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NATIONAL AUDIT OFFICE

Report by the
Comptroller and Auditor General

Ministry of Defence

Major Projects Report 1999

HC 613 Session 1999-2000
6 July 2000

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John Bourn
Comptroller and Auditor General

National Audit Office
27 June 2000

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Part 1: Introduction

1.1 The Major Projects Report is produced and submitted to Parliament annually by the Ministry of Defence (the Department). It reports the progress at 31 March of the reporting year of the 25 largest defence equipment procurement projects against the costs and in-service dates estimated when the projects were first approved. To the extent that projects have featured in previous Reports, comparisons will already have been reported in previous Reports. This year's Report covers the period up to the start of the major changes in organisation and procedures being implemented by the Department and generally described as Smart Procurement. This Part of our report sets the 1999 Major Projects Report in context and explains:

- the scope of the Department's Report including how projects are selected for inclusion in the Report and how the Report is compiled (paragraphs 1.2 to 1.4);
- the acquisition process against which the projects covered by the 1999 Report have been procured and how this is changing; (paragraphs 1.5 to 1.12); and
- how we have analysed the Department's performance in managing major equipment projects (paragraph 1.13).

The scope of the Major Projects Report

The projects in the Major Projects Report are selected on the basis of forecast future expenditure

1.2 Projects qualify for the Major Projects Report if their forecast expenditure at 31 March each year is among the 25 highest and at least £10 million has already been spent. Projects are replaced in the Report when, as they progress through the procurement cycle, estimated future expenditure reduces below the level of the top 25. Depending on their value relative to others, projects will normally appear in the Major Projects Report for several years and the Report population is therefore made up of projects at various stages of maturity in the procurement process. Figure 1 (overleaf) shows the population of the 1999 Major Projects Report. Three of the 25 projects – the Future Offensive Air System, Successor Identification Friend or Foe and Tactical Reconnaissance Armoured Combat Equipment

Requirement - are new to the 1999 Report, replacing the Tornado GR1 Mid-Life Update, the Advanced Short-Range Air-to-Air Missile and the Seawolf Mid-Life Update. Further details of these projects are provided in Figure 2.

Figure 1

The projects in the 1999 Major Projects Report

At 31 March 1999, the projects in the Major Projects Report were at various stages of the procurement process (known then as the Downey Cycle).

Project	Year entered report	Approved Expenditure (£m)	Expenditure to date (£m)	Procurement stage reached			
				Feasibility Study	Project Definition	Full Development[1]	Production[1]
MERLIN HM MK1 Maritime helicopter	1993	3,867	3,805			●	●
EUROFIGHTER	1993	13,356	3,797			●	●
CHALLENGER 2 Main Battle Tank	1993	2,313	1,960				●
SPEARFISH Heavyweight Torpedo	1993	1,628	1,416				●
Swiftsure and Trafalgar Class Nuclear Submarine Update	1993	672	383			●	●
BOWMAN – Armed Forces Tactical Communication System	1993	321	185		●		
Common New Generation Frigate	1993	201	141		●		
Medium Range TRIGAT	1993	127	102			●	
Landing Platform Dock (Replacement)	1994	619	223			●	●
HERCULES C-130J	1995	COM	473			●	●
ASTUTE Class Submarine	1995	2,083	138			●	●
SKYNET 5 – UK Military Satellite Communications System	1995	116	30		●		
MERLIN HM MK 3 Medium Support Helicopter	1996	773	281			●	●
Attack Helicopter WAH-64 APACHE	1997	2,835	901			●	●
Nimrod MRA (Maritime Reconnaissance and Attack Aircraft Mark 4)[2]	1997	2,409	326			●	
SONAR 2087	1997	52	45		●		
Air-launched Anti-Armour Weapon	1998	799	117			●	
Conventionally Armed Stand-Off Missile	1998	877	114			●	
Future Carrier Borne Aircraft	1998	155	101	●			
STING RAY Torpedo Life Extension	1998	114	39			●	●
Airborne STand-Off Radar	1998	13	14		●		
Beyond Visual Range Air-to-Air Missile	1998	14	20		●		
Future Offensive Air System[3]	1999	38	22	●			
Successor Identification Friend or Foe[3]	1999	113	21		●		
Tactical Reconnaissance Armoured Combat Equipment Requirement[3]	1999	124	18		●		

Notes:
1. On many projects there will be overlap between Full Development and Production or contracts will be combined deals including development and production work.
2. Nimrod MRA 4 was called Replacement Maritime Patrol Aircraft (RMPA) prior to the 1999 Major Projects Report.
3. Projects new to the 1999 Report.

Source: National Audit Office

Project changes in the 1999 Major Projects Report

Figure 2

Projects in	Description
Future Offensive Air System (FOAS)	A long-range offensive air capability to replace that currently provided by the Tornado GR fleet. A range of options including manned aircraft, unmanned aerial vehicles and conventional air launched cruise missiles are being investigated.
Successor Identification Friend or Foe (SIFF)	A NATO-compatible, secure identification friend or foe system allowing rapid and accurate identification of friendly forces.
Tactical Reconnaissance Armoured Combat Equipment Requirement (TRACER)	A manned, armoured reconnaissance vehicle, which is one of the options under consideration to meet the information, surveillance, target acquisition and reconnaissance (ISTAR) requirement.
Projects out	**Description**
Advanced Short-Range Air-to-Air Missile (ASRAAM)	An air-to-air missile to be carried on the Eurofighter aircraft, the Harrier GR7, the Tornado F3 and the Sea Harrier (in the 1998 Major Projects Report approved expenditure was £924 million and expenditure to date was £499 million).
Sea Wolf Mid-life Update	Upgrade to maintain the performance of the current system against the evolving Anti-Surface Ship Missile threat (in the 1998 Major Projects Report approved expenditure was £19 million and expenditure to date was £13 million with significant further expenditure in clear prospect).
Tornado Mid-life Update	Upgrade to enhance the all-weather capability of Tornado aircraft and to reduce its vulnerability to counter-attack (in the 1998 Major Projects Report approved expenditure was £601 million and expenditure to date was £562 million).

Source: National Audit Office

The Major Projects Report is made up of 25 summary sheets, one for each project

1.3 The Major Projects Report takes the form of 25 summary sheets, one for each project. Each summary sheet includes a short description of the project and gives key information on the extent of cost variations and in-service date slippage and what has caused them. The Department compiles this information according to guidelines agreed with us. We validate the data in the project summary sheets for accuracy and consistency with the guidelines. Until the 1997 Major Projects Report, we validated a sample of around half the project summary sheets.

However, in response to concerns expressed by the Committee of Public Accounts over the incidence of errors we found in the sample validated for the 1997 Report, in 1998 and 1999 we have validated all 25 summary sheets.

1.4 The outcome of the 1999 validation exercise is summarised in Appendix 1 and copies of the summary sheets making up the 1999 Major Projects Report are reproduced at Appendix 2. A glossary containing a brief description of each of the 25 projects in the 1999 Report is at Appendix 3, and the specialist procurement and contractual terms which we have used in our report are explained in Appendix 4.

The acquisition process for projects in the 1999 Report

The Department is radically changing the procurement process with the aim of acquiring equipments 'faster, cheaper and better'

1.5 The Strategic Defence Review defined one of the Department's objectives as being '*to procure equipment which most cost effectively meets agreed military requirements'*. To achieve this objective both the organisation of the Department and the procurement process are being radically changed with the intention being to undertake faster, cheaper and better procurement. These changes are being brigaded under the Smart Procurement banner and are intended to address the time and cost overruns on defence equipment projects that have been highlighted in successive Major Projects Reports. The 1999 Major Projects Report presents the position at 31 March 1999 and reports the performance of projects against the procurement process that was then in place, before the full implementation of the Smart Procurement reforms. The following paragraphs explain this procurement process and highlight how it will change under Smart Procurement.

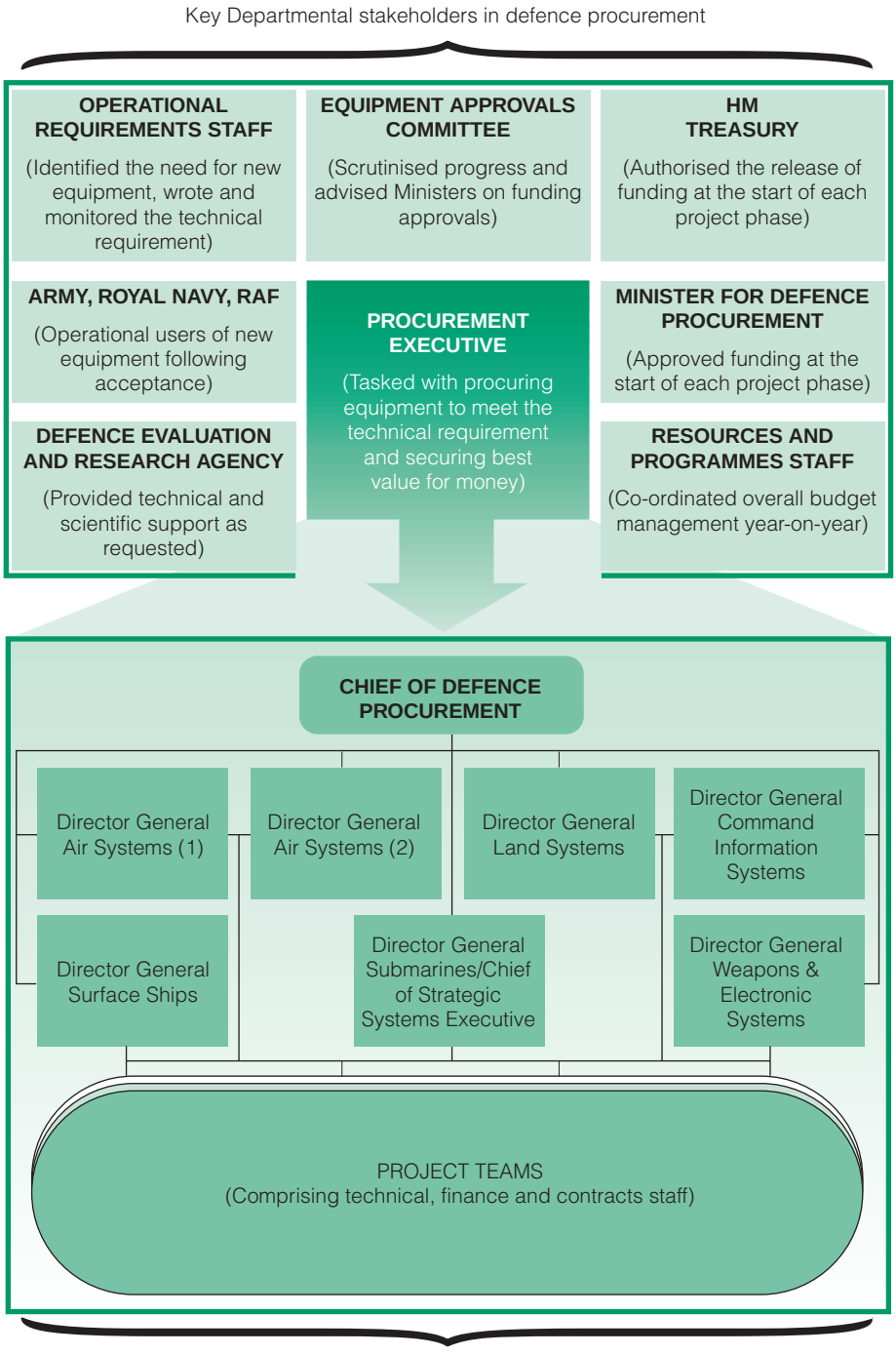
The organisation underpinning defence equipment acquisition has changed radically

1.6 Figure 3 shows the main stakeholders in the process for procuring the equipments covered by the 1999 Major Projects Report. In overview, Operational Requirements staff (mostly military personnel) identified the need for new equipment and, following feasibility work, this was translated into a formal requirement, known as the Staff Requirement, which served as a baseline for the remainder of the procurement cycle. Ministers and the Treasury approved funding for each stage of the project, and the Department's Resources and Programmes staff controlled annual cash allocations. The Procurement Executive, headed by the Chief of Defence Procurement, was responsible for the acquisition of the

equipment and was organised into project teams including specialist contracts and finance staff, engineers and other technical experts. The Defence Evaluation & Research Agency provided scientific and engineering support to the Procurement Executive teams.

Figure 3

The relationships between stakeholders in the acquisition process being superseded by Smart Procurement



The organisational structure of the Procurement Executive

Source: National Audit Office

1.7 Figure 4 shows the major organisational changes which are taking place under Smart Procurement immediately following 31 March 1999, the datum date of the Major Projects Report. In particular, it highlights the creation of the Defence Procurement Agency, which replaced the Procurement Executive from 1 April 1999, with a clear customer-supplier relationship between the Agency and the Central Customer (Deputy Chief of Defence Staff (Equipment Capability)) and the creation of a tri-Service Defence Logistics Organisation headed by the Chief of Defence Logistics.

1.8 A key element of Smart Procurement is the creation of Integrated Project Teams responsible for the through-life management of an equipment. The Department is creating some 139 Integrated Project Teams across the Defence Procurement Agency and the Defence Logistics Organisation, and 133 had been established by April 2000. The teams will bring together different functions at appropriate points in the project including requirements, procurement, contracts, finance and logistics staff within the Department together with representatives from industry. The relationship between the Integrated Project Team and the Central Customer will be governed by a Customer Supplier Agreement. This agreement will specify the outputs required from the team for each project phase and will include the cost, performance and time parameters within which the team has authority to make trade-offs in managing the project.

There will be fewer approval points in the revised acquisition process

1.9 The basic acquisition process used by the Procurement Executive to manage the major projects examined in this report was known as the Downey Cycle. The Downey Cycle aimed to minimise financial and technical risk by breaking projects into a number of stages as shown in Figure 5 (overleaf). Not all of the projects examined in this report passed through all the stages of the Downey Cycle. For example, 'off-the-shelf' purchases, such as the Hercules C-130J transport aircraft, and mid-life updates, such as the Swiftsure and Trafalgar Class nuclear submarine update, bypassed the early Feasibility Study and Project Definition risk reduction phases. Similarly, the Full Development and Production phases may have been combined for projects where technical risk was assessed as low or the quantity to be purchased was small, as for the Astute Class submarines.

Figure 4

The organisation of the Defence Procurement Agency and its relationship with the main Departmental stakeholders in defence procurement

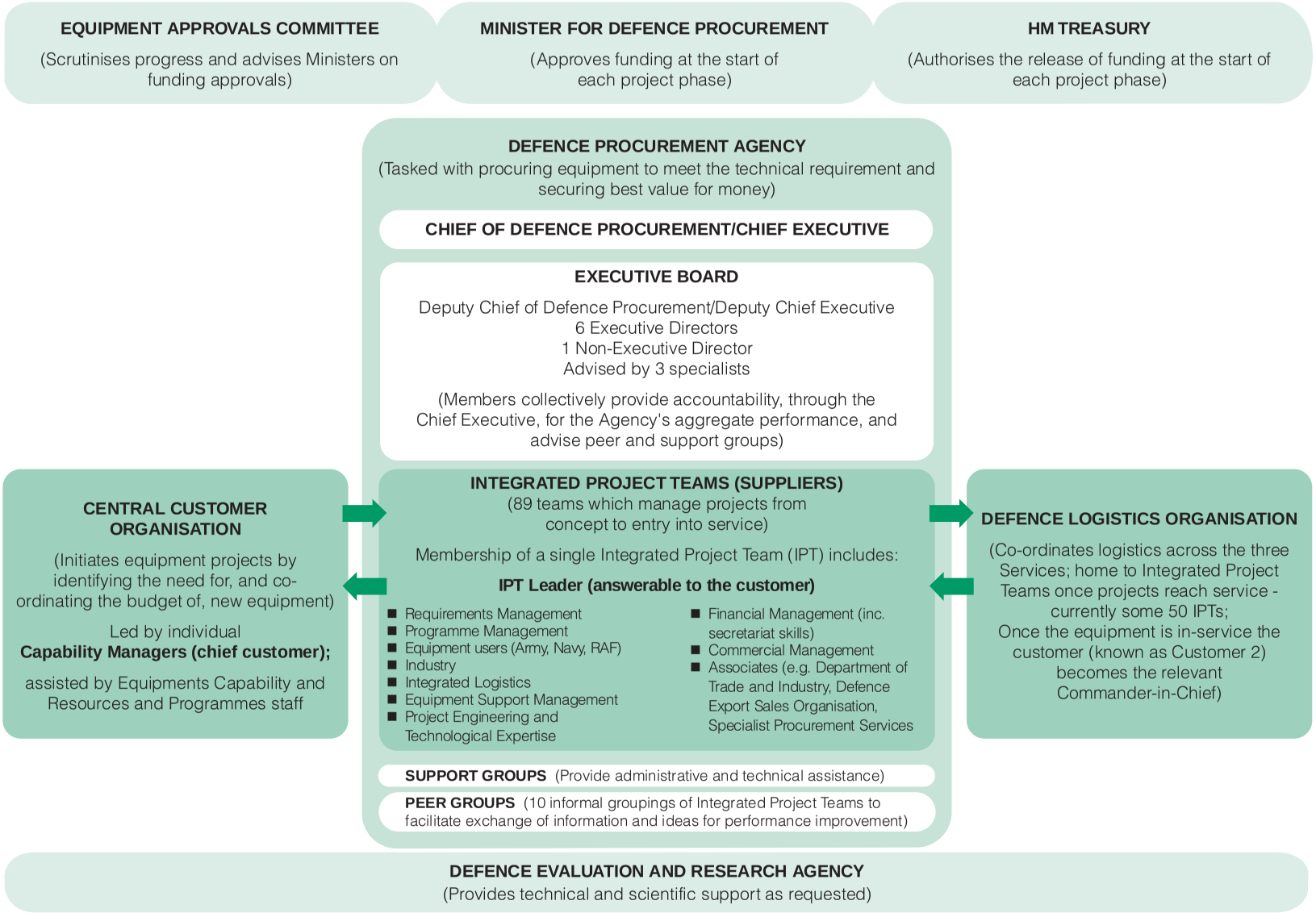
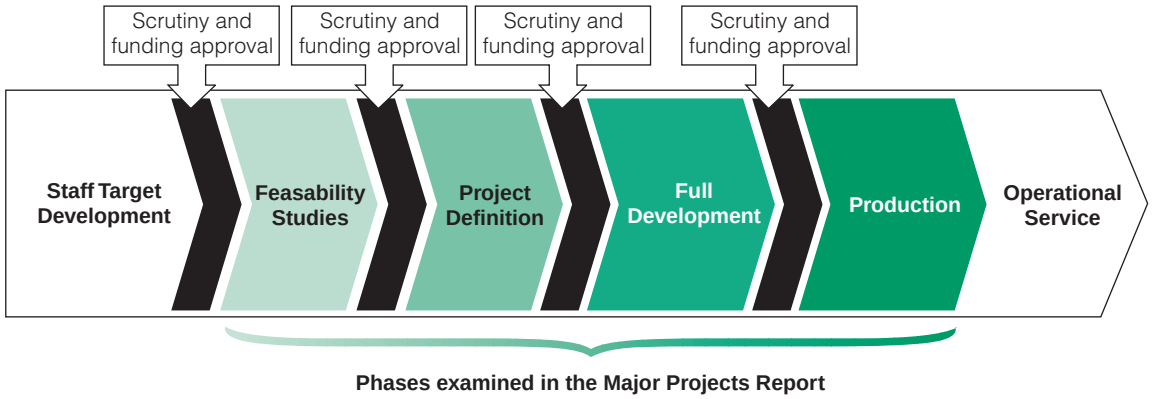


Figure 5

The Downey Cycle

Under the Downey Cycle projects could be subject to four separate approvals.



