£30m	–

The Assessment Phase

In March 2010 Initial Gate approval for the Chinook New Buy project was granted to conduct an Assessment Phase at a total cost of £67 million. This funding approval assumed that a Main Gate Business Case would be presented in December 2010, and that a Demonstration and Manufacture contract would be placed shortly thereafter.

In April 2010 the Investment Approvals Board endorsed a Review Note to down-select to a preferred configuration for the new Chinooks. The configuration selected was the CH-47F equipped with a development of the Thales JULIUS cockpit and a digital automatic flight control system and current UK Chinook Theatre Entry Standard modifications.

The Strategic Defence and Security Review reduced the requirement to 14 aircraft (12 + 2 attrition) reflecting reprioritisation of resources. In April 2011 the Department's latest financial plan captured the Defence Board's direction to pursue a 14 Chinook aircraft programme that would see the first flight in quarter one of 2013 and all aircraft delivered by end of 2015. HM Treasury approved an Investment Approvals Board uplift to the Assessment Phase of £23.4 million in April 2011 as the Main-Gate investment decision is on hold, pending a review of affordability within the defence programme.

Cipher

The Capability

Cipher will provide protection for all of MOD's sensitive information and communications both at home and overseas. The project encapsulates work to renew the MOD cryptographic inventory and key management systems. Cipher will replace a number of current systems, in particular the General Key Management System.

There are three business drivers for Cipher. The first is to overcome the obsolescence of existing equipment and key management systems. The second is to enable network agility and interoperability with our Allies. The final driver is to improve security and efficiency in the delivery of cryptographic services.

Cipher will be delivered in three increments. Increment 1 provides an Enduring Operational Capability, Increment 2 replaces all legacy services and Increment 3 provides the additional services required to satisfy new requirements.



Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase	£19m	***	***	***

The Assessment Phase

Cipher is a combination of two earlier MOD projects, the Future Crypto Programme (delivering the hardware) and Interoperable Electronic Key Distribution (the complementary system to deliver keying material, and other supporting configuration and management data).

Following Initial Gate approval, two consortia were down-selected and awarded Assessment Phase contracts in November 2008 to evaluate potential options, develop solutions, undertake demonstration programmes and deliver costed delivery phase proposals.

Recognising the importance of Cipher and its potential use across Government, the Government Communication Headquarters has engaged proactively, providing guidance on

standards to ensure that the resulting solutions and services can be readily adopted by other government departments and partners across Government and be interoperable with our Allies.

A Review took place in February 2011. The outcome was to proceed, but with caveats noting that all outstanding actions from the Performance Delivery Improvement Treatment Phase have been rolled up into the recommendations of this review. Additional funding required for the delivery of the extended Assessment Phase has been identified, and sufficient staff levels have been agreed.

Indirect Fire Precision Attack

The Capability

Indirect Fire Precision Attack will provide, by incremental acquisition, a suite of munitions for indirect precision attack of static, mobile, and manoeuvring targets, extending to ranges in excess of 150 kilometres. The capability required under Indirect Fire Precision Attack will be delivered through a structured programme of Assessment, Demonstration and Manufacturing phases. The first Assessment Phase indicated that the Indirect Fire Precision Attack capability is likely to be achieved by a mixture of guided rockets, enhanced artillery shells and Loitering Munitions. They will carry a variety of payloads. Indirect Fire Precision Attack munitions will make use of a number of in-service platforms such as the Multiple Launch Rocket System and the AS90 self-propelled howitzer. The mix of munitions procured under the programme will have a range of In-Service Dates: this multi-solution approach is being managed through an incremental procurement strategy.



Summary of Project Progress

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase	£170m	£137m	-£33m	-

The Assessment Phase

Date	Milestone
May 2001	Initial Gate Approval.
May 2002	Assessment Phase Contract Award.
September 2007	Increment 1 – Ballistic Sensor Fuzed Munition- Contract Placement for Demonstration & Manufacture achieved following international competition.
June 2008	Increment 2 – Loitering Munitions Approval.
February 2010	Increment 1 – Ballistic Sensor Fuzed Munition – contract terminated (cancellation approved December 2009).
March 2010	Increment 2 – Loitering Munitions – Demonstration and Manufacture phase approved.

The Demonstration & Manufacture phase for the Loitering Munitions was approved by the Investment Approvals Board in March 2010 as part of the Complex Weapons Interim Main Gate 1 submission. Guided Multiple Launch Rocket System has a proposed first delivery date of June 2018. Guided Shell has had its funding deleted in Planning Round 2011; however, the planned capability requirement remains. The Large Long Range Rocket capability was deleted in Planning Round 2011.