Note: Each approval can take up to two years to decide whether or not to proceed to the next stage

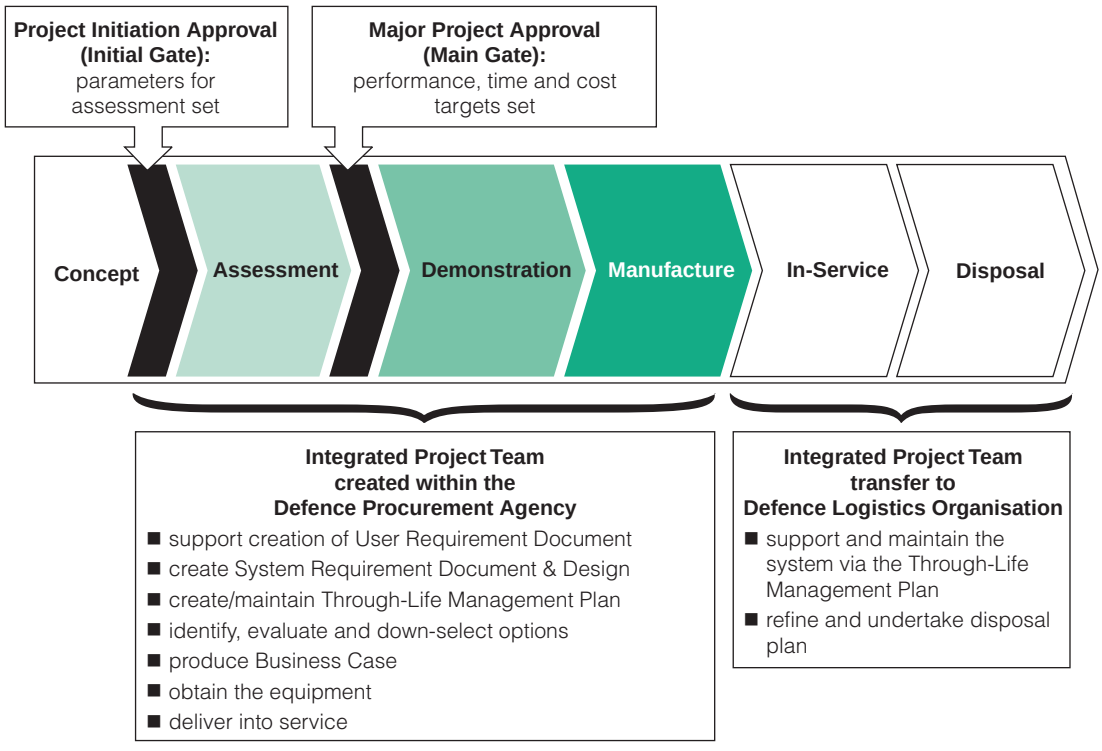
Source: National Audit Office

1.10 Progress through the Downey Cycle was dependent upon successful progress in the previous phase (although there would usually be overlap between the development and production phases as shown in Figure 1 on page 2) and approval was required from Ministers and the Treasury before committing to the next phase of a major project. It is these approvals against which the Major Projects Report assesses the Department's performance in managing projects. For cost, performance is measured against the cumulative total of the costs approved at the beginning of each stage in the Downey Cycle. For time, performance is measured against the date – known as the in-service date - at which the equipment was forecast to enter service at the time of first approval. Care is needed in interpreting these figures since the definition of in-service dates, in particular, can vary between projects. For example, the Eurofighter in-service date is defined as the date of delivery of the first aircraft to the Royal Air Force and the Future Carrier Borne Aircraft's in-service date is defined as the Royal Navy's receipt of the tenth aircraft. Similarly, the realism of in-service dates has tended to vary with some, such as the Air-launched Anti-Armour Weapon being aspirational since the risks involved in achieving it were not well understood. In future, as part of Smart Procurement, the Department is examining the scope to base in-service dates on a more consistent assessment of when the military capability provided by the equipment is available for operational use.

1.11 Under Smart Procurement, the Downey Cycle is being replaced by an acquisition process based on acquiring military capability progressively, at lower risk, and with more scope for trade-offs between military effectiveness, time and the whole-life cost of the equipment. As Figure 6 shows, there will be fewer approvals which the Department anticipates should eliminate the dead time associated with additional Downey approvals. The Department expects that up to 15 per cent of the procurement cost of equipment might typically be spent before 'Main Gate', with the intention of reducing risk so that performance, cost and time parameters for delivery of the project can be set with a high degree of confidence. Delivering projects within these parameters is a key objective of Smart Procurement. Figure 6 outlines the responsibilities of the Integrated Project Team at the different project phases. The team will manage the project in accordance with a Through-Life Management Plan drawn up at the outset of the project, pulling together key information such as user requirements, approvals, risk management and support strategies, and incorporating the Customer Supplier Agreement.

Figure 6

The Smart Procurement acquisition cycle showing the role of Integrated Project Teams



Note: Each approval can take up to two years to decide whether or not to proceed to the next stage

Source: National Audit Office

The introduction of Smart Procurement and Resource Accounting will change the way we measure the Department's performance

1.12 The changes to the way defence equipment is acquired and managed under Smart Procurement together with accounting changes flowing from the introduction of Resource Accounting and Budgeting mean that the format of future Major Projects Reports will have to change to ensure that it continues to accurately reflect the Department's performance in acquiring equipment to time, cost and quality targets. The most significant change as a result of Resource Accounting and Budgeting is that the costs of projects will be given in outturn prices, not constant prices as now, and that they will include all resource costs and investment in capital assets, rather than focusing only on cash flows. Appendix 7 outlines the principles underpinning the changes to the format of future Major Projects Reports and includes illustrative new project summary sheets. The changes have been agreed by the Committee of Public Accounts.

How we analysed the Department's performance

1.13 We have analysed the data in the 1999 Major Projects Report to highlight:

- the progress of the top 25 major projects in meeting cost and timescale targets, the factors that cause projects to vary from approved performance parameters and trends in the Department's performance (Part 2); and

- the causes, cost and operational impacts of project slippage on four case study projects (Part 3).

Summaries of the main points and recommendations arising from our examination are contained in the key points boxes contained within each section.

Part 2: The status of projects against cost and time targets

2.1 In this part of the Report we analyse the outcomes so far on the 25 largest procurement projects. Our analysis is in two sections covering cost and time performance, each of which examines what the 1999 Major Projects Report shows about the Department's performance; the reasons for variances from approved cost and time parameters; and trends emerging in the seven years since the Major Projects Report was first produced in the current format.

The key points emerging from our examination are:

The Department's performance in procuring equipments within approved cost parameters has been mixed:

- 13 projects are forecast to exceed their original cost approvals, 11 are expected to be under budget and one project is showing no net cost variance (paragraph 2.2);
- approved expenditure and further expenditure in clear prospect on the 25 projects totals £76 billion (paragraph 2.2);
- the estimated total cost of the 25 projects, excluding Eurofighter, is 6.3 per cent higher than the sum of the original approvals (paragraph 2.2);
- costs on 18 projects are within ten per cent of approvals (paragraph 2.5);
- the main causes of cost over-runs - programme changes, inflation adjustments, and accounting changes - are unchanged from the 1998 Report (paragraph 2.9);
- the main causes of cost reduction are earlier over-estimation of costs, movements in exchange rates and the outcome of contract price negotiations.(paragraph 2.10);
- excluding Eurofighter, cost over-runs have increased by £22 million since 1998 (paragraph 2.11);
- once costs start to escalate on projects they are not recovered (paragraph 2.12).

The Department's performance in procuring equipments to approved timescales is getting worse:

- 23 projects in the 1999 Report have entered service or are expected to enter service later than originally estimated (paragraph 2.13);
- 15 projects are expected to enter service at least three years later than originally estimated (Figure 12);
- the average in-service date delay has increased to 47 months (averaged over 24 projects), compared with 43 months (averaged over 25 projects) in the 1998 Major Projects Report (paragraph 2.14);
- since 1993, the average delay to the eight projects common to all Major Projects Reports has more than doubled and is now 64 months (paragraph 2.16);

…continued

The Department's performance in procuring equipments to approved timescales is getting worse *(continued)*:

- on average, more than a quarter of the lifecycle of the projects in the 1999 Report is represented by slippage (paragraph 2.17);
- project lifecycles are getting longer (paragraph 2.18).

There have been significant developments on a number of projects in the 1999 Report:

- the Nimrod MRA 4 project is currently running some £92 million below the originally approved costs, primarily as a result of the Department re-negotiating the contract in May 1999 (Box 2);
- the cost variation on the Eurofighter project has fallen by £180 million since the 1998 Major Projects Report (paragraph 2.3);
- there has been a cost increase of £326 million on the Merlin Mk 1 project (Box 1);
- the Common New Generation Frigate and Airborne Stand-off Radar projects have both recorded delays of two years or more since the 1998 Major Projects Report (Figure 12).

The Department's performance in procuring equipments to approved cost parameters has been mixed

The projects in the 1999 Report are expected to exceed approved costs by 6.3 per cent

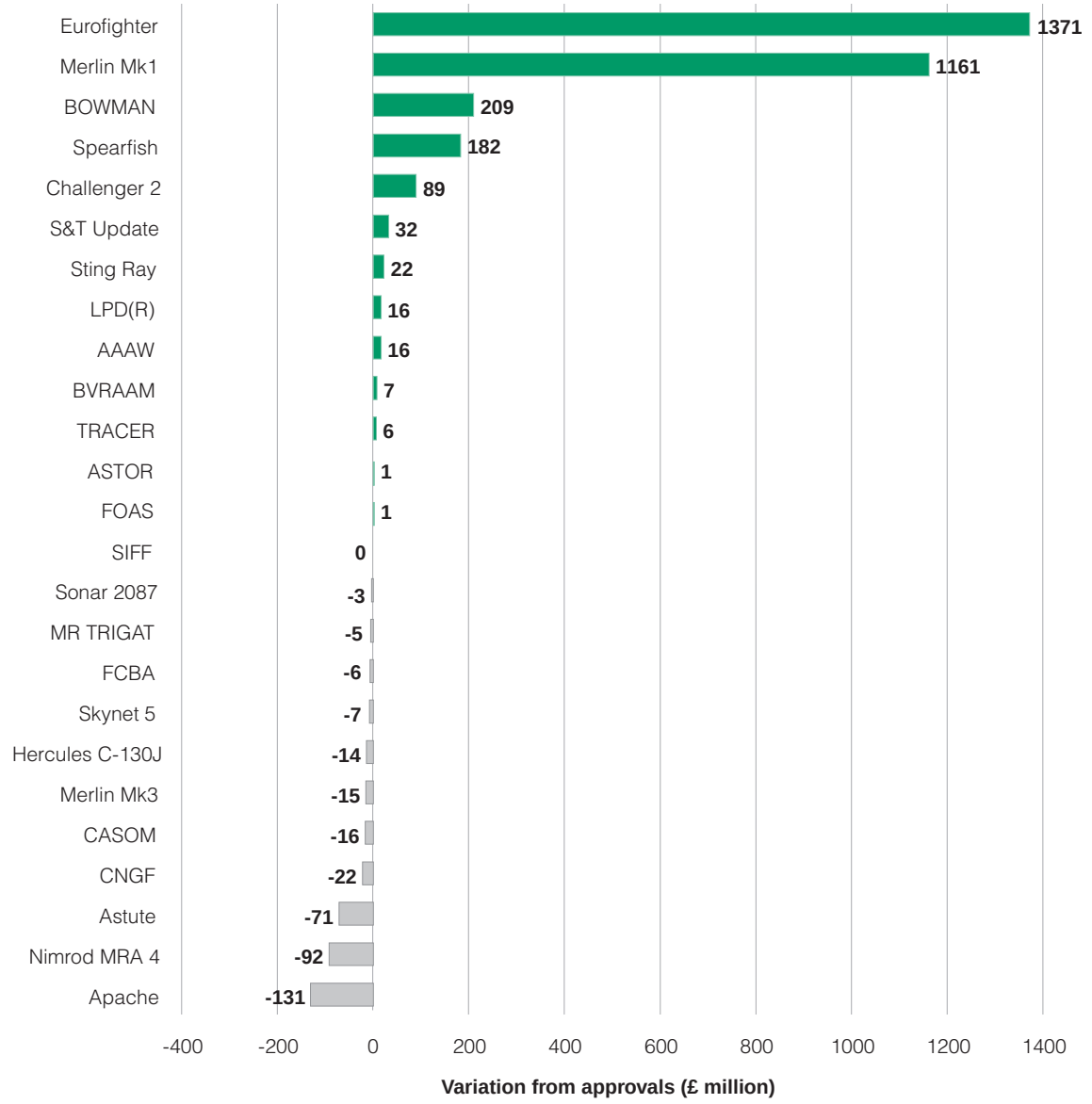
2.2 The 25 projects in the 1999 Major Projects Report are expected to cost a total of £37.6 billion for the stages approved to date compared to £34.8 billion of originally approved costs - a £2,731 million or 7.8 per cent increase, compared with equivalent figures of £2,889 million or 8.0 per cent in the 1998 Major Projects Report. In addition to the approved expenditure, the Department estimates that there is a further £38.4 billion of expenditure in clear prospect on 15 of the projects. Thirteen projects are forecast to exceed their original cost approvals, 11 are expected to be under budget, and one project (Successor Identification Friend or Foe) is showing no net cost variance. Figure 7 shows actual cost variances on the 25 projects. Four projects contribute the vast bulk (94 per cent) of the over-runs and just under half (44 per cent) of the total is due to the £1,371 million increase on Eurofighter since the project began. If the exceptionally large Eurofighter project is excluded from the cost variance analysis, the remaining 24 projects are forecast to exceed the sum of their original approvals for each phase by some 6.3 per cent[1], representing an increase of £22 million compared with an equivalent figure of 5.9 per cent in the 1998 Major Projects Report.

1 This figure includes a cost increase of £189 million in the approved Project Definition phase of the BOWMAN project, which the Department has funded by bringing forward expenditure and cost saving measures elsewhere. The Department does not expect this to increase the overall cost of the BOWMAN programme.

Figure 7

Actual cost changes

Thirteen projects are forecast to exceed their approvals and 12 projects are forecast to achieve or cost less than their approvals.



Source: National Audit Office

2.3 Most of the cost escalation on the Eurofighter project occurred during the earlier stages of development and the rate of cost increase has slowed markedly. Indeed, the cost variation in the 1999 Report has reduced by £180 million compared to the 1998 Report. However, this is predominantly due to a change to the contract payment arrangements and there is no reduction in the actual cost of the project. The nations have decided that from January 1998 the costs of the industrial consortia management activities by Eurofighter and Eurojet GmbH, covering personnel and other administrative costs and currently estimated at

£218 million for the United Kingdom's share, will now be paid solely under the support phase contracts rather than under development and production. As a result, the estimated cost of the production phases shown in the Major Projects Report has been reduced by £218 million and the funding has been transferred to the support phase, for which costs are not shown in the Major Projects Report.

2.4 The Department's rationale for the transfer of costs is that the support phase contracts will run to the end of the life of the aircraft and from January 1998 the industrial consortia management costs will increasingly focus on support activities. However, it effectively creates £218 million of extra funding for the project as the approved funds for development and production, which included the industrial consortia management costs, have not been reduced whereas those for the support phase have been increased to include the same costs. This means that if there is further cost growth in the development and production phases of the project, it may not be immediately transparent in all the figures shown in the Major Projects Report. In performing our analysis for future Major Projects Reports, we will ensure that any cost growth that may occur in future years is transparent.

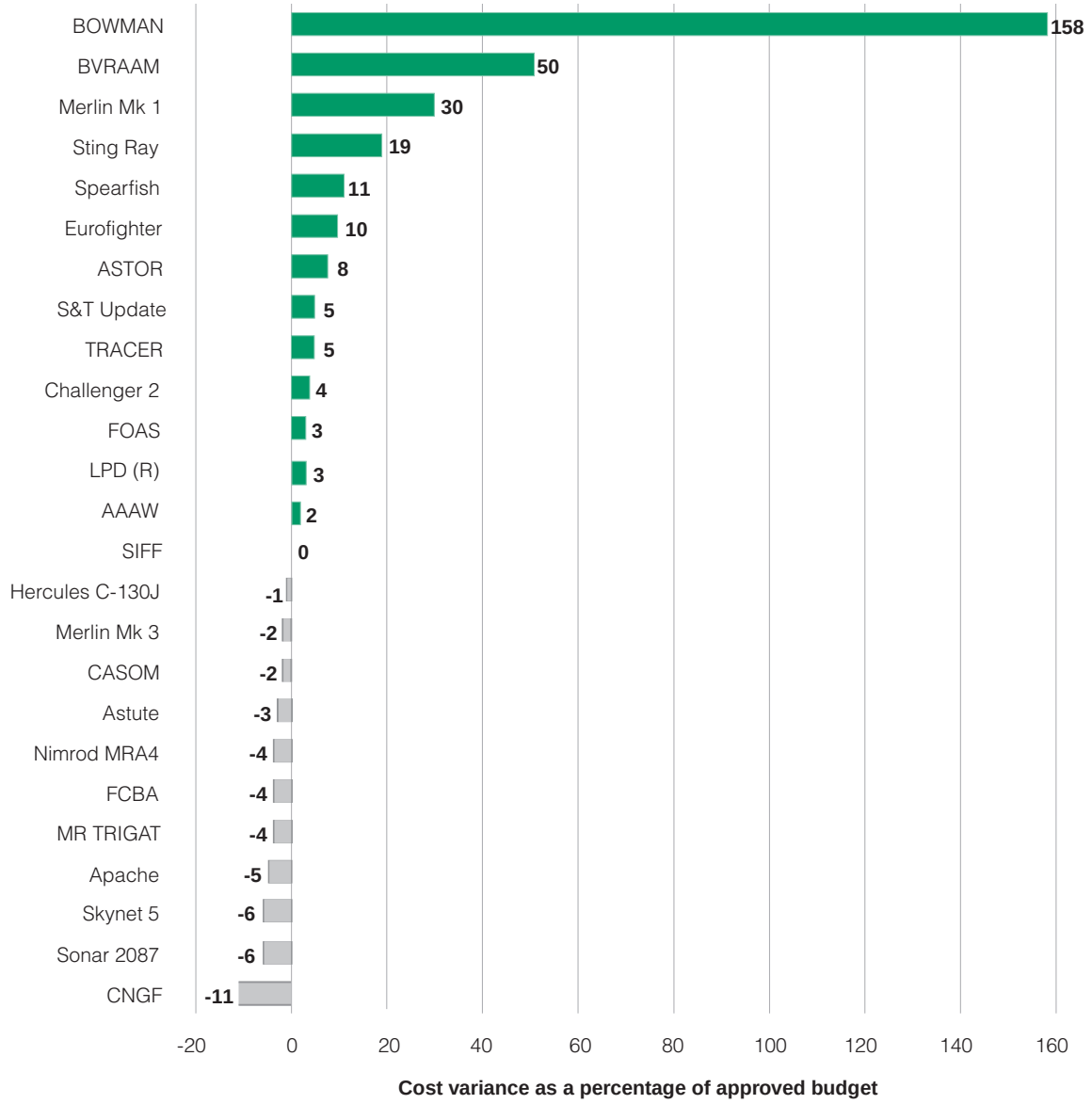
Costs on 18 projects fall within ten per cent of approvals

2.5 Figure 8 shows estimates of project outturn as a percentage of approved project costs and reveals a similar, although more balanced, pattern to Figure 7. The costs on 18 projects, including those projects new to the 1999 report, are either less than the original project approval or no more than five per cent above it. The approved phases for one project (the Common New Generation Frigate) are estimated to cost over ten per cent less than at approval. Six projects are expected to exceed their approvals by ten per cent or more and two projects (BOWMAN and the Beyond Visual Range Air-to-Air Missile) are expected to exceed their approved project costs by 50 per cent.

Figure 8

Percentage cost changes

Six projects are forecast to exceed their approvals by ten per cent or more



Source: National Audit Office

2.6 The figures for BOWMAN and the Beyond Visual Range Air-to-Air Missile must be interpreted with care. The scale of the cost increase on the approved phases of the Beyond Visual Range Air-to-Air Missile - £7 million, mostly due to a need for additional Defence Evaluation and Research Agency support during bid assessment - is less than one per cent of the total cost of the whole project, some £900 million. There has been a cost increase of £189 million on the BOWMAN project due to the extension of risk reduction work prior to the award of the supply contract. The Department has funded this work, known as Package 0 and which is

essentially bringing forward expenditure originally planned for future years, by cost saving measures elsewhere, and it does not expect Package 0 to increase the overall cost of the BOWMAN project. The increased spending on Package 0 early in the project is intended to better define the BOWMAN system and reduce risks before the main investment decision, which is in line with the improved procedures that the Department is introducing under Smart Procurement.

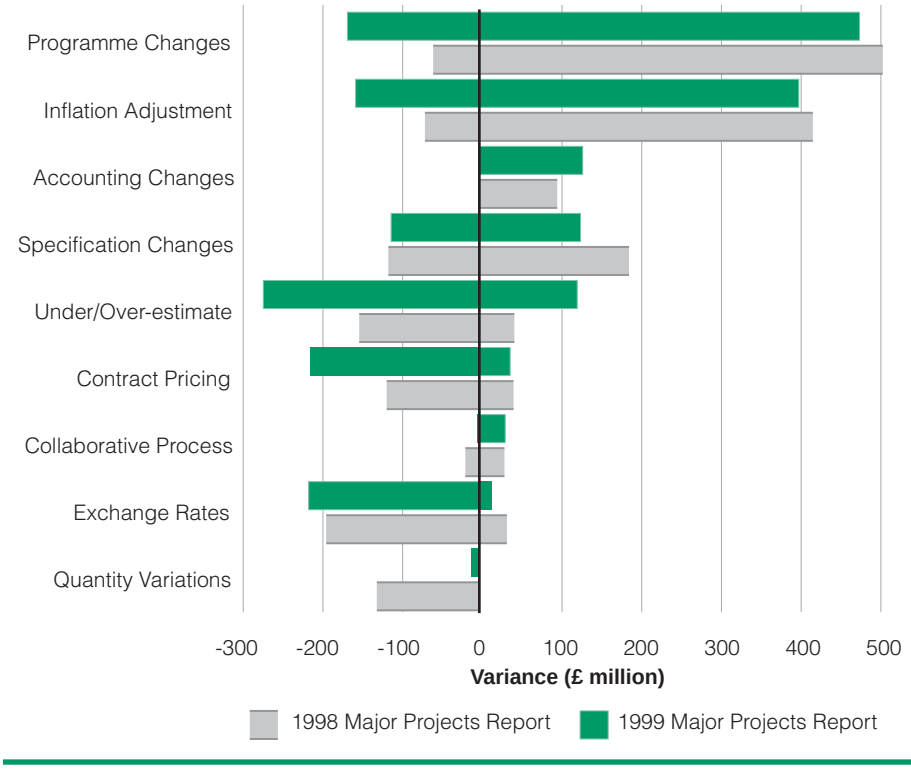
There are a variety of reasons for cost variances

2.7 The Major Projects Report breaks the reasons for cost variance down into nine categories. The reasons are listed in Appendix 5. The overall cost of any project in the Report may reflect both cost increases and decreases, and may be affected by more than one cause of cost variation. Figure 9 shows the amount of cost change due to each cost variation category in both the 1998 and 1999 Reports. The Figure excludes the cost variances on Eurofighter and the Merlin Mark 1 Helicopter since these two large variations obscure the messages emerging on the other 23 projects. The following paragraphs consider the main reasons for cost variations on the 23 projects, together with coverage of Eurofighter and Merlin Mark 1 where relevant.

Figure 9

The causes of changes to project costs

The main causes of cost increases are programme changes and inflation adjustments. The main causes of cost reductions are over-estimates and exchange rate movements.



Source: National Audit Office

The Tornado GR4 Mid-life Update project leaving the Report has affected the scale of a number of cost variances

2.8 The most significant single factor affecting changes in variances between the 1998 and 1999 Reports is the fact that the Tornado Mid-life Update project has dropped out of the Report taking with it £341 million of cost increases due to programme changes, £92 million of cost increases attributed to specification changes and cost reductions due to quantity variations of £117 million (over 90 per cent of the cost reduction attributed to this category).

The main causes of cost increases are programme changes, inflation adjustments and accounting changes

2.9 The cost increase has fallen in all but two of the nine categories since the 1998 Report. However, the main causes of cost increases in the 1999 Report remain as in previous years with the four main reasons accounting for 84 percent of variance. In particular:

- **changes in the scope of programmes** as they progress have caused cost increases totalling £470 million. These include £189 million on the BOWMAN project due to the extension of risk reduction work prior to the award of the supply contract. Costs on the Merlin Mark 1 project have also increased by £326 million (not included in Figure 9) since the 1998 Report. The causes of the increase lie primarily in changes in the scope of the programme and are explained in detail in Box 1 (overleaf);

- **inflation adjustments** worth £395 million have arisen because the defence specific indices used in many of the Department's contracts have tended to escalate more than more general measures of inflation. Such adjustments account for 30 per cent of the total cost increases in the 1999 Report and are reported on nine of the 23 projects. In particular, inflation adjustments have added some £685 million to the combined costs of the Eurofighter and Merlin Mark 1 projects not included in Figure 9;

- **accounting changes** account for £128 million of nominal cost increases. The increase since 1998 is because estimated project costs on the Apache Attack Helicopter project have increased by £28 million due to changes in accounting rules since approval, so that Defence Evaluation and Research Agency and Communications Electronic Security Group costs previously excluded from project costs are now included. The Apache project is under budget by £131 million overall; and

- **specification changes** are responsible for cost increases of £125 million in the 1999 Report, a fall of £60 million on the 1998 figure. This reflects a reduction of £126 million due to the removal of the Tornado Mid-life Update project and the Advanced Short Range Anti-Air Missile project from the population covered by the Report. This reduction is partially offset by new cost increases due to an additional £30 million attributed to specification changes on Challenger 2 and £24 million on the Astute Class Submarine project.

Box 1 **Cost changes on the Merlin Mark 1 helicopter**

The Merlin Mark 1 helicopter will provide anti-submarine warfare capability to support the nuclear deterrent and protect other maritime forces from submarine attack. The helicopter air vehicle was developed under a bi-lateral United Kingdom/Italian programme with industrial responsibility vested in EH Industries, a consortium comprising GKN Westland and Agusta of Italy. Following a review of the industrial arrangements, in 1991, the United Kingdom appointed IBM ASIC (now Lockheed Martin ASIC) prime contractor for completion of Royal Navy specific development, integration of the Mission System and production of 44 Merlin Mark 1 helicopters. The helicopter entered service in March 1999, 63 months later than expected, and at a cost £1.161 billion higher than the sum of its original 1984 approvals. In particular, accidents to three prototype aircraft have increased costs and hampered progress in the past. There has been a total net cost increase of £326 million since the 1998 Major Projects Report. This Box provides further details of two of the reasons for the latest cost increases, extra deployment costs and early settlement of liabilities with GKN Westland, both of which are reported for the first time this year.

Revisions to deployment patterns have led to £160 million of further costs falling to the existing contract

Prior to the Strategic Defence Review the Department planned to provide a total fleet capability to support two operational aircraft carriers, 12 Type 23 Frigate flights and three shore-based squadrons together with two 'fly-away' packs of spares to provide deployment flexibility. To achieve this, the Department planned to procure, in addition to the 44 helicopters (Batch 1) on order, a follow-on buy of 22 Merlins (Batch 2) with their logistic support, at a cost of £976 million. The Strategic Defence Review concluded that the 22 additional Merlins were no longer required, but that there remained the need to deploy 12 helicopters to the aircraft carriers and 6 Type 23 Frigates, together with on-board logistic support. As a result, the planned deployment of the 44 Merlins on order was revised and some of the logistic support costs that had previously been estimated for the follow-on buy were transferred to the existing order for Merlin Mark 1. In total, this change in requirement resulted in £160 million being transferred from Batch 2 to Batch 1. Although this represents additional cost to the Merlin Mark 1 Batch 1 project, it does not constitute an additional cost to the Department since it is a transfer of funds between one budget and another.

continued...

Box 1 *continued*

Early settlement of outstanding liabilities with GKN Westland required additional financial provision of £34 million

Merlin Mark 1 and Merlin Mark 3 are military variants of a joint civil/military helicopter programme - the EH101. In 1984, the Department and GKN Westland signed an Associated Agreement on how the United Kingdom non-recurring costs of the EH101 programme should be shared between the two, reflecting the fact that the programme had both military and commercial applications. The Associated Agreement made the Department responsible for the whole of the United Kingdom's share of common development costs in return for the contractor carrying out - and funding to completion - specified elements of production launch work. The Associated Agreement provided for GKN Westland to recover some of its non-recurring investment in the EH 101 Integrated Development Programme through a levy (the 'Reverse Levy') on the production prices of up to 250 helicopters and associated spares bought by the United Kingdom over the 25-year life expectancy of the aircraft. The Agreement assured the company that the Department would fund the Integrated Development Programme to completion and, in the final settlement, provided for the Department to recover any excess payments made to GKN Westland under the programme's contract incentive schemes by means of a reduction in the unit production price of aircraft and spares at a rate limited to 2.5 per cent of the price per aircraft.

Under the terms of the Agreement, the cap on the amount by which the unit production price of aircraft and spares could be abated restricted the rate at which the Department could recover costs. Subsequent developments, such as the decision not to procure the additional 22 Merlins, led the Department to form the view that there would be a considerable delay before it would fully recover the costs due under the Agreement, potentially until close to the end of the aircraft's life. In view of this, the Department began negotiations with GKN Westland to settle the Reverse Levy payments on the 44 Merlin Mark 1 aircraft and their spares in exchange for simultaneously settling liabilities due from GKN Westland under the terms of the Associated Agreement.

Following negotiations, both sides agreed to reduce the Reverse Levy total and to net off recoveries from GKN Westland, thus reducing the Department's liability to GKN Westland from an estimated £52.1 million to £23 million. This required the Department to make some additional funds immediately available. The Department had previously made some provision for the Reverse Levy, and it had assumed that it would be entitled to a payment from GKN Westland in respect of overpayments against the Integrated Development Programme contracts and for non-compliances against the contractual specifications, but this was not enough to meet the whole £23 million cost. The Department estimates that, had it continued to make Reverse Levy payments on aircraft and spares acquired throughout the procurement cycle, its equivalent net liability would have amounted to £52 million in total.

The settlement also included cancellation of potential reimbursements from GKN Westland for non-compliances against the contractual specifications of the Integrated Development Programme as the Department considered that it would not be straightforward to agree with GKN Westland how much the non-compliances were worth. The Department had originally assumed that £14 million could be recovered from GKN Westland, and this figure had been incorporated into the estimates of total net project costs. As at the end of March 1999 (the reporting date of the 1999 Major Projects Report), the Department believed that closure of the 1984 Associated Agreement would involve setting aside all of the £14 million. However, the Department has secured agreement from GKN Westland to pay £2.6 million to cover non-compliances.

Taken together, the total net effect of these changes is a £34 million (£23 million and £14 million less £2.6 million) cost increase to the Merlin Mark 1 project.

The main causes of cost reduction are over-estimation of costs, movements in exchange rates and contract price negotiations

2.10 The most significant causes of cost reduction - the over-estimation of project costs, movements in exchange rates and contract price negotiations - have remained unchanged since 1998 and, taken together, account for 59 per cent of total cost reductions. Specifically:

- **changes to cost estimates** accounted for a £241 million reduction (21 per cent of total cost reductions) on ten projects. Such variances reflect the over-estimation of costs by the Department in seeking funding approval, alterations to cost profiles due to slippage and consequent alterations to the timing of payments or cost reductions introduced as part of the annual budgeting process. In particular, there has been a reduction of £54 million in the estimated costs of the Swiftsure and Trafalgar Class Nuclear Submarine Update project, reflecting reassessment of the work required (a £48 million reduction) and reduced estimates of the cost of trials ranges and services (£6 million);

- cost reductions attributable to **exchange rate variations** reflect the strong performance of Sterling which has affected the costs of projects involving foreign currency payments to overseas contractors and has led to cost reductions of £211 million (19 per cent of the total cost reduction) on six projects. In particular, favourable movements in the United States exchange rate have resulted in a £89 million reduction in the estimated cost of the WAH-64 Apache attack helicopter; and

- the Department's success in **negotiating contracts at prices below those estimated at the time of approval** has resulted in cost reductions of £209 million (19 per cent of the total cost reduction) on nine projects. This reduction is almost twice that reported in 1998 and reflects a reduction of £92 million in the project costs of the Nimrod MRA 4, primarily as a result of the Department re-negotiating the contract. The circumstances surrounding this particular case are described in Box 2.

Box 2 **Cost changes on the Nimrod MRA 4**

The Department is procuring 21 Nimrod Maritime Reconnaissance and Attack Mark 4 aircraft to replace the existing Royal Air Force Nimrod Mark 2 fleet. The aircraft will provide an enhanced anti-submarine warfare and anti-surface unit warfare capability. The original in-service date for the aircraft was December 2000 but this has now slipped by 51 months to March 2005. The cost of the project is currently running some £92 million below approved cost which is primarily a result of renegotiating the contract.

The aircraft are being supplied by British Aerospace (now BAE SYSTEMS) who were appointed in December 1996 following a hard fought competition. The programme which the Department agreed with British Aerospace was ambitious - the Department's risk analysis estimated that there was only a one in two chance of the contracted in-service date of April 2003 being met - and just under two years after contract award, British Aerospace formally notified the Department that they had encountered problems on the programme and that they were unlikely to meet the contract timescales. In particular, the company were having difficulty in achieving the target aircraft mass, were unable to recruit sufficient numbers of skilled staff and had been over-optimistic in estimating the efficiency gains to be derived through new development tools they were using on the programme. In May 1999, the Department and British Aerospace completed re-negotiation of the contract with a revised in-service date of March 2005. In particular, the Department has:

- negotiated with British Aerospace that, as milestones agreed under the original contract fall due, the company will be liable to pay liquidated damages totalling £46 million. The Department will be able to claim further liquidated damages if British Aerospace fail to achieve the milestones set out in the revised contract;

- secured cost reductions by negotiating a new variation of price arrangement which aligns more closely to the Gross Domestic Product deflator - the previous formula exceeded the Gross Domestic Product deflator by some one per cent per annum. Furthermore, the new variation of price arrangements are designed to ensure that British Aerospace will not benefit beyond the original programme dates so that the Department will not bear any additional variation of price costs as a result of the revisions to the programme;

- relaxed a number of requirements to facilitate achievement of the key time-on-station performance parameter. Specifically, the Department has reduced the fuel reserve required, limited in-service growth potential to 5,000 pounds rather than at a percentage of the aircraft's final mass, and reduced the aircraft's dash speed. For their part, British Aerospace have instigated major mass reduction measures and agreed to incorporate other changes which should benefit the Department, for example flat screen monitors will be installed at no additional expense to the Department; and

- agreed a revised milestone payment plan which ensures that payments are behind British Aerospace expenditure.

The Department believes that the restructured programme is now technically achievable whilst, for their part, British Aerospace are continuing to explore measures to deliver the aircraft more quickly. The Department has also sought better visibility of programme progress with a data link to the contractor and the establishment of an Integrated Project Team.