Marshall

The Capability

The Joint Military Air Traffic Services, now known as Marshall project, seeks to sustain the provision of Air Traffic Management at MOD Airfields and Air Weapons Ranges through the provision of new capability to meet new regulatory airspace management requirements set by the Civil Aviation Authority, addressing equipment obsolescence in the air traffic inventory and through the more efficient delivery of support services. The project will provide air traffic services to military and civilian aircraft arriving at, departing from and operating within the immediate vicinity or confines of, MOD aerodromes (United Kingdom, overseas permanent and deployed) and at air weapons ranges.



Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase 1	£3m	£3m	–	–
Assessment Phase 2	£6m	£6m	–	–

The Assessment Phase

A Review Note Industry Engagement was issued in December 2009 seeking approval to initiate formal industry engagement and release of an additional £6 million to provide specialist technical support and external assistance to the competitive dialogue process. Although approval for Part 2 of the Assessment Phase was given on 22 February 2010, it was caveated with a requirement for further work to be undertaken to demonstrate commercial maturity before the contract notice, (launching the formal procurement process) could be

published. This work was largely completed by late 2010, and a second Review Note was approved in February 2011. This too was caveated with the need to gain Treasury approval of key project documents, before the contract notice could be published. This final approval was received on 25 March 2011. In addition, the change of government introduced a 'freeze' on consultancy expenditure. Although the case to re-engage consultants on the project was approved in August 2010, formal approval by the Efficiency Reform Group was not achieved until 23 February 2011.

Military Afloat Reach and Sustainability

The Capability

The Military Afloat Reach and Sustainability programme will provide afloat logistic support to UK and allied maritime task groups at sea and their amphibious components operating ashore. Although not strictly a one-for-one replacement programme, new vessels will incrementally replace much of the existing Royal Fleet Auxiliary flotilla, as ships enter and leave service, respectively.



Summary of Project Progress

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase	£44m	***	***	***

The Assessment Phase

Date	Milestone
May 2008	4 bidders selected for Fleet Tanker competition: Navantia of Spain, Fincantieri of Italy, a BVT lead consortium with BMT and DSME (of Korea), and HHI of Korea.
December 2008	Department's Equipment Examination announcement states that there is scope for considering alternative approaches to procurement of the Fleet Tanker. Competition put on hold pending review.
March 2009	Competition for Fleet Tanker formally closed.
October 2009	Advert placed in Official Journal of the European Union for up to six Tankers.
March – September 2010	Competitive Dialogue Process Stage 1 – Invitation to Submit Outline Solutions.
October 2010	Competitive Dialogue Process Stage 1 – Invitation to Submit Detailed Solutions commenced.

Following Ministerial approval a new competition was launched in October 2009. Following assessment of initial Pre-Qualification Questionnaires six companies were invited to proceed to the next stage of the competition which is being conducted over three stages using Competitive Dialogue process. Stage 1 – Invitation to Submit Outline Solutions took place over March to September 2010. Stage 2 – Invitation to Submit Detailed Solutions commenced in October 2010 and is expected to continue through to Invitation to Submit Final Bids. There are currently five companies included in the process

following the withdrawal from the competition in 2010 of one company, Flensburger Schiffbau-Gesellschaft (Germany); the five bidders are: A&P Group Limited (UK), Daewoo Shipbuilding and Marine Engineering (Republic of Korea), Fincantieri (Italy), Hyundai Heavy Industries (Republic of Korea) and Knutsen OAS(UK) Limited.

Since the 31 March two of these companies, Knutsen OAS Ltd in June 2011 and A&P Group Ltd in August 2011 have withdrawn, meaning that the competition is now reduced from five to three bidders. This will be examined in MPR 2012.

Operational Utility Vehicle System

The Capability



The requirement for Operational Utility Vehicle System was reviewed in 2007 by the Army, as lead user, when the need for vehicles with enhanced protection, capacity and mobility was identified. The Single Statement of User Need stated that 'Operational Utility Vehicle System would provide a robust, easily supported system, comprising operational utility vehicles that are able to carry light cargo (up to 6T) or small groups of personnel, integrate as many special-to role systems as possible and which can operate in diverse climatic and topographical conditions worldwide, in order to support and contribute to land (including land air) and littoral manoeuvre operations'. This capability would be a key supporting enabler for offensive combat operations providing the following roles: unit level logistic cargo vehicle; systems carrier; mobile command; liaison; and personnel transport.

Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase	£13m	£5m	-£8m	-

The Assessment Phase

The Operational Utility Vehicle System programme was deferred for two years as part of the Departments 2010 financial planning round with the previous assumption to restart the project during the Financial Year 2011-12.

The Operational Utility Vehicle System project has been removed from the programme during 2011. A Review Note has been prepared to reflect this, which states that the requirement will be re-scoped, and the outcome of this work will form the basis for the Multi Role Vehicle – Protected Programme. It is currently planned for Multi Role Vehicle – Protected to commence concept stage during Financial Year 2015-16. Multi Role Vehicle-Protected will have its own Initial Gate and Main-Gate Approvals.

Search and Rescue Helicopter

The Capability

Search and Rescue – Helicopter is a joint MOD and Maritime & Coastguard Agency (an Agency of the Department for Transport) programme. It seeks to replace the current Search and Rescue capability, provided around the UK by the Royal Navy and the Royal Air Force, using Sea King Helicopters, and through the Maritime & Coastguard Agency service contract.



Summary of Project Progress

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase	£11.2m	£7.2m	-£4.0m	-

The Assessment Phase

Date	Milestone
Assessment Phase 1	
May 2003	Initial Gate Approval.
Assessment Phase 1	
August 2005	Second Initial Gate Approval.
May 2006	PFI Competition launched.
November 2006	4 consortia down-selected.
February 2007	Competitive Dialogue Starts.
January 2008	1st Round Costed Bids.
September 2008	Withdrawal of UK Air Rescue consortia leaving two remaining bidders.
November 2008	2nd Round Costed Bids.
January 2010	Assessment Phase concluded.
February 2010	Preferred Bidder (Soteria consortium) announced.
February 2011	Irregularities identified in the bid making proceeding with the preferred bid or current procurement process inappropriate.

Main-Gate approval was achieved in February 2010. The project was suspended in June 2010, as part of a review of all spending decisions taken since January 2010 and the review concluded with Treasury agreement in December 2010 that the project should continue on the basis of the proposed solution. In December 2010, just prior to the planned public announcement of the continuation, the Soteria Consortium informed the MOD of a possible issue in connection with its bid, and in February 2011 the two Departments announced that irregularities had

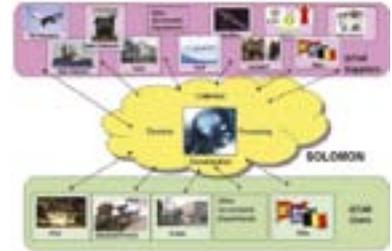
been identified such that it would not be appropriate to proceed with the preferred bid, or the current procurement process. The two Departments are currently considering potential procurement options to meet future requirements for search and rescue helicopters in the United Kingdom, including options to maintain continuity of search and rescue helicopter cover until new longer-term arrangements can be put in place. Costs incurred since Main-Gate total £1.1 million and relate to accrued expenditure for legal, financial and technical advice.

Solomon

The Capability

The Solomon Programme will significantly improve the efficiency, effectiveness, quality and timeliness of intelligence delivered to a commander, primarily by making better use of legacy systems but also through the introduction of new capability across all the Defence Lines of Development. It consists of a number of projects delivering capability across a number of overlapping phases.

Solomon was previously known as Dabinett until March 2010.



Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Continuous Assessment Phase	£8m	£7m	−£1m	–
Phase 1 Assessment Phase	£4m	£3m	−£1m	–

Solomon is currently planned to deliver over a number of phases:

Phase 1: The Intelligence, Surveillance, Target Acquisition and Reconnaissance Information Integration & Management project is the only project in Phase 1 of the Programme. It passed Initial Gate in April 2009. In February 2010 two competitive Assessment Phase contracts were placed, with preferred bidder selection expected in late 2010. The Main-Gate planned for December 2010 has been re-scheduled for May 2011.

Phase 2 onwards: During 2010-11 Defence Intelligence provided a Single Intelligence Environment requirements definition paper which aligned the provision of capability to the desired MOD military requirement in 2015 and 2020. The Strategic Defence and Security Review took these changes forward which revised the funding profile.

The Assessment Phase

Date	Milestone
March 2008	Programme Initial Gate Approval
April 2009	1st Project Initial Gate Approval

The programme is in a continuous Assessment Phase that will initiate a number of projects, with their own lifecycles, over a series of phases to deliver the full capability identified for Solomon. The 1st Phase is forecast to meet Main-Gate in May 2011.

An option to reduce funding on Direct Process and Disseminate Projects in years one to ten has been taken. A further option to defer £25 million from year 5 to 6 has also been taken. The current forecast for Solomon aligns to the outcome of these options.

Type 26 Global Combat Ship

The Capability

The Type 26 Global Combat Ship will replace the 13 Type 23 surface combatant capability before the safe operating standard for legacy ships is withdrawn and the Type 23 platforms become obsolete. This decision came out of the Strategic Defence and Security Review.

The Type 26 Global Combat Ship is a globally deployable and sustainable warship that will form the spine of the Royal Navy's future fleet. It is a task group enabled Anti-Submarine Warfare warship and will combine the capabilities necessary to protect maritime task groups, the strategic deterrent and land forces, with the flexibility to conduct a wide range of other tasks. The Type 26 Global Combat Ship retains the combat power that had been provisioned for the Type 26 C1 originally, whilst enhancing endurance and intelligence gathering attributes.



Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase	£158m	£156m	-£2m	–

The Assessment Phase

The result of the Strategic Defence and Security Review was a change to a Global Combat Ship design that is smaller, less capable and more exportable whilst still maintaining the needs of industrial sustainability. The Strategic Defence and Security Review reduced the total surface fleet to 19 frigates and destroyers which will include six Type 45 destroyers and the current Type 23 frigates which will be replaced by Type 26 frigates after 2020.

The alignment of renamed Type 26 Global Combat Ship against the goals of the Strategic Defence and Security Review has been confirmed in an Information Note submitted to the Investment Approval Board in January 2011. This Information Note stated that:

- a Approval will be split into two parts. Approval (Main-Gate 1) will be sought in late 2011 of the requirements to be delivered by Global Combat Ship, with Main-Gate 2, the main investment decision at Quarter 3 2013. This will allow detailed costing and design work to proceed against a defined requirement so that the project will be ready for approval at Main-Gate 2 and subsequent contact signing.

- b The remaining programme key milestones remain unchanged, with planned service entry in 2021.
- c Global Combat Ship is considered to be a highly exportable surface combatant with considerable effort being expended to encourage overseas partner interest.

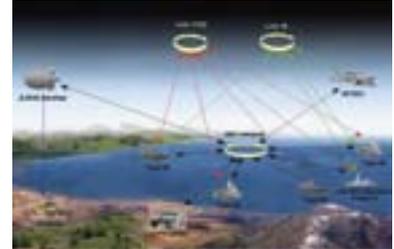
In order to maximise Type 26 Global Combat Ship export potential to realise wider benefits to the MOD, industry and the UK, engagement has begun with several countries to determine their requirements and how these can be matched with Type 26 Global Combat Ship. This design is being developed in close partnership with industry to improve the opportunities for these requirements to be realised in the design.

United Kingdom Co-operative Engagement Capability Frigate and Destroyers Programme

The Capability

The Co-operative Engagement Capability is a United States Naval System fitted to an increasing number of United States assets including ships, aircraft, and Army and Marine Corps land systems. It optimises war-fighting capabilities inherent in existing and future combat systems.

UK Co-operative Engagement Capability is a UK Network-Enabled Capability project which provides an advanced air and missile defence capability by sharing and fusing engagement quality data from suitably equipped platforms to deliver a single, coherent, stable air picture. It will fill the capability gap originally identified in Commander-in-Chief Fleet's Military Capability reports and re-affirmed in the Above Water Effects capability audit in 2007, updated in 2009, to detect, monitor, and counter air-warfare threats. It will also reduce a gap in interoperability with the United States.



Overview of Cost, Time and Performance

	Approved	Forecast/Actual	Variation	IY Variation
Assessment Phase	£25m	£53m	+£28m	–

The Assessment Phase

The objective of the Assessment Phase is to establish the most cost-effective solution to the requirement for a Co-operative Engagement Capability for maritime platforms. It is a proven programme which the UK is considering purchasing via the Foreign Military Sales process. The UK, with United States assistance, is developing and testing the platform architecture and support and integration aspects, to reduce risk prior to Main-Gate.

A contract was placed with BVT Surface Fleet (now BAE Systems Surface Ships Ltd) in January 2009, amended in 2010, to complete the design and installation aspects of Assessment Phase 3. Activity during 2010 and up to 31 March 2011 has focused on de-risking equipment interfaces, developing programme and technical project plans, updating the Operational Analysis, and drafting a Statement of Work to deliver the next phase following the main investment decision.

The Planning Round 2011 has changed the platform fit from Type 23 Frigates to Type 26 Global Combat Ships.

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