Cost over-runs continue to escalate on some projects

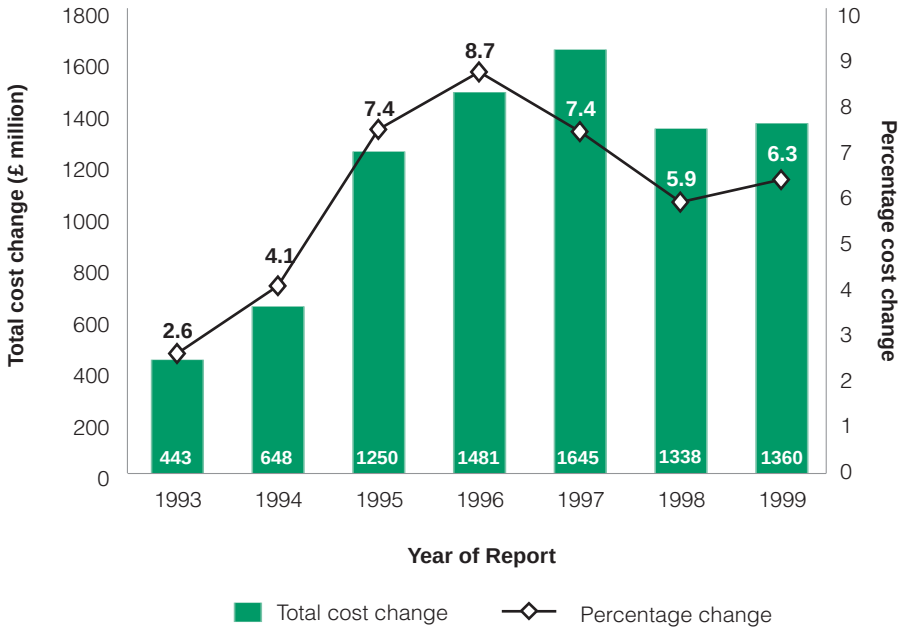
Excluding Eurofighter, the total cost over-run has increased since the 1998 Report

2.11 Figure 10 shows that, excluding the dominant Eurofighter project, in the years from 1993 to 1996, the total net cost increases on projects in the Major Projects Report grew from 2.6 per cent of the sum of the original approvals for each phase to 8.7 per cent. However, whilst cost increases continued to rise in absolute terms in the 1997 Report, an increase in the total value of the sum of the original approvals resulted in a fall in percentage terms to 7.4 per cent. In 1998 the cost variance decreased both in absolute and percentage terms but has risen again in 1999 to 6.3 per cent. The £22 million increase between 1998 and 1999 shown in Figure 10 includes a £161 million increase on Merlin Mark 1 as a result of an internal Ministry of Defence budgetary transfer, as well as the additional £189 million risk reduction expenditure on BOWMAN.

Figure 10

Total cost changes (excluding Eurofighter) in the Major Projects Reports 1993-99

Since 1998, cost overruns have increased in absolute and percentage terms.



Source: National Audit Office

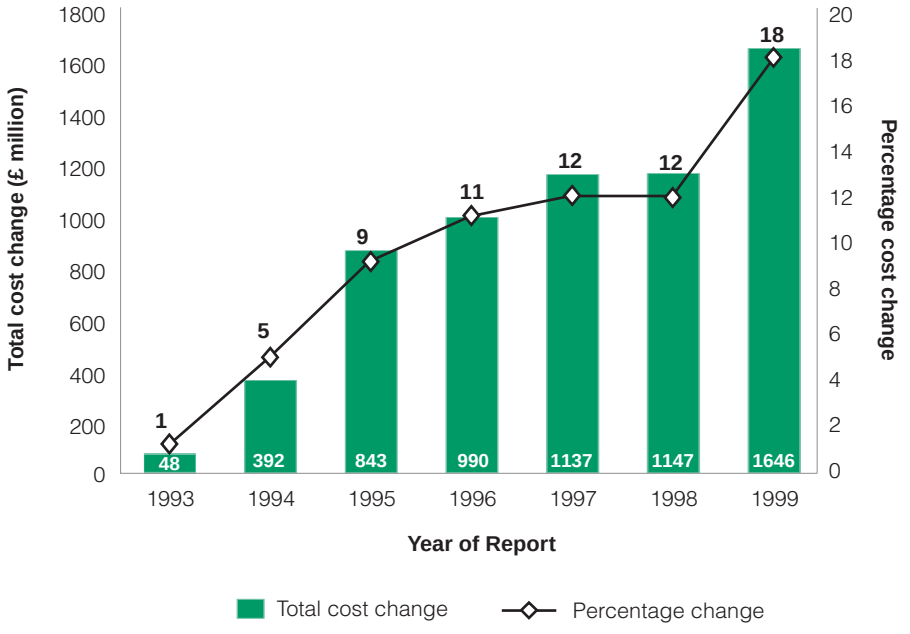
Costs on projects common to each Major Projects Report since 1993 have increased significantly

2.12 There have been eight projects common to the Major Projects Report from 1993 to 1999, while a further 45 projects have featured in the Report. Figure 11 shows the total cost changes between 1993 and 1999 for seven of the common projects. Eurofighter is excluded because the size of the project unduly skews the analysis. The graph shows a gradual increase in percentage cost variances each year until 1997 and 1998 when they reached a plateau of 12 per cent. The major increase from 12 per cent in 1998 to 18 per cent in 1999 is largely attributable to a cost increase of £326 million on the Merlin Mark 1 project (£161 million of which results from an internal Ministry of Defence budgetary transfer) and the £189 million advanced expenditure on BOWMAN risk reduction.

Figure 11

Total cost changes (excluding Eurofighter) for the projects common to each Major Projects Report since 1993

Estimated costs on projects common to each Major Projects Report have increased significantly since 1993.



Source: National Audit Office

The Department's performance in procuring equipments to approved timescales is getting worse

23 of the projects in the 1999 Report have entered service or are expected to enter service late

2.13 Only one of the projects in the 1999 Report, the Future Carrier Borne Aircraft which is currently at Feasibility Study stage, is expected to meet the in-service date originally estimated. Of the remaining 24 projects, 12 have already missed their in-service dates and a further 11 are forecast to do so. The Department is waiting until the main investment decision in early 2000 before setting an in-service date for one project, Successor Identification Friend or Foe (SIFF). This unusual approach has been adopted because a plan for the integration of SIFF onto over fifty platforms and the extent of the platform modifications necessary will not be finally established until the end of the current integration study and planning phase.

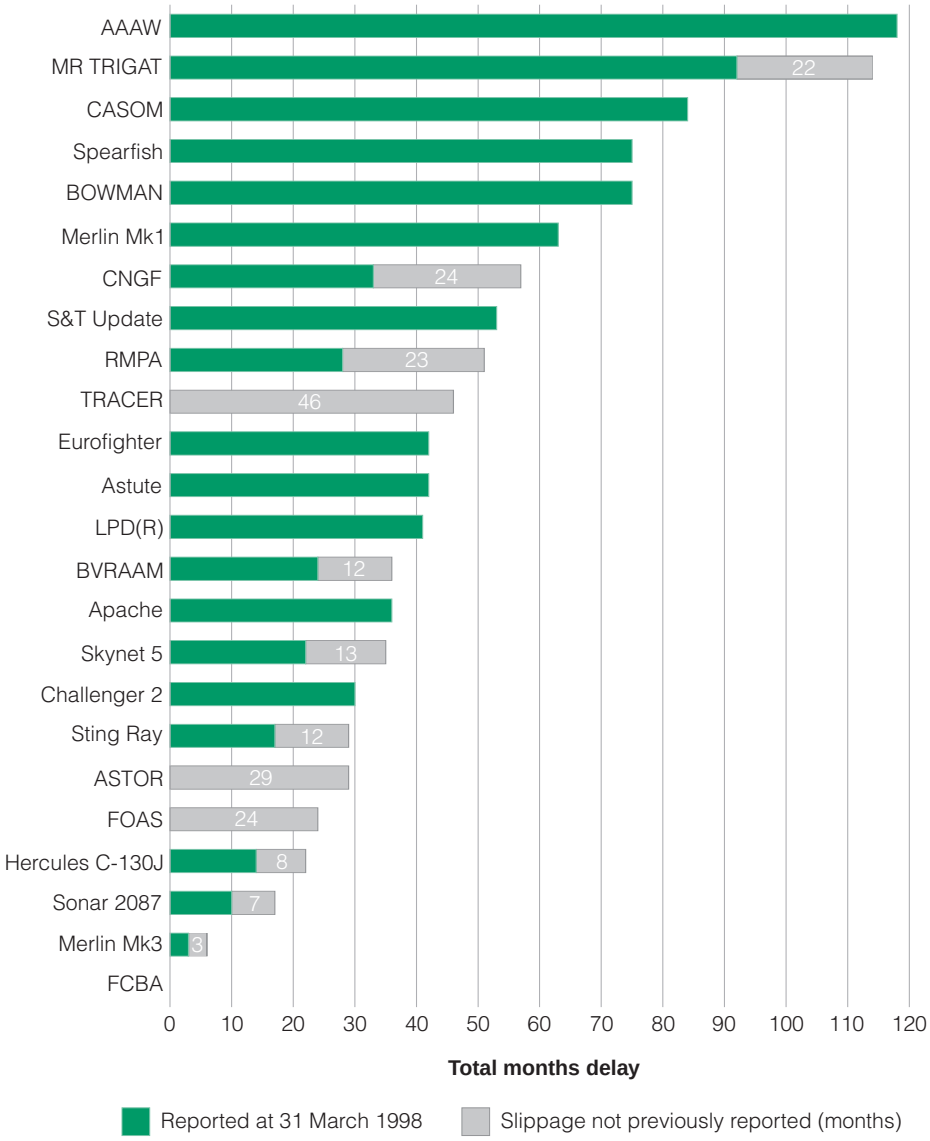
On average, projects in the 1999 Report are running nearly four years late

2.14 Figure 12 shows the expected in-service date delays by project and highlights that four projects will miss their in-service dates by more than five years; two other projects, Spearfish and Merlin Mark 1 entered service in March 1994 and March 1999 respectively, missing their originally estimated in-service dates by more than five years. The average in-service date delay across the 24 projects with estimated in-service dates in the 1999 Report, is 47 months, or nearly four years, an increase of four months on the 1998 Report. This increase reflects the fact that two of the projects new to this year's Report, Tactical Reconnaissance Armoured Combat Equipment Requirement and Future Offensive Air System, have entered the Report with 46 months and 24 months of delay respectively. Also ten projects have been subject to additional delays since the 1998 Report, with seven being delayed by a year or more. The Airborne Stand-Off Radar project has been delayed by 29 months, mainly as a result of budgetary constraints and time taken to negotiate the contract, and the Common New Generation Frigate has been delayed by 24 months largely due to collaborative problems.

In-service date delays

Figure 12

The average in-service date delay is 47 months.



Source: National Audit Office

There are a number of reasons why timescales slip

Causes of in-service date delays include problems with project definition and budgetary constraints

2.15 The Major Projects Report breaks the reasons for in-service date delay into seven categories. These are listed in Appendix 5. Figure 13 (overleaf) shows that, as in the 1998 Report, four of these categories account for the vast majority (86 per cent) of this slippage. Specifically:

- **technical difficulties** have caused 298 months slippage (26 per cent of total delays) on nine projects - an average of 33 months per project. This is an increase of 32 months in total slippage caused by technical difficulties compared to the 1998 Report and reflects difficulties on two projects in particular. The Nimrod MRA 4 contractor, BAE SYSTEMS, has been unable to recover slip caused by their resource and technical problems, leading to re-negotiation of the contract to take account of a 23 month slippage. The difficulties on the Medium Range TRIGAT project are examined in more detail in Part 3 of our Report. Resource difficulties in industry have also caused delays on the Landing Platform Dock Replacement project. However, the extent of delay was not finalised before the end of the Major Projects Report 1999 reporting period, so is discussed separately in Box 3 (overleaf);

- **delays in defining the scope of a project** due either to the time taken to reduce project risk to an acceptable level or by the re-definition of the project have caused in-service date slippage totalling 274 months (24 per cent of all delays) on 12 projects - an average of 23 months per project. These figures are broadly similar to those recorded in the 1998 Report, however, they mask the fact that one of the projects new to the 1999 Report - the Tactical Reconnaissance Armoured Combat Equipment Requirement - has slipped by 24 months as a consequence of extended Feasibility Study work to ensure the project is clearly defined;

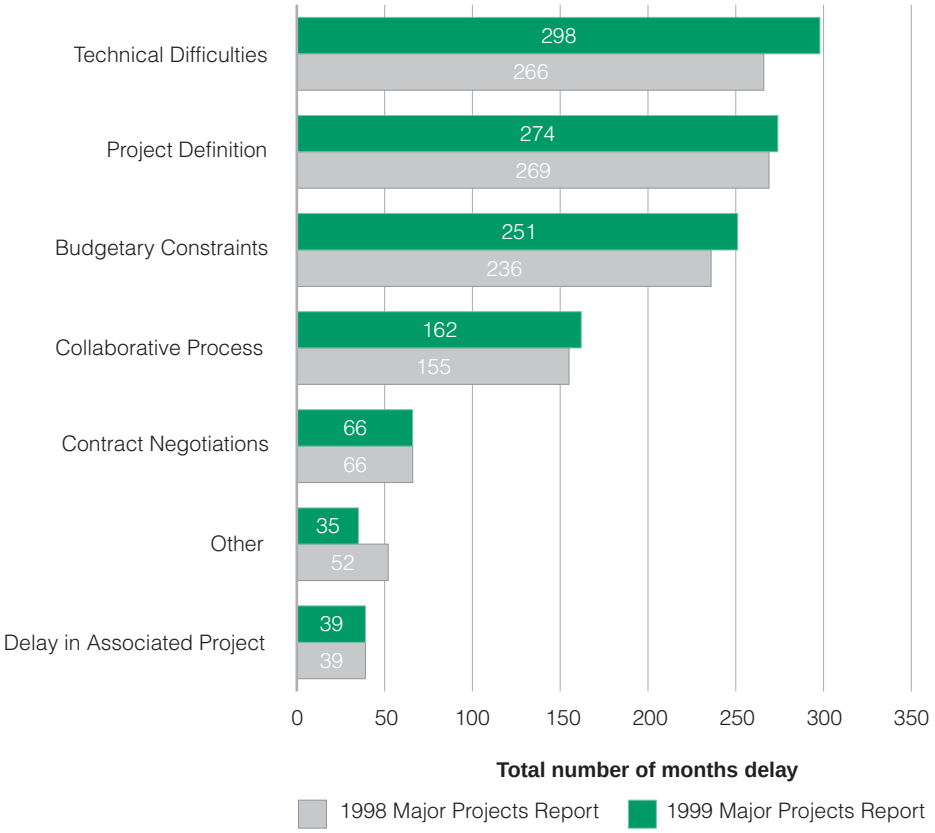
- **budgetary constraints** account for 251 months of delay (22 per cent of the total delay) on 14 projects in the 1999 Report - an average of 18 months per project. This is broadly similar to the picture in 1998 and reflects the effect of the re-profiling of the overall annual procurement budget to address problems of over-programming which can occur when forecast annual procurement costs exceed the annual procurement budget and/or where that budget is reduced because of Departmental resource constraints. The Future Offensive Air System project, which entered the Major Projects Report this year, provides a good example of such effects with the programme being re-profiled as a result of the Strategic Defence Review to enter service some two years later than planned in order to match the programme to available resources; and

- **the collaborative process** has caused delays totalling 162 months (14 per cent of the total delay) on six projects - an average of 27 months per project. In particular, since the 1998 Report, the Common New Generation Frigate project has slipped by 24 months, 17 months of which can be attributed to collaborative factors. The Common New Generation Frigate project is discussed further in Part 3.

Causes of in-service date delay and the extent of consequent slippage (in months)

Figure 13

Technical difficulties, project definition and budgetary constraints are the three biggest causes of in-service date delay.



Source: National Audit Office

Box 3 **Slippage on the Landing Platform Dock (Replacement) project**

The Landing Platform Dock Replacements will replace the existing amphibious assault ships, HMS FEARLESS and HMS INTREPID with two new platforms, HMS ALBION and HMS BULWARK. These ships are being built under a fixed price prime contract awarded to Vickers Shipbuilding and Engineering Ltd. (now part of BAE SYSTEMS) in July 1996.The contract was awarded to Vickers using No Acceptable Price No Contract (NAPNOC) principles seven months later than anticipated due to a change in procurement strategy when an earlier competition collapsed.

The 1999 Major Projects Report records that before 31 March 1999 the originally estimated in-service date for HMS ALBION had slipped by 41 months to March 2002 and that for HMS BULWARK had slipped by 27 months to March 2003. The Department also noted in the Landing Platform Dock (Replacement) summary sheet that there would be further delay to the in-service dates although they were not then able to identify the extent of the unrecoverable slippage. In response to a Parliamentary question in December 1999, the Department announced that, due to difficulties caused by the heavy industrial workload at the Barrow shipyard, the in-service date of HMS ALBION would slip by around a year and that for HMS BULWARK would slip by some 9 months. Current planning dates for the in-service dates of the ships are March 2003 and December 2003 respectively. The Department is having ongoing discussions with the contractor aimed at improving on these dates for both ships if at all possible.

During 1999, the Barrow shipyard was involved in four of the Department's procurement projects - including the Vanguard Class and Astute Class submarines, as well as the Landing Platform Dock (Replacement) and the Auxiliary Oiler projects which currently occupy the majority of the capacity at the shipyard. To achieve the programme timetables for all four projects the Department was relying on the prime contractor to meet a challenging level of industrial efficiencies. These efficiencies were not obtained initially at the required rate - primarily because of problems with a newly acquired computer-aided design tool - causing engineering congestion in the shipyard and consequent delays to the Landing Platform Dock Replacements and the Auxiliary Oilers. The Department expressed concern about progress at Barrow during 1998 but the complexity of cross-project planning meant that the contractor was unable to stabilise the programmes for several months and hence no accurate picture of the expected slippage could be provided at 31 March 1999.

Delays to the Landing Platform Dock Replacements have serious operational implications, as first highlighted in the Major Projects Report 1996, and involve additional support costs on the existing ships. The additional delays will bring the total slippage on HMS ALBION to 53 months and that on HMS BULWARK to 36 months. This further delay may mean running on the 32 year-old HMS FEARLESS for even longer than planned, adding to her support cost and potentially requiring re-validation of her Sea Safety Certificate. There is also a risk that the ship may, like her sister ship HMS INTREPID, become unserviceable due to the obsolescence of spares and declining numbers of steam engineers. However, the Department would expect to partially offset any such additional costs by exercising their contractual entitlements to liquidated damages from the contractor.

Trends in the Department's performance in procuring equipments to approved timescales are unfavourable

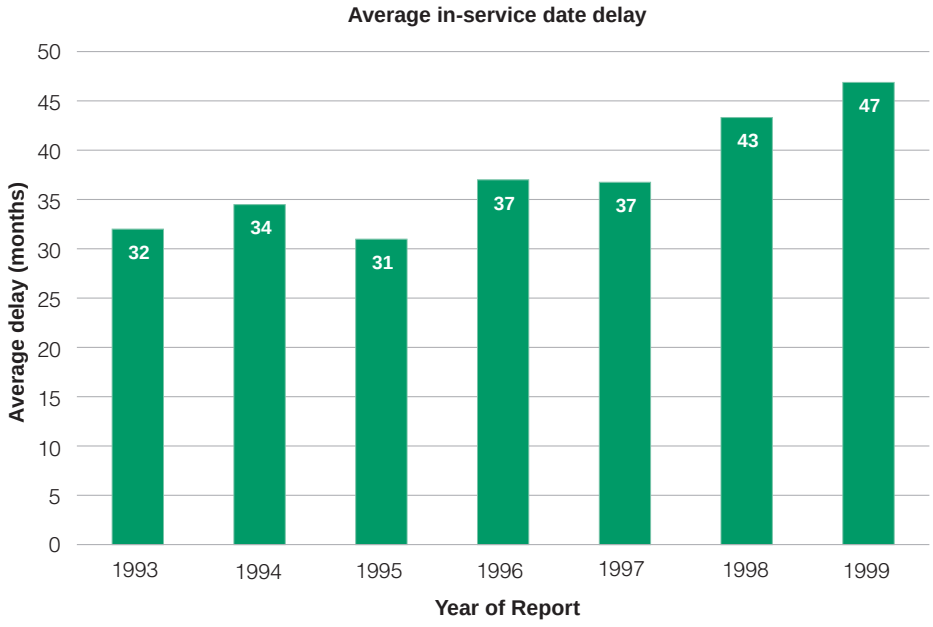
The additional in-service date delays in the 1999 Major Projects Report have occurred mostly in the early stages of projects

2.16 Figure 14 shows that the average in-service date delay recorded in each Major Projects Report since 1993 has increased from 32 months in 1993 to 47 months in 1999. As Figure 15 (overleaf) highlights, the trend is re-emphasised by the eight projects which have been common to the Major Projects Report since 1993 with slippage more than doubling from 31 months in 1993 to 64 months in 1999. However, of the 223 months additional delay reported in the 1999 Major Projects Report, 155 months (70 per cent) occurred on projects yet to pass their main investment decision point.

Figure 14

Average in-service date delay for the Major Projects Reports 1993-99

The Department's performance in meeting time estimates for major projects is getting worse.



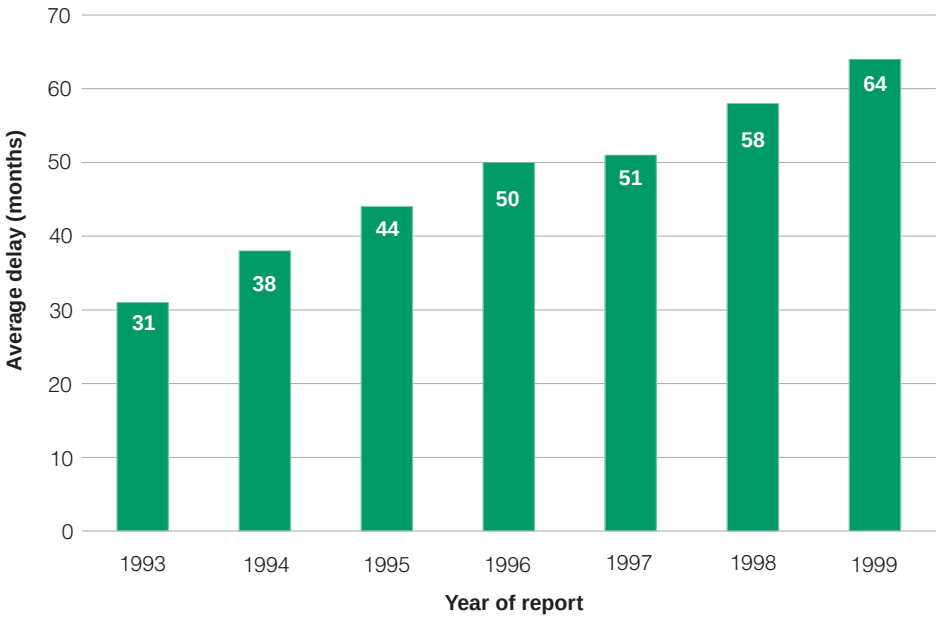
Note: The annual average is based on 25 projects except for 1993 and 1999, when it is based on 24 projects. In 1993, the Challenger 2 project did not have an in-service date, and in 1999 an in-service date had not yet been set for the Successor Identification Friend or Foe project.

Source: National Audit Office

Average in-service date delay for the eight projects common to each Report since 1993

Figure 15

The average in-service date delay has increased each year since 1993 for the projects common to the Major Projects Report.



Source: National Audit Office

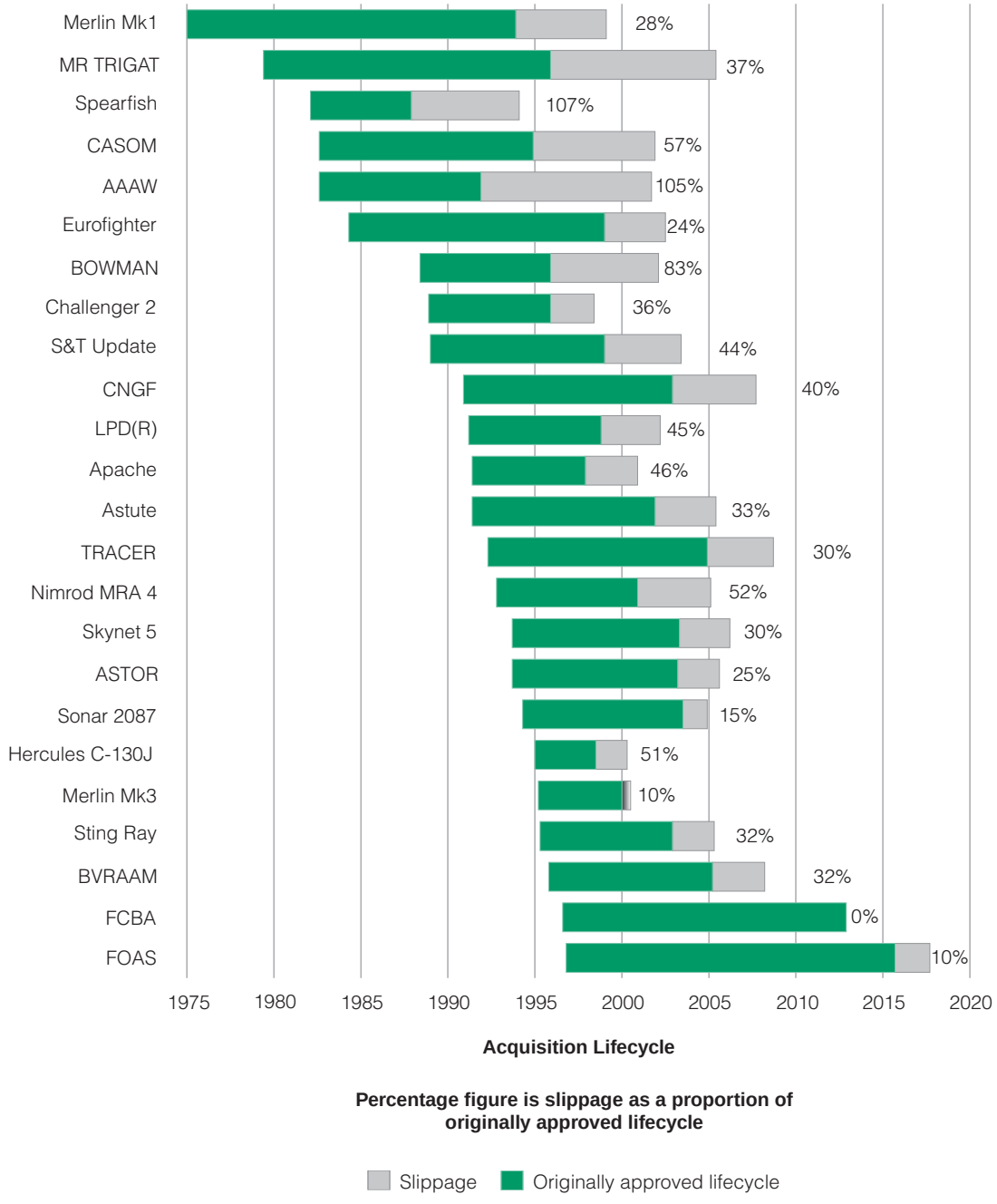
More than a quarter of the lifecycle of the projects in the 1999 Report is due to slippage

2.17 In addition to performance against approved timescale parameters, the total elapsed time of a project can provide an indication of the efficiency of the procurement process. The average lifecycle of projects in the 1999 Report (excluding Successor Identification Friend or Foe for which an in-service date has not yet been set), from the approval of the start of the first stage to the current forecast in-service date, is 14 years. Figure 16 shows the lifecycle of each project in the 1999 Report and indicates the proportion of elapsed time due to in-service date delays in each case. It highlights that, on average, delays extend the originally estimated lifecycles of projects by 38 per cent and in two cases, Spearfish (which achieved its in-service date in 1994) and the Air-launched Anti-Armour Weapon, means that the elapsed time between first approval and in-service date is more than twice that originally intended.

Figure 16

Acquisition lifecycles of each project in the 1999 Major Projects Report

Lifecycles have been extended by an average of 38 per cent due to slippage.



Note: Acquisition lifecycle refers to the period from the approval of the start of the first stage to the current forecast in-service date.

Source: National Audit Office

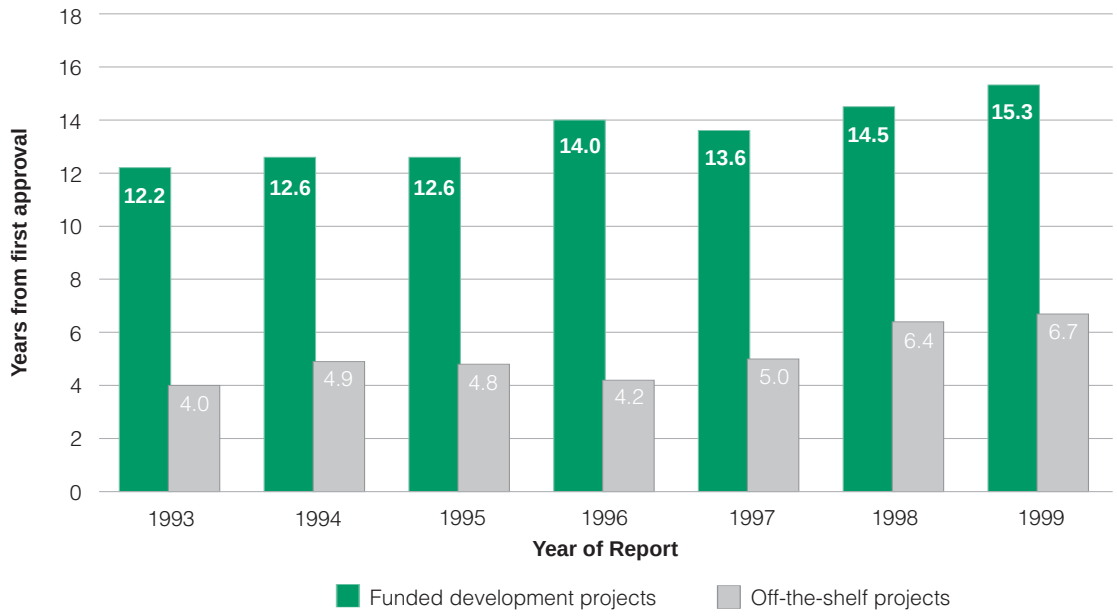
Lifecycles are getting longer

2.18 Figure 17 shows that, as might be expected, the lifecycle of an off-the-shelf project is less than half that of a funded development project. However, project lifecycles for both funded development and off-the-shelf procurements are getting longer, increasing by 25 per cent and 68 per cent respectively since 1993, a trend which contrasts with other manufacturing industries, where 'time to market' has generally shortened as new technology has facilitated quicker design and development processes.

Figure 17

Average lifecycles for funded development and 'off-the-shelf' projects since the 1993 Major Projects Report

Average lifecycles are increasing.



Notes: 1. On funded development projects the Department places contracts with industry to develop equipment, including designing it. Equipment categorised as purchased off-the-shelf generally has already been designed, although further development work to meet the Department's specification is usually necessary.

2. In each year of the Report, the following equipments have been included as off-the-shelf projects:

1993	1994	1995	1996	1997	1998	1999
Harrier T10 AS90 Howitzer	Sea Harrier Attrition buy AS90 Howitzer	Sea Harrier Attrition buy Hercules C130-J	Sea Harrier Attrition buy Hercules C130-J Chinook Merlin Mk 3	Hercules C130-J Chinook Merlin Mk 3 Apache Tomahawk	Hercules C130-J Merlin Mk3 Apache	Hercules C130-J Merlin Mk 3 Apache

3. The Apache Attack Helicopter is included as an off-the-shelf project in 1997, 1998 and 1999. Unlike the other projects classified as off-the-shelf procurements, for which the first approval was for development and production, Apache included a competition phase and its lifecycle is 9 years as opposed to 4 or 5 years for the others.

Source: National Audit Office

Part 3: The impact of project slippage on operational capability and costs

3.1 The Department's performance in procuring major projects to meet originally estimated in-service dates is getting worse with the Armed Forces receiving major equipments on average almost four years later than originally estimated. Such slippage means that the equipment being procured will not be available at the date envisaged in the original plans, and this is likely to have some adverse implications for operational capability. The nature and scale of any adverse capability impact will, in practice, depend upon a range of factors such as the improved performance of the equipment eventually put into service after a prolonged study period, the use which would have been made of a differently specified equipment during the period of slippage and the comparative capability of the equipment which it is replacing. Similarly, the cost implications of slippage may be varied, ranging from additional costs in running-on or modifying old equipments to possible cost savings or deferral of expenditure, as is usual if a delay in committing to development and production of the new equipment is accompanied by a delay in associated expenditure. Assessing the operational and cost impacts of slippage is therefore a complex task.

3.2 This Part of our report examines:

- what the Major Projects Report shows about the operational and cost effects of slippage (paragraphs 3.3 to 3.4);
- the operational and cost effects of project delays on four case study projects - the Air-launched Anti-Armour Weapon, the Medium Range TRIGAT anti-tank weapon system, the BOWMAN communications system and the Common New Generation Frigate (paragraphs 3.5 to 3.25); and
- how Smart Procurement is seeking to address the problems that cause project delays and how such approaches may have helped to prevent some of the causes of delay on the four case study projects (paragraphs 3.26 to 3.36).

The key points emerging from our examination are:

On the significance of slippage for the operational capability of the Armed Forces:

- the primary reason for 80 per cent of the projects in the 1999 Major Projects Report is to replace and improve existing equipment. In may of these cases slippage delays the introduction of improved military capability but the significance of the impact of the delay will depend on whether the equipment would actually have been utilised in an operational scenario and the extent to which the original in-service date had been correctly specified. (paragraph 3.4 and Figure 19);

- on Medium Range TRIGAT the operational effect of the nine and a half year slippage has, in practice, been limited since the capability has not been required to date, although this could not have been anticipated when the in-service date was originally set (paragraphs 3.16 - 3.21);

- on the Air-launched Anti-Armour Weapon and Common New Generation Frigate, delays have led to significant capability gaps which have only been partially offset by upgrades and changed operating patterns (paragraphs 3.6 - 3.15).

On the effects of slippage on the operational utility of the equipment procured:

- changes in the military environment since the Medium Range TRIGAT requirement was written in 1982 may influence the Department's decision on whether to procure a second anti-tank missile to meet the needs of Rapid Reaction Forces (paragraphs 3.16 - 3.21);

- the Department's ability to deploy RBL755 ahead of the introduction into service of the Air-launched Anti-Armour Weapon may be limited by possible future restrictions on the unexploded bomblets that it leaves behind (paragraph 3.10);

- the Department believes that delays associated with the study phases of a project can be expected to result in the procurement of an equipment with a better performance than originally envisaged.

On the cost implications of slippage:

- slippage on 17 of the projects in the 1999 Major Projects Report is expected to result in a net increased cost to the Department of £426 million – about one and a half per cent of approved project procurement costs (paragraph 3.3).

On the variety of ways slippage affects costs:

- upgrades to BL755 and CLANSMAN to maintain a minimum acceptable capability ahead of the introduction of the Air-launched Anti-Armour Weapon and BOWMAN respectively, have added at least £34 million to project costs (paragraphs 3.8 - 3.9 and 3.25);

- delays on to the Air-launched Anti-Armour Weapon led the Department to upgrade additional stocks of BL755 for use in the NATO air campaign over Yugoslavia, paying a premium of almost double the cost for each bomb compared to a previous upgrade because of the urgency of the situation and small quantities involved (paragraph 3.9);

- the lower operating costs of the equipments to be replaced by the Air-launched Anti-Armour Weapon, Medium Range TRIGAT and BOWMAN have reduced the costs borne by the Department during the period of slippage (paragraphs 3.11, 3.18 and 3.25);

- conversely, on the Common New Generation Frigate delays have increased support and operating costs by £537 million (paragraph 3.15);

continued…

On the variety of ways slippage affects costs *(continued)*:

- most of the delays on the Air-launched Anti-Armour Weapon and all of the delays on Medium Range TRIGAT, BOWMAN and Common New Generation Frigate have occurred before the Department committed to production expenditure so there have been significant delays in incurring acquisition costs.

On the Department's ability to predict the costs of slippage:

- the Department has been unable to produce estimates of additional run-on costs incurred for three delayed projects in the Major Projects Report (paragraph 3.3);
- on the Air-launched Anti-Armour Weapon and BOWMAN projects the Department has only broad estimates for the costs of operating the new systems ahead of the definition of support policies and the requirement respectively (paragraphs 3.11 and 3.25);
- the full scale of additional costs on Medium Range TRIGAT will remain unclear until the Department decides what to do with the excess equipments it has agreed to procure in the international collaborative Memorandum of Understanding (paragraph 3.21).

On the potential of Smart Procurement to reduce project slippage:

- Smart Procurement should help to address many of the underlying causes of delay. In particular, the greater emphasis on risk reduction before making main investment decisions, the introduction of Integrated Project Teams with industry representation and a clear customer, improved estimating and the use of incremental acquisition (paragraphs 3.26-3.30);
- some causes of slippage, notably the actions of other nations, major changes in the security environment and changes in government policy, are outside the Department's ability to influence directly (paragraphs 3.31-3.34);
- there are signs that recently established Integrated Project Teams are identifying opportunities which may result in cost savings (paragraphs 3.35-3.36).

What the Major Projects Report shows about the operational and cost effects of slippage

Slippage on the 25 projects in the 1999 Report will increase the net costs (mainly support costs) borne by the Department by £426 million but this will be offset by the deferral of acquisition expenditure

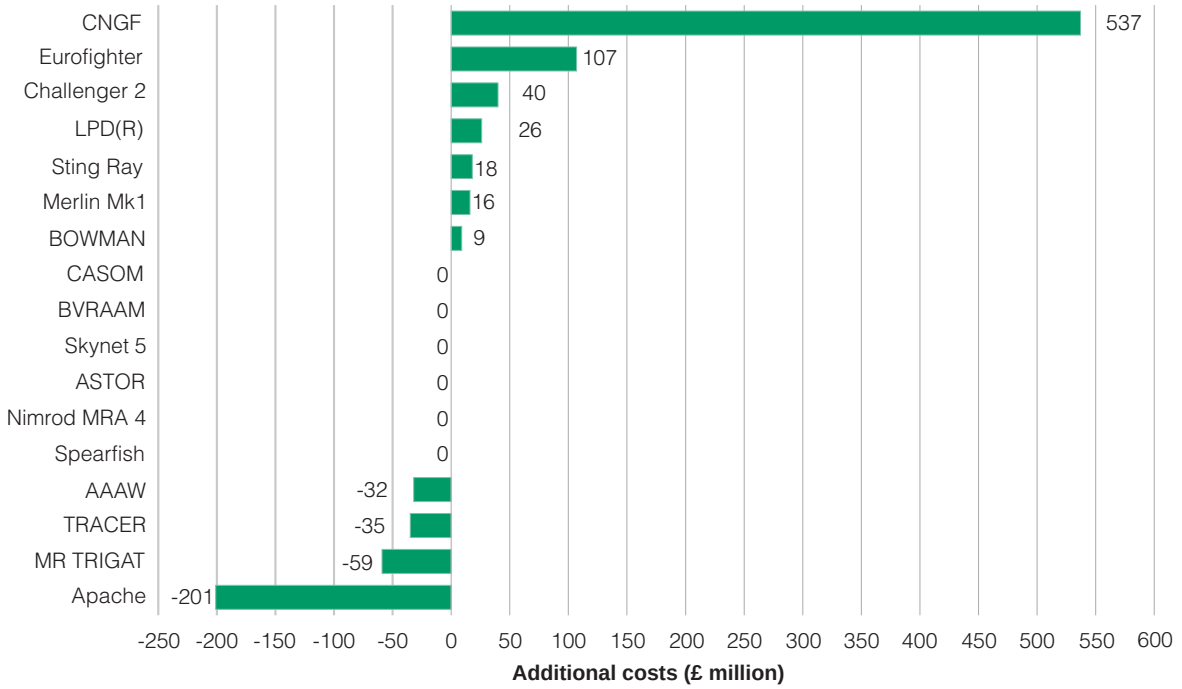
3.3 In producing the Major Projects Report the Department estimates the additional costs which it has, or expects to, incur on all projects which have slipped by two years or more. Figure 18 (overleaf) summarises the additional costs associated with the 20 projects in the 1999 Report on which the Department is required to provide data. It shows that, on seven projects, slippage is expected to increase the costs borne by the Department by £753 million with the main drivers being the cost of sustaining or improving existing equipments and additional support and manpower costs. In four cases, the Department expects to save money since the existing equipments are cheaper to support than the new equipments are

expected to be, although such benefits must be offset against the lower capability available pending the entry into service of the new equipments. In six cases, the Department does not expect any additional costs will accrue and, in three cases, it does not possess sufficient data to provide a reliable estimate of the additional costs. The net result of slippage on the projects in the 1999 Major Projects Report is therefore to increase the costs borne by the Department by £426 million. These costs of squeezing more life out of existing systems reflect only additional costs incurred by the Department until the new equipment enters service and do not reflect, for example, any costs incurred by industry in sustaining teams during elongated competition and approvals processes. Extra support costs will be accompanied by a corresponding deferral of acquisition expenditure which may also, if the delay has occurred following the main investment decision, be reduced by the amount of any liquidated damages received.

Figure 18

The cost implications of slippage on the projects in the Major Projects Report

Project delays will cost the Department an additional £426 million, mainly in support costs



Note: The costs shown are the net costs over the period of slippage for each project, e.g. costs of running on old equipment net of savings on the support costs of the new equipment.

Source: National Audit Office

The effect of project slippage on operational capability varies

3.4 Figure 19 (overleaf) shows that four fifths of the projects covered by the Major Projects Report are being procured primarily with the intention of replacing an existing capability. In such cases, when faced with delays, the Department is likely to be able to field some capability although, as the case studies highlight, this may be limited and of differing levels of utility depending upon the scenarios in which it is required to be deployed. If the equipment being procured represents a new or a step-change in capability (as is the case for six equipments in the 1999 Report) the effect of delay may be more serious and mean no comparable operational capability is available. Conversely, if the capability being acquired is not required for operational use during the period of delay the operational implications are likely to be marginal. If the existing capability provides an extended period of operational utility, as is expected to be the case with the Skynet 4 communications satellite for example, then the deferral of its replacement, Skynet 5, leads to a sensible economy.

The operational and cost effects of programme slippage on four case study projects

3.5 The following paragraphs examine the operational and cost effects of delay on four case study projects - the Air-launched Anti-Armour Weapon, the Medium Range TRIGAT anti-tank weapon system, the BOWMAN communications system and the Common New Generation Frigate - in more detail. The projects were selected to provide a spread across each of the land, sea, air and communications sectors. Figure 20 (overleaf) provides further details of the four case studies. Appendix 6 explains how we selected the case studies and the methodology underpinning our examination.

The operational rationale underlying the projects in the Major Projects Report

Figure 19

Most new equipment acquisition projects are intended to replace and improve existing capabilities

Project	New capability	Replacing equipment	Upgrading capability /extending the life of existing equipment
AAAW	✓		
Apache	✓		
ASTOR	✓		
Astute		✓	
Bowman	✓		
BVRAAM	✓		
CASOM	✓		
Challenger 2		✓	
CNGF		✓	
Eurofighter		✓	
FCBA		✓	
FOAS		✓	
Hercules C-130J		✓	
LPD(R)		✓	
Merlin Mk1		✓	
Merlin Mk3		✓	
MR Trigat		✓	
Nimrod MRA 4		✓	
S&T Update			✓
SIFF		✓	
Skynet 5		✓	
Sonar 2087		✓	
Spearfish		✓	
Sting Ray			✓
TRACER		✓	
Total	**6**	**17**	**2**

Note: Categorisation reflects the primary purpose of the acquisition project. In practice many of the new equipments being procured will not only improve on an existing capability but will extend it into new areas. AAAW and BOWMAN provide new capabilities which are different in character from the equipment being replaced.

Source: National Audit Office

Figure 20 The projects we examined

The projects were selected to provide a spread across each of the land, sea, air and communications sectors.

Project	Operational Environment	Project Maturity	Slippage (months)
Air-launched Anti-Armour Weapon A two stage warhead missile, known as Brimstone, that will be used to defeat enemy armoured forces, primarily main battle tanks, as early and as far forward as possible, minimising their contribution to the battle. Brimstone will replace the BL755 free-fall cluster bomb. The missile is equipped with a microwave seeker which is capable of categorising targets as well as providing a homing capability.	Air	90% towards forecast in-service date 2001	118(1)
Common New Generation Frigate A replacement for the Royal Navy's Type 42 Destroyers. The Common New Generation Frigate was to be equipped with the Principal Anti-Air Missile System (PAAMS). In April 1999, tripartite collaboration on the warship with France and Italy was discontinued and the United Kingdom will procure a ship, the Type 45 Destroyer, on a national basis. This will be equipped with PAAMS which continues to be developed as a tripartite project.	Sea	50% towards forecast in-service date 2007	57
Medium Range TRIGAT An anti-tank guided weapon system for the Infantry and the Royal Marines to replace the MILAN system. A multi-national project - the United Kingdom, France and Germany will purchase the majority of the equipment with the Netherlands and Belgium also involved.	Land	80% towards forecast in-service date 2005	114
BOWMAN – Armed Forces Tactical Communication System BOWMAN will provide the Armed Forces with a secure tactical communications system replacing and improving on both the CLANSMAN combat radio and part of the PTARMIGAN communications infrastructure.	Communications	80% towards forecast in-service date 2002	75

Note: 1. All contract milestones for Brimstone have been met since the award of the development and production contract in November 1996

Source: National Audit Office

The Air-launched Anti-Armour Weapon (AAAW)

3.6 Operational experience during the Gulf Conflict, and more recently in the Balkans, has emphasised the importance of air-launched anti-armour attack. The Air-launched Anti-Armour Weapon – AAAW – is intended to provide such a capability and will replace the BL755 free-fall cluster bomb which first entered service in 1972. The Department originally estimated that AAAW could be brought into service in December 1991 but following contract placement in 1996, it is now scheduled to become available for operational use in October 2001. The Department reports that the AAAW which will come into service then will be considerably more effective, particularly with regard to target discrimination, than the weapon which was envisaged to come into service in 1991.

Slippage on the Air-launched Anti-Armour Weapon project has had significant operational implications

3.7 The ten-year delay in procuring AAAW has resulted in a capability gap. In 1991, the year AAAW was originally due to enter service, the Department acknowledged that experience during the Gulf Conflict had shown that BL755 was no longer credible against modern main battle tanks. This reflected the fact that BL755s must be dropped by overflying the target at low-level. Restrictions, requiring pilots to release munitions from a height considered sufficiently operationally safe, limited the operational utility of BL755 and meant that less than half of one percent of BL755 stocks transported to the Gulf were used during the air campaign.

Upgrading BL755 has cost £20 million

3.8 The Department has taken a number of actions to improve BL755 and to provide an interim capability pending the entry into service of the AAAW. The most significant of these has been the development and procurement, at a cost of some £11 million, of a radar proximity sensor that can be fitted to existing BL755 bombs, upgrading them to RBL755 standard. The sensor enables RBL755 to be dropped from a higher level, enhancing its deployability. Some 17 per cent of BL755 stocks have been upgraded to RBL755 standard. Despite the upgrade, developments since the Gulf Conflict have exacerbated the deficiencies of BL755. In particular, advances in countermeasures, such as Defensive Aids Suites and Explosive Reactive Armour, mean that modern hostile main battle tanks are now at least four times more likely to survive an attack from BL755 than in 1991. BL755 is currently assessed as having only around five percent of the operational capability against tanks that AAAW will have.

3.9 Despite its limited capability against modern tanks, BL755 remains effective against a wide range of softer targets such as trucks and transport vehicles. RBL755 was the Royal Air Force's most frequently used munition in the NATO air campaign over Yugoslavia that began in April 1999. Recognising the likelihood that RBL755 would play an important part in the campaign, the Department raised an Urgent Operational Requirement for the procurement of modification kits sufficient to increase RBL755 stocks by some 50 per cent. Because of the urgency of the situation and the small order quantity involved, the Department is likely to pay a premium of around double the cost for each modification kit, compared to the initial procurement of RBL755. The Urgent Operational Requirement will cost up to £9 million. In the event, the additional munitions were not required for the campaign before it ended although, should

they have been, delivery of them was delayed by the late availability of an essential component. The munitions will be used to replenish RBL755 war reserve stocks, making stocks significantly higher than when the campaign started.

The operational use of BL755 may be limited

3.10 Ongoing testing of BL755 has demonstrated continuing high levels of reliability which mean that more recently procured BL755s will still be usable well after AAAW enters service. However, there are disadvantages associated with using BL755 that may limit the Department's ability to deploy the weapon in future. In particular, BL755 is a cluster bomb, which contains 147 bomblets. When these are dispensed, typically between 94 and 96 per cent detonate leaving some 6 to 9 live bomblets on the ground. Since the end of the NATO air campaign over Yugoslavia, British forces have been engaged in clearing several thousand unexploded cluster-bomb munitions. The Department intends to consider the future use of cluster bombs in the light of lessons learned from Kosovo and the restrictions that currently apply to the use of anti-personnel mines.

Delays on the AAAW project have saved the Department money

3.11 The existing stocks of BL755 and RBL755 are considerably cheaper to maintain than AAAW is expected to be. Annual support costs for BL755 and RBL755 are currently £0.6 million and are expected to remain constant. By comparison, the Department has made provision of £5 million per year for supporting AAAW during its first ten years in service. This much higher figure is largely accounted for by the cost of mid-life replacement of the solid-fuel rocket motor that will power the AAAW. However, there is still considerable uncertainty over the actual levels of support costs. These will depend on the operational deployment of the missile and the Department is currently considering this issue together with whether the Royal Air Force or industry will be responsible for supporting AAAW. Disposal costs for BL755 and RBL755 are currently £0.5 million annually. The cost of disposing of the oldest BL755s would have to be incurred whether or not AAAW was delayed. The considerably later than envisaged placement of the combined development and production contract has resulted in a substantial deferral of acquisition costs.

The Common New Generation Frigate

3.12 The Common New Generation Frigate project comprised two linked collaborative programmes to acquire a replacement Class of vessels for the Royal Navy's existing Type 42 anti-air warfare Destroyers (Project Horizon) and to equip them with a missile system (the Principal Anti-Air Missile System (PAAMS)) capable of protecting the vessels themselves and ships in their company against aircraft and missiles. The Common New Generation Frigate was originally intended to enter service in December 2002 and work alongside the Type 23 Frigates whose primary role is anti-submarine warfare. In April 1999, the Defence Ministers of the United Kingdom, France and Italy agreed not to proceed with development and production of the Horizon project, and Phase 1 (Project Definition) was subsequently completed at the end of October 1999. The replacement national Type 45 Destroyer project (which will still be equipped with PAAMS) is due to enter service in 2007, the same timescale envisaged for the Common New Generation Frigate Project at the conclusion of Phase 1, but still five years later than the date originally estimated based on military judgement of when the new ships were required.

Delays in replacing the existing Type 42 Destroyers and SeaDart anti-air warfare system mean that the Navy has a limited capability against emerging stressing 21st century threats

3.13 The Type 42 Destroyers are fitted with the SeaDart anti air-warfare system which was designed in the 1960s primarily to counter the threat from manned aircraft. SeaDart is constrained by limitations on its firing capacity and reaction times. To minimise the effect of these shortcomings a number of modifications to SeaDart have been made, and others intended to sustain performance against sea-skimming and high diving anti-ship missiles are under development. Allied to the use of existing assets such as airborne early warning systems, carrier-launched aircraft and Type 22 and Type 23 Frigates equipped with the Sea Wolf missile system, these modifications are expected to sustain anti-air warfare performance in the short-term. However, the Department has assessed that overall SeaDart system capability will be limited against emerging stressing 21st century threats such as modern sea-skimming missiles and the anti-air warfare capability shortfall is likely to expand in the future.

Sea Dart will become progressively more difficult and expensive to support if the project slips further

3.14 The need to run-on SeaDart will also impose reliability and supportability risks since the missile contains obsolete components and, although reliability currently meets the requirement, this will be harder to maintain as the missiles become older. In particular, from 2006, suppliers and sub-contractors will not be contractually required to produce components which have ceased to be economically viable.

Running on the Type 42 Destroyer will cost an additional £500 million on operational and support costs

3.15 The new Type 45 Destroyers are expected to be considerably cheaper to operate and support than the Type 42 Destroyers, the first of which entered service in 1977. The Department estimates that, in net total, it will cost an additional £537 million to operate and support the existing Type 42 Destroyers because of the 57 month delay, assuming that the schedule for retiring the Type 42s and commissioning the Type 45s remains as envisaged when the Department was committed to the collaborative Project Horizon programme. The greatest cost driver is expenditure on spares due to the age of the Type 42 Destroyers. Annual spares costs for each Type 42 are on average some £12 million compared to an average £4 million expected for the Type 45. Operating costs should also be less when the Type 45 enters service. For example, the complement anticipated for each Type 45 is 72 fewer than that for the Type 42, an annual cost saving of £2.3 million per vessel. The net additional support costs are accompanied by a substantial deferral of acquisition expenditure because of the delay in the planned ship order dates.

Medium Range TRIGAT

3.16 Medium Range TRIGAT is being procured through a collaborative programme to replace the ageing MILAN anti-tank weapon which first entered service in 1979. The final batch of MILAN missiles was delivered in 1989 and, given that each MILAN missile has a planned ten year lifespan, the intention was that Medium Range TRIGAT should begin to enter service in 1996 to allow MILAN to be phased out of operational service by 1999.

The nine and a half year slippage on the Medium Range TRIGAT project has limited the anti-tank capability of the Armed Forces

3.17 Medium Range TRIGAT is not now expected to begin to enter operational service until June 2005. The Department has therefore extended the operational life of MILAN by five years and is currently considering whether a further five-year extension of the life of MILAN until 2009 would be possible. Extending the life of MILAN is of only limited military utility since the system has an extremely limited ability to defeat modern tank armour. The Department does not consider that the delay in the entry into service of Medium Range TRIGAT has adversely affected the effectiveness of the Armed Forces in recent deployments, notably in the Balkans. However, the Department recognises that, if the nature of the deployment was different and British troops were required to defend ground against Main Battle Tanks equipped with modern armour, a more effective anti-tank guided weapon system than MILAN would be essential. This is the role that Medium Range TRIGAT is intended to perform.

Delays introducing Medium Range TRIGAT into service will save the Department £59 million, mostly in support costs

3.18 The Department has estimated that extending the life of MILAN by ten years will cost £22 million, reflecting the £2 million annual cost of supporting MILAN and the cost of trials to determine the possibility of running MILAN until 2009. These costs assume that the trials do not identify any additional expenditure necessary to maintain the MILAN missiles as they become older. By comparison, the Department currently estimates that it will save £81million in cash terms from the delays in introducing Medium Range TRIGAT into service because the new system will be more complex than MILAN and the Department forecasts that it will be significantly more expensive to support. This cost saving is accompanied by the delayed commitment to production expenditure but has been achieved at the price of reduced military capability between 1996 and 2005, although the Department considers that this has had no operational impact.

Medium Range TRIGAT may not meet all the Armed Forces' needs

3.19 When the Medium Range TRIGAT Operational Requirement was written in 1982 the solution proposed was considered to be innovative but lower risk than the next generation technology solutions which other nations were considering

adopting. However, in the 17 years since the Requirement was written, specifying a laser-guided weapon, these next generation technologies have matured and alternative weapons systems – notably the United States Javelin and Israeli GILL/SPIKE – have been developed utilising them. At the same time, the level of protection afforded to the tanks which Medium Range TRIGAT is intended to defeat has improved and the greater emphasis being placed on manoeuvrability and speed of response implies that a more mobile system than Medium Range TRIGAT may be needed to equip part of the United Kingdom's Rapid Reaction Forces.

3.20 The Department has recognised these challenges and will undertake a pre-planned product improvement programme to maximise the performance of the Medium Range TRIGAT missile warhead once it is in-service. However, the need to maintain a minimum level of capability once MILAN stocks begin to be depleted, coupled with the limited suitability of Medium Range TRIGAT for use by the United Kingdom's Rapid Reaction Forces, will create a significant equipment shortfall from 2004 onwards. The Department has not yet undertaken the operational analysis to define the scale of the capability shortfall, but is considering buying one of the alternative systems to Medium Range TRIGAT. An off-the-shelf purchase of this type would aim to ensure that a suitable level of capability is attained and would result in the Armed Forces having different attack methods available. The number of weapons to be purchased and the funding required for this interim buy are not clear but, as the approved funding for Medium Range TRIGAT is fully committed, the costs will have to be met from elsewhere within the Department's budget.

The cost of buying more Medium Range TRIGAT systems than now required is some £40 million at present

3.21 The interim buy would be in addition to, and may reduce the need for, the quantities of Medium Range TRIGAT which the Department has agreed to procure in the Memorandum of Understanding which it has concluded with its partners on the programme. The quantities in the Memorandum of Understanding reflected assumptions made in the Strategic Defence Review which have subsequently been re-assessed, reducing the numbers required. Since the negotiations on the Memorandum of Understanding had only been concluded with some difficulty, given the substantial reduction in United Kingdom orders already made following the end of the Cold War, the Department did not feel able to seek a further re-negotiation. Rather, the Department is considering ways of minimising the financial impact of buying the excess missiles and firing posts to which it is

committed. Options under consideration include industry buying back the excess for sale to a third party or using the extra systems as spares. The estimated cost of the excess weapons is some £40 million at present.

BOWMAN

3.22 BOWMAN will provide the forces supporting land operations with a tactical communications system to replace the increasingly obsolescent CLANSMAN combat radio which has been in-service since the mid-1970's and the Headquarters infrastructure element of the PTARMIGAN trunk system. BOWMAN was due to enter service in 1995, but by March 1997 this date had slipped to March 2002. The Department now expects it to slip further to late 2003 or early 2004.

Slippage on the BOWMAN project means that forces supporting land operations must operate with an insecure, cumbersome and unreliable tactical communications system

3.23 Military communications using the CLANSMAN radio are not cryptographically protected. Classified messages are encrypted and sent using cumbersome paper codes that are slow to compile and prone to error and inaccuracy in use. These factors limit the ability of units to pass secure messages quickly up and down the command chain.

The digitisation programme will be delayed by the slippage on BOWMAN

3.24 The slippage on BOWMAN also has wider implications. The Strategic Defence Review highlighted the importance to the United Kingdom's defence capability of introducing digital technology to communications and other defence systems. The Department expects digitisation to yield operational benefits through more timely and efficient acquisition, processing, distribution and presentation of information. BOWMAN is a cornerstone of the Department's programme for digitisation of the three defence environments and the planned main introduction of digitised battlefield command and control systems cannot begin until BOWMAN has entered service. The further slippage expected on BOWMAN means that this will not now begin until around 2004.

The slippage on BOWMAN has cost the Department £9 million in additional run-on costs, a figure which will rise now that the project is expected to be further delayed

3.25 To minimise the effects of the shortcomings in the CLANSMAN combat radio the Department has introduced a number of short-term upgrades at significant cost. For example, Project KIPLING costing £14 million was assessed by the Department as vital to protect the security of tactical data transmissions made using CLANSMAN. The cost of such measures has been partially offset by the running costs of CLANSMAN being lower than those estimated for BOWMAN so that, at the end of March 1999, the Department estimated that the net additional cost of support and short-term upgrades over the seven year delay will be £9 million, although acquisition costs of around £900 million have been deferred over the same period. However, the further slippage is likely to cost the Department some £2 million for each additional year due to the costs of continuing to support the increasingly obsolescent CLANSMAN exceeding those estimated for supporting BOWMAN (£20 million compared to £18 million).

Addressing the problems that cause project delays through Smart Procurement

3.26 Figure 21 (overleaf) highlights the causes of delay on the four case study projects. Together with the vesting of the Defence Procurement Agency on 1 April 1999 and its subsequent reorganisation on the basis of Integrated Project Teams, Smart Procurement is intended to ensure that the Department is better able to define projects, identify risks earlier, and develop strategies for managing them to deliver equipments within approved cost, time and quality boundaries. The following paragraphs examine how Smart Procurement might have prevented some of the delays which occurred on the four case study projects we examined.

Figure 21

Causes of delay on the case study projects

The case studies have been delayed for a number of reasons.

Project	In-service date slippage (months)	Technical Difficulties	Project Definition	Budgetary constraints	Collaborative Process	Contract Negotiations	Other
Air-launched Anti-Armour Weapon	118 months to Oct. 2001		●	●		●	
Common New Generation Frigate	57 months to Sep. 2007				●	●	●(1)
Medium Range TRIGAT	114 months to Jun. 2005	●		●	●		
BOWMAN – Armed Forces Tactical Communications System	75 months to Mar. 2002	●	●	●			

Note: 1. This slippage was caused by the need to align the separate Project Horizon and Principal Anti-Air Missile System collaborative programmes, which together were intended to meet the Common New Generation Frigate requirement.

Source: National Audit Office

Technical difficulties emerged because risks were not fully understood and addressed from the outset

3.27 As part of Smart Procurement the Department is putting in place processes to identify and evaluate alternative technical and procurement solutions early in the acquisition cycle so that, at the time at which the main investment decision ('Main Gate') is made, the level of risk outstanding is low and well understood. This philosophy should help to prevent problems such as those on the Medium Range TRIGAT project, where the lack of a formal risk management strategy for the development phase of the project contributed to 22 months delay due to uncertainty over the level of risk remaining for future phases. Similarly, on the technically complex BOWMAN project, a number of risks have matured which were not fully considered or evaluated when the original in-service date was set. In particular, neither the Department nor industry were able to take full account of the effect which the rapid pace of technological change, and the corresponding increase in Users' expectations, would have on demand. For example, Users' data transmission needs increased tenfold between 1988 and 1996. These factors contributed to the collapse of competition on the project in 1996. Since 1996 the Department has committed to an advance of some £200 million of development

work as risk reduction aimed at producing a technically compliant and affordable solution before commitment to the main supply (development and production) contract.

Changes in the defence environment and the pace of technological change meant that the continuing relevance of the original Requirements and technological solutions were questionable

3.28 Several aspects of Smart Procurement are aimed at improving the definition of equipment requirements and matching them more closely to the available technology and what industry can realistically deliver. For example, the establishment of a clear relationship between those responsible for funding and defining Users' needs and the Defence Procurement Agency Integrated Project Team, responsible for acquiring the equipment with agreed boundaries within which time, cost and capability can be traded-off. Similarly, the involvement of industry in Integrated Project Teams throughout the equipment lifecycle (except during competitions) should ensure their knowledge and expertise is more fully utilised. These initiatives should help the Department to baseline its requirements more accurately and set in-service dates with confidence at the point of the main investment decision. For example, they should help to prevent problems such as those encountered on the Air-launched Anti-Armour Weapon where the Department was expected to set a firm baseline for the requirement and in-service date at the outset. In the event, that project had to be re-defined twice to reduce the level of technical risk (and ensure affordability) before a realistic in-service date was set.

3.29 Smart Procurement promotes the use of incremental acquisition, which is aimed at acquiring capability progressively through initial delivery of a specified baseline capability using technology confidently expected to be available and then progressively incorporating evolving technology as it is needed. The Department is already adopting incremental acquisition to resolve problems on projects such as BOWMAN. The Department originally specified the performance required from BOWMAN in general terms and has sought to incorporate emerging advances in technology that have realistically been in prospect, such as digitisation, into the proposed solution. Such changes have added to the technical complexity and cost of the project and have contributed to the delay in meeting the in-service date.

3.30 Recognising the shortcomings in its previous approach, the Department froze its Requirement in 1997, and now intends to approach acquisition of the full BOWMAN capability by using incremental acquisition techniques. The Department introduced a tactical ground-to-air radio capability in November 1998

and announced in December 1999 that it plans to deliver the short-range non-secure tactical radio capability (the Personal Role Radio) starting in 2001, ahead of the main BOWMAN system. These are relatively small and less complex parts of the intended full BOWMAN capability, and the Department believes that their early introduction will not prejudice integration of the main BOWMAN system. The Department expects to start introducing the main BOWMAN system in late 2003 or early 2004, at which point it will be available to light units in the first brigade to be equipped. Capability will be increased as equipment is integrated onto more technically complex platforms, such as armoured vehicles. Elements such as a battlefield internet capability will also be introduced incrementally and initially a relatively simple battlefield internet will be fielded, which will be extended down to lower tactical levels around 2007.

Project schedules have been adversely affected by budgetary constraints

3.31 The need to match project funding with the Department's overall resources led to 40 months delay on the BOWMAN project and 24 months delay on the Medium Range TRIGAT project. Some of the reasons for budgetary constraints are outside the Department's ability to influence, for example decisions on the re-allocation of resources across government. Others are clearly within the Department's ambit. In particular, one reason for over-programming has been to compensate for unrealistic timescale estimating on projects deriving from factors both within and outside the Department's control. By reducing and better understanding programme risks before making major investment decisions, Smart Procurement should enable the Department to set cost and timescale parameters for projects with greater confidence, hence providing a sounder basis upon which to manage the procurement budget.

Agreeing equipment requirements and industrial and project management arrangements with collaborative partners was problematic

3.32 Smart Procurement will not address all of the causes of project delay highlighted by the Major Projects Report. For example, it cannot predict changes to the external security environment, government policy, or funding levels. This was the case with the Air-launched Anti-Armour Weapon where a full review of the continuing validity of the Requirement was conducted following the end of the Cold War. The review effectively froze work on the project for 63 months.

3.33 The factors affecting the timely progression of collaborative programmes, such as political and funding difficulties and changed requirements driven by foreign partners, will continue to prove challenging for the Department even under Smart Procurement, although the ability to make trade-offs brings the Department's practices more into line with many partners. For example, on the Common New Generation Frigate project, many of the difficulties have stemmed from differing assessments by the United Kingdom and its French and Italian partners of the capability required of individual sub-systems, and hence of the time required for them to achieve their performance requirements. Resolving these differences between partners led to delays and complicated negotiations between governments and industry. The negotiations are often protracted because of a natural reluctance to disclose technical and pricing information before a collective agreement to proceed. This is particularly sensitive in the area of detailed performance information available to one partner but which may need to be disclosed to others in order to substantiate their confidence in the proposed system. For example, it took over three and a half years for the partner nations to reach the agreements on system performance and costs that allowed the three partners to sign the full development and initial production contract for the Principal Anti-Air Missile System.

3.34 In other cases the differences between partner nations and industry could not be resolved and, reflecting the emphasis which Smart Procurement places on achieving approved cost, time and performance targets, the Department has decided not to proceed with the collaborative programme. This was the case on the Project Horizon element of the Common New Generation Frigate project, where the Department was not confident that the required solution would be delivered within the time, cost and performance parameters specified. Amongst other factors, industry were unable to agree a suitable managerial structure and this was a major factor influencing the three nations decision to abandon the Project Horizon element of the collaborative programme. On Medium Range TRIGAT the Department faced similar problems and there was a two year delay to the project whilst nations reached agreement on changes to the industrial arrangements although, in this case, industry did re-organise successfully with Aerospatiale taking on a prime contractor role.

There are signs of some early successes from the application of Smart Procurement principles

3.35 It is too early to tell whether Smart Procurement will fulfil all of its aims and in some areas, such as establishing robust whole-life costs for equipments, there is still a long way to go. However, in conducting our analysis of the 1999 Major

Projects Report, we have noted some signs that Smart Procurement principles are being put into practice on the ten projects in the 1999 Report which were amongst the first 33 Integrated Project Teams formed:

- the Nimrod MRA 4 Integrated Project Team has identified scope to recover part of the 23 months project slippage, and opportunities for whole-life cost savings;

- the Air-launched Anti-Armour Weapon Integrated Project Team has agreed a gain-sharing arrangement with Marconi Defence Systems (now part of BAE SYSTEMS) whereby each will share cost savings identified by either party; and

- the Challenger 2 Integrated Project Team has developed partnering relationships with Vickers Defence Systems and Royal Ordnance, and with the military customer. These have produced a number of benefits, including improvements in the tank's reliability and the earlier provision of a hot climate charge for the tank's ammunition, which produced a £3 million saving in the procurement cost. The team has also identified potential savings which, if they can be demonstrated, could save up to £200 million over the life of the tank.

3.36 Whilst, in theory, all of the measures listed above could have been identified before the introduction of Smart Procurement, they serve to illustrate how the new structures and systems of responsibility and accountability being introduced should encourage innovation and well-judged risk taking and should lead to better use of defence resources.

Appendix 1

The validation process

Scope of the validation process

1 The Major Projects Report is not a statutory account and we do not offer a formal audit opinion on the accuracy of data contained within it. We do, however, perform a number of test checks on the data. For the 1999 Report these checks included:

- confirmation that the projects reported were the top 25 projects by value; and

- validation of the data in all the 25 project summary sheets in the draft Major Projects Report.

2 The Department compiles the summary sheets according to guidelines which we have agreed with them. The guidelines require the Department to calculate figures on a different basis to the Appropriation Accounts and Treasury approvals of expenditure. Our validations are designed to confirm that the draft project summary sheets conform to the guidance and that it has been accurately and consistently applied. We check that the correct approvals are quoted and that both approvals and current estimates of costs are accurately uplifted to current prices. We also ensure that variances are correctly calculated and categorised. Although we confirm that the costs reported are consistent with the variation of price (VOP) clauses of the relevant contracts, we do not question the forecasts or assumptions of the Departments' Long Term Costings unless better information has subsequently become available.

3 In 1999, as in 1998, the draft project summary sheets were also made available to industrial prime contractors for comment and amendments were incorporated where appropriate.

Outcome of the validation process

4 Twenty of the 25 draft project summary sheets in the 1999 Report were amended following validation and eight required changes to the overall cost figures or in-service date originally shown. Of these eight, five were due to only minor errors, while more significant problems were identified on:

- the Air-launched Anti-Armour Weapon draft summary sheet, where amendments were necessary to accurately reflect the effect of VOP elements of the contract on costs. The complexity of contract clauses, particularly the use of VOP formulae, means that accurate calculation of current estimates of costs is often difficult; and

- the BOWMAN and Skynet 5 draft summary sheets due to misunderstanding of the Department's guidelines for calculating approval costs.

5 Of the remaining 12 projects, eight required only minor textual amendments and four required adjustments to the scale or categorisation of individual cost and slippage variations that did not significantly affect the overall cost figures or the in-service dates originally shown. However, the information supporting the draft project summary sheets often required significant clarification before it provided an acceptable level of assurance on the accuracy of the figures and dates shown.

6 As in 1998, the level of accuracy in the draft project summary sheets and the quality of the supporting data were better in 1999 than in earlier Major Projects Reports. This improvement was aided, in particular, by the more widespread use of computerised spreadsheets in the Department to perform the often-complex calculations, which should also help to prevent inaccuracies in the future. Notably, the draft project summary sheet for the Tactical Reconnaissance Armoured Combat Equipment Requirement project was supported by good quality information and required very little alteration.

Appendix 2

MINISTRY OF DEFENCE

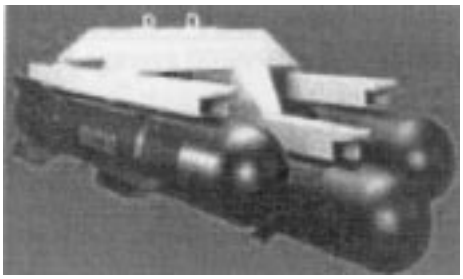
PROJECT SUMMARY SHEETS 1999

March 2000

Ministry of Defence
PROJECT SUMMARY SHEETS 1999

Contents

Air-launched Anti-Armour Weapon (AAAW)



Integrated Project Team:
BRIMSTONE

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

SR(A)1238, Air-launched Anti-Armour Weapon (AAAW) is designed to reduce the fighting power of enemy armoured forces as early and as far-forward as possible by defeating modern and future Main Battle Tanks (MBTs). It replaces the BL755 cluster bomb and will be fitted on Tornado GR4, Harrier GR7 and Eurofighter. Fixed-wing aircraft armed with this new weapon will complement the capability provided by the Apache AH-64D. The longer reach and speed of deployment of fixed-wing aircraft means that they can engage tanks far beyond the battlefield area and before the tanks are able to join the contact battle.

Approval was given for feasibility studies and a project definition phase to be carried out in 1982 and 1986 respectively. A further proposed risk reduction phase was not finally approved because Treasury were unconvinced that it would lead to a cost effective solution. During Options for Change, specific funding for the programme was withdrawn while consideration was given to various alternatives for providing a future anti-armour capability. The project was reinstated in 1993 and the Staff Requirement was reviewed and brought up to date. The resultant document was SR(A)1238 1st Revise for an Advanced Anti-Armour Weapon which was endorsed by the EAC in 1994.

An invitation to tender was then issued and bids were received from five companies. In November 1996 a development and production contract was placed with Alenia Marconi Systems Ltd (formerly GEC Marconi Radar and Defence Systems) and the development phase is progressing satisfactorily with all milestones achieved on time. Qualification testing of the launcher leading to a successful first flight of the weapon fitted to a Tornado GR1 was achieved in December 1998 and the ground launch development firing programme is due to be completed in March 2000. The first 12 missiles are due to be delivered in March 2001.

In November 1998, responsibility for the Brimstone project was transferred to an Integrated project Team as part of the Department's Smart Procurement initiative.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
Tornado GR4[1]	1998

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Alenia Marconi Systems Ltd. Prime Contractor Development/Production	Firm Price until December 98, Fixed Price thereafter	International Competition
Boeing North American Operations sub-contractor		

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	369	446	815
Estimate of Costs at MoD Approval	364	435	799
Difference	+5	+11	+16

1 ISD for Harrier GR7/T10 has slipped to 2002. As this is now later than ISD for AAAW it is no longer critical to the project ISD and the reference is therefore deleted.

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	4	1	Reassessment of integration costs (+£2m). Reassessment of DERA costs (-£1m). Reassessment of development costs (+£2m).
Changed Requirement	4	-	Additional requirement for quantity 6 Weapon Emulators (+£4m).
Inflation	16	-	Difference between inflation assumed at contract let and GDP deflator at time of approval for production (+£14m). Difference between annual price uplift between specific indices and GDP deflator (+£2m).
Exchange Rate Variation	-	7	Exchange rate change from $1.581 to $1.624 = £1 (-£7m).
Total	24	8	

Total Balance	+16

Expenditure to date (31 March 1999) **£118m**

Approval	Date	Explanation
First approval:	1982	Feasibility Studies
Latest approval:	August 1996	Full Development & Production

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£688M (Dev/Prod)
Cost Change since Main Contract Award	-£1m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Exchange Rate Variation	-	7	Exchange rate change from $1.581 to $1.624 = £1 (-£7m).
Inflation	2	-	Increase due to difference in annual price uplift between specific indices and GDP deflator (+£2m).
Changed Requirement	4	-	Procurement of quantity 6 Weapon Emulators (+£4m).
Total	6	7	

Total Balance	-1

Year(s) of Peak Expenditure: 2003/04 & 2004/05
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): Nil

Unit Production Cost (UPC)	Quantities Required
***	***

IN-SERVICE DATES

ISD Definition: When the first *** weapons and associated support equipment have been delivered to a front-line unit and the unit is declared operational.

Original ISD (Month/Year)	December 1991
Forecast ISD (Month/Year)	October 2001
Variation (Month(s))	+118

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Changed Requirement	30	-	Refinement of Staff Target specification during feasibility studies (+1 month). Review of programme risks & financial constraints (+29 months).
Project Re-definition	75	-	Delay between EPC submission and invitation to tender (+12 months). Suspension of Project while requirement was reviewed during Options for Change and following lessons learnt from Operation Granby (+63 months).
Budgetary Constraints	12	-	Issue of RFP delayed until outcome of the Defence Costs Study was known (+6 months). To match the programme with available Departmental resources (+6 months).
Contract Negotiations	1	-	Contract placed 1 month later than planned due to final pricing negotiations (+ 1 month).
Total	118	-	

Total Balance	+118

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	- £32m[2]

2 Additional costs to modify RBL755 total £11M however this is offset during the period of slippage by the cheaper support costs for BL755 compared to those for AAAW. Across the period of slippage it is calculated that support costs for BL755 will be £43m lower than those anticipated for AAAW.

Airborne STand-Off Radar (ASTOR)

Director General Responsible:
DIRECTOR GENERAL COMMAND INFORMATION SYSTEMS (DGCIS)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

ASTOR is a long-range all weather theatre surveillance and target acquisition system, capable of detecting moving, fixed and static targets. The system comprises a fleet of air platforms, each with a radar sensor, and a number of ground stations.

In 1989 a technology demonstration programme (TDP) worth £12m (at 99/00 prices) was agreed with Research Establishments now incorporated into the Defence Evaluation and Research Agency. This intramural work ran for two years and demonstrated that the concepts used in ASTOR were practicable. A move into Project Definition (PD) was approved in September 1993.

Following open competition, two parallel contracts for an 18 month PD programme were let in February 1995. After assessment of the PD proposals it was considered that the optimum solution would be to invite the two PD consortia to submit Best and Final Offers (BAFOs) for the Development, Production and In-Service Support rather than undertake a new open competition. This revised procurement strategy was approved by Minister for Defence Procurement on 20 March 1997.

During the preparation to invite the two PD consortia to submit BAFOs in September 1997, it was decided to consider a third bid based upon the US Joint Surveillance Target Attack Radar System (JSTARS) upgrade programme, the Radar Technology Insertion Programme (RTIP). Various unsolicited revisions to the bids were received during the assessment process and the latest of these forced further BAFOs being sought in January 1999 with responses being received in February. These final BAFOs have now been assessed, and approval for the implementation phase was given in June 1999.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Lockheed Martin UK Government Systems (PD Study)	Firm	Competitive (International)
Raytheon E-System (PD Study)	Firm	Competitive (International)

PROJECT COSTS SUMMARY
(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	14	-	14
Estimate of Costs at MOD Approval	13	-	13
Difference	+1	-	+1

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	+1	-	Increase due to cost of additional work, by Defence Evaluation and Research Agency (DERA), pre-PD studies.
Total	+1	-	

Total Balance	+1

Expenditure to date (31 March 1999) 14m

Approval	Date	Explanation
First approval:	1993	Project Definition (PD)
Latest approval:	1997	Down Selection two PD Consortia and request for Best and Final Offers

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A
Cost Change since Main Contract Award	N/A

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure: 2002/03 & 2004/05

Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): £1050m - Full Development, Production and Initial In-Service Support.

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition: The date by which 2 Aircraft and 2 Ground Stations are accepted into service.

Original ISD (Month/Year)	April 2003
Forecast ISD (Month/Year)	September 2005
Variation (Month(s))	+29

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Budgetary Constraints	15	-	Due to programming measures which delayed the availability of funding and limited the flow of funds in the early years of the programme (+15 months).
Procurement Delays	14	-	Delays introduced due to the late introduction of an unplanned third bidder (based on RTIP) and various unsolicited bid revisions, leading to the need for a further round of BAFOs (+14 months).
Total	29	-	

Total Balance	+29

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	Nil (new capability)

Astute Class Submarine (Formerly known as Batch 2 Trafalgar Class Submarine)

Director General Responsible:
DIRECTOR GENERAL SUBMARINES/CHIEF STRATEGIC SYSTEMS EXECUTIVE (DGSM/CSSE)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The Astute Class submarine is the planned replacement for the Swiftsure Class SSNs. Invitations to tender were issued in July 1994 with competitive bids received in June 1995. GEC-Marconi was identified as the MOD's preferred bidder in December of the same year. Following protracted negotiations, using the policy of No Acceptable Price No Contract (NAPNOC), a contract was placed with GEC-Marconi as the Prime Contractor and announced on 17 March 1997. The contract put in place the first whole boat, Prime Contract for UK nuclear powered submarines.

The Prime Contract with GEC-Marconi is for the design, build, and initial support of three submarines. The support task will be undertaken by the Prime Contractor for a total of eight submarine years. The Prime Contract requires an integrated Tactical Weapons System with a similar performance to the Swiftsure & Trafalgar (S&T) Update. By novation and as a risk reduction measure, the former MOD contracts for the Final Phase of the S&T Update are now included in the Prime Contract.

During the coming year the key objectives are to:

- start Astute steel work;
- incorporate the latest approved requirements into the Prime Contract; and
- establish the strategies to acquire Astute Class crew training and the additional submarines of the class.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
S&T Update Final Phase.	2003
D154 - Nuclear Submarine Refit and Refuel Facilities at Devonport.	2002

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
GEC-Marconi currently trading as Marconi Electronic Systems Ltd.	Fixed Price Incentive	UK Competitive
(Full Development and Production package)	Fee with a Maximum Price	

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total
Current Estimate of Costs	33	1979	2012
Estimate of Costs at MoD Approval	37	2046	2083
Difference	-4	-67	-71

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	-	4	Reassessment of costs due to VSEL's decision not to claim the costs directly for risk reduction work (-£4m).
Accounting Adjustment	-	2	Accounting adjustment due to change in revaluation factors (-£2m).
Price Base/Inflation	-	89	Difference between the specific indices and GDP deflator following the revision by DASA of index values included in last years report (-£89m).
Changed Requirement	24	-	Change to fore-end design and completion of TLAM capability (+£24m).
Total	24	95	

Total Balance	-71

Expenditure to date (31 March 1999) £138m

Approval	Date	Explanation
First approval:	1991	Feasibility Studies
Latest approval:	1997	Full Development & Production package of three Astute Class Submarines

PROJECT CONTRACT SUMMARY

Current Estimated Cost of Main Contract	£1961M (Full Development & Initial Production)
Cost Change since Main Contract Award	-£65m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Inflation	-	89	Difference between specific indices and the GDP deflator (-£89m).
Changed Requirement	24	-	Changes to fore-end plus completion of TLAM capability (+£24m).
Total	24	89	

Total Balance	-65

Year(s) of Peak Expenditure:	2003/04 & 2004/05
Further Expenditure in Clear prospect (at 1998/99 average forecast of outturn prices to the nearest £10m):	£890m (current estimate for 4th and 5th submarines of the Class)

Unit Production Cost (UPC)	Quantities Required
£508m (Average for the Class of 5)	Class of 5 submarines

IN-SERVICE DATES

ISD Definition: The date on which the first submarine contributes to the operational capability of the Royal Navy.

Original ISD (Month/Year)	December 2001
Forecast ISD (Month/Year)	June 2005
Variation (Month(s))	+42 months

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Budgetary Constraints	28	-	The ISD for the First of Class slipped 28 months between the initial approval for studies and approval to issue the ITT. The studies took longer than expected, and with a procurement cost cap for the Class, it was necessary to ensure clear definition of the Requirement (+28 months).
Programming Constraints	15	1	**Extended tendering process** The need for early down-selection arose from GEC's take-over of VSEL. As competition was then no longer possible, subsequent negotiations with GEC-Marconi took place under NAPNOC procedures and were slower than the competitive negotiations planned. Further definition and risk reduction studies were necessary (+ 9 months). **Extended Design & Build Programme** The need to ensure value for money for the Defence budget as a whole, to contain the forecast expenditure within the available cash profile and to contain the price of five submarines within the overall Procurement Cost cap precluded the additional expenditure which might have persuaded the contractor to accept a shorter programme and hence reduced slippage to delivery dates (+6 months). The decrease is due to these factors acting concurrently (-1 month).
Total	43	1	

Total Balance	+42

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	No reliable evidence currently exists on which to base such a calculation.

Attack Helicopter - WAH-64 Apache

Integrated Project Team:
ATTACK HELICOPTER INTEGRATED PROJECT TEAM

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

WAH-64 Apache attack helicopter, a version of the US Army AH-64D, will replace the ageing Lynx Mk7/TOW system in the anti-armour role. It will be equipped with the Longbow Fire Control Radar and Semi-Active Laser and Radio Frequency versions of the Hellfire missile. The UK's Apache will have Rolls Royce Turbomeca 322 engines and the CRV-7 ground suppression rocket system.

The procurement strategy was based on an “off the shelf” buy of the complete weapons system through a Prime Contractor. Following a competition, a Prime Contract for the supply of 67 WAH-64s and the integration of their weapons was placed with GKN-Westland Helicopters Ltd. (GWHL) on 25 March 1996; the project is therefore in the production phase. Boeing is the major sub-contractor. Some other equipments to meet key requirements have yet to be added to the contract (i.e. Health and Usage Monitoring System and Communications upgrade (both achieved in 1999). A separate contract for the procurement of the Apache munitions was placed with Hunting Engineering on 29 March 1996, and a contract for an Air-to-Air Missile (AAM) will be placed after selection of an appropriate weapon. The first aircraft will be delivered in March 2000 and all deliveries will be completed by December 2003; the maiden flight of WAH-64 was in September 1998, ahead of schedule.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
Attack Helicopter Training Package (PFI)	2000 (Ready for Training Date)

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
GKN-Westland Helicopters Ltd. (Production)	Fixed Price	International Competition
Boeing, USA		Sub Contractor

PROJECT COSTS SUMMARY
(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total
Current Estimate of Costs	7	2697	2704
Estimate of Costs at MoD Approval	4	2831	2835
Difference	+3	-134	-131

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Inflation	2	23	Effect of GDP deflator exceeding specific inflation, including Variation of Price (VoP) clauses (-£23m). Effect of inflation on Air-to-Air Missile costing (+£2m).
Exchange Rate Variations	-	89	Movement in US exchange rate compared with the rate assumed for approval for main production contract (-£83m). Movement in US exchange rate compared with the rate assumed for approval for Air-to-Air Missile (-£6m).
Changed Requirements	35	102	Reduction of Air-to-Air Missile quantity (-£10m).Deletion of Direct Fire Weapon Effects Simulator (DFWES) requirement (-£31m) and expected adoption of a US solution for Integrated Helmet (-£43m). Deletion of M36 training round (-£8m), descoping of Helmet requirement (-£10m) and extra funding for Defensive Aids Suite (+£13m) . Incorporation of Health and Usage Monitoring System onto main AH approval (+£22m).
Accounting Adjustment	28	-	Inclusion of DERA costs for Tender Assessment phase disaggregated since Tender Assessment approval (+£5m). Inclusion of DERA and CESG costs for Production phase disaggregated since Production approval (+£23m).

continued…

Factor	Increase £m	Decrease £m	Explanation
Changed costing	64	46	Outcome of tendering and contractual negotiations (+£14m). Reassessment of costs to support tender assessment (-£1m). Reassessment of cost of FMS cases (+£5m). Reassessment of cost for Bowman integration study (-£3m). Reassessment of cost for Software Consultant and RTM322/CRV.7 integration (+£3m). Reduction in VAT applicability on Prime Contract (-£41m). Reassessment of costs to support missile trial (-£1m). Inclusion of funding for the incorporation of Arc Radios onto the aircraft (+£7m). Inclusion of funding to incorporate US Configuration Changes onto the aircraft (+£9m). Increased estimate to incorporate necessary Communications upgrade (+£16m). Reassessment of DERA support for Production phase (+£10m).
Total	129	260	

Total Balance		-131

Expenditure to date (31 March 1999) £901m

Approval	Date	Explanation
First approval:	1991	Tender/assessment phase
Latest approval:	1996	Production of 67 WAH-64 Apache attack helicopters

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£2135m: Production
Cost Change since Main Contract Award	-£45m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase	Decrease	Explanation
Inflation	-	23	Effect of GDP deflator exceeding specific inflation, including Variation of Price (VoP) clauses (-£23m).
Changed Costing	102	41	Reduction in VAT applicability on Prime Contract (-£41m). Defensive Aids Suite added to contract (+£77m). Spares for RTM322 added to contract (+£11m). IFF added to contract (+£5m). US Configuration Changes added to contract (+£9m).
Exchange Rate Variations	-	83	Movement in US exchange rate compared with the rate assumed at time of contract placement (-£83m).
Total	102	147	

Total Balance	-45

Year(s) of Peak Expenditure: 1999/00 & 2000/01

Further Expenditure in clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): NIL

Unit Production Cost (UPC)	Quantities Required
£21.4m	67

IN-SERVICE DATES

ISD Definition: Delivery of the first nine production standard WAH-64s.

Original ISD (Month/Year)	December 1997
Forecast ISD (Month/Year)	December 2000
Variation (Month(s))	+36

EXPLANATION OF ISD SLIPPAGE

Factor	Increase	Decrease	Explanation
Project Definition	24	-	The original ISD of December 1997 was set as a 'preferred' ISD date in order to foster an international competition and to avoid ruling out any of the potential contenders who could satisfy the Attack Helicopter requirement. By the time a competition was launched in 1993 the ISDs of the six contenders ranged from 1999 to 2003. The MoD wished to maintain the option of a re-assessment of the ISD if a better or cheaper solution to the AH requirement was likely to be available at a later date (+24 months).
Programming Constraints	6	-	Reflects the selection of a different engine option (RTM 322 (+6 months)).
Budgetary Constraints	12	-	The programme has been slipped by 12 months in order to match the programme to the available Departmental resources (+12 months).
Total	36[3]	-	

Total Balance	+36

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	Saving of £201m

3 The 6 months slip due to engine change acted concurrently with the 12 months slip caused by budgetary constraints.

Beyond Visual Range Air-to-Air Missile (BVRAAM)

Picture not yet available

Integrated Project Team Responsible:
BVRAAM

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

On 2 October 1995, Minister (DP) gave approval for the issue of an Invitation to Tender (ITT) for a Beyond Visual Range Air-to-Air Missile for the Royal Air Force's Eurofighter aircraft. The ITT was issued on 5 December 1995. Two bids were received; one from a consortium led by Matra BAe Dynamics UK Ltd, and one from Raytheon Systems Ltd. After extensive analysis, it was decided that both bids contained areas of risk which needed to be addressed before a development and production contract could be placed. It was decided that Project Definition & Risk Reduction (PDRR) contracts would be placed with both bidders and the results technically and operationally assessed before a final decision was made.

Both PDRR contracts were let in August 1997 and revised bids were received in May 1998. It is intended that Ministerial approval for the award of a development and production contract will be sought in July 1999 with contract placement expected in November 1999.

Our Eurofighter partners (Germany, Italy and Spain) and Sweden have similar requirements and they were involved in both phases of bid assessment. Memorandum of Understanding (MOU) negotiations with a view to collaboration on the BVRAAM programme with both our European partners and the US are now well advanced.

In early 1999, responsibility for the BVRAAM project was transferred to an Integrated Project Team as part of the Department's Smart Procurement initiative.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
Eurofighter	2002

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Matra BAe Dynamics (Project Definition & Risk Reduction)	Firm Price	International Competition
Raytheon Systems Ltd. (Project Definition & Risk Reduction)	Firm Price	International Competition

PROJECT COST SUMMARY
(At 99/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total
Current Estimate of Costs	21	-	21
Estimate of Costs at MoD Approval	14	-	14
Difference	+7	-	+7

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	6	-	Additional DERA support costs for Operational Analysis to support Staff Requirement during the first bid assessment (+£4m). Additional DERA support, bid assessment activity and Operational analysis in support of the COEIA for the PDRR phase (+£1m). An increase in the cost of the PDRR contracts due to the omission of VAT from the original estimate of costs (+£1m).
Changed Requirement	1	-	An increase due to the need for the Aircraft Design Authority to carry out studies estimating the cost and risk involved in integrating the bid missiles on Eurofighter (+£1m).
Total	7	-	

Total Balance	+7

Expenditure To date (31 March 1999): £20m

Approval	Date	Explanation
First Approval:	October 1995	Issue ITT and assess bids
Latest Approval:	May 1997	Introduction of a competitive Project Definition & Risk Reduction (PDRR) phase to be carried out between Matra BAe Dynamics UK & Hughes UK now Raytheon Systems Ltd.

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A
Cost Change since Main Contract Award	N/A

REASONS FOR COST VARIATION SINCE MAIN CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	-
Total	-	-	

Total Balance	-

Years of Peak Expenditure: 2006/07 & 2009/10

Further Expenditure in Clear prospect (at 1999/2000 average forecast of outturn prices to the nearest £10m) £890m To procure *** missiles and their associated equipment

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition: First unit equipped with 72 missiles and associated support equipment.

Original ISD (Month/Year)	March 2005
Forecast ISD (Month/Year)	March 2008
Variation (Month(s))	+36

EXPLANATION OF ISD SLIPPAGE

Factor	Increase	Decrease	Explanation
Budgetary Constraints	12	-	The need to match expenditure to available resources (+12 months).
Budgetary Constraints/ Procurement Delays	12	-	The need to carry out a Project Definition and Risk Reduction (PDRR) phase (+12 months).
Budgetary Constraints	12	-	The impact of an Alternative Assumption taken during SDR (+12 months).
Total	36	-	

Total Balance	+36

COST OF ISD SLIPPAGE

Additional Costs arising as a result in delays to ISD (for delays over 24 months) (at 1999/2000 average forecast of outturn prices)	Nil

Bowman

Director General Responsible:
DIRECTOR GENERAL COMMAND INFORMATION SYSTEMS (DGCIS)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

BOWMAN will provide the armed forces with a tactical communications system replacing CLANSMAN combat radio, in-service since the mid 1970's and now becoming increasingly obsolete, and the Headquarters infrastructure element of the PTARMIGAN trunk system.

Feasibility studies were split into two stages, Feasibility Stage 1 (FS1) completed in August 1993. Following international competition in 1993, contracts were placed with two competing consortia; YEOMAN (Siemens Plessey Systems Ltd. and Racal) and CROSSBOW (led by ITT Defence (UK) Ltd.) for Feasibility Stage 2 (FS2) and the first Project Definition stage (PD1).

FS2 indicated that the risk of procuring and integrating the communications harness for BOWMAN, known as the Local Area Sub-system (LAS) (previously Vehicle Integrated Communications and Distribution System (VICDS)), would be best managed by placing the responsibility on the BOWMAN contractors, rather than developing a MoD solution. This change in procurement strategy was approved in February 1997, when approval was also given for BOWMAN core Risk Reduction work.

In November 1996, the two consortia formed a Joint Venture Company (JVC) known as ARCHER (now trading as Archer Communications Systems Ltd. (ACSL)), to bid jointly for the BOWMAN supply contract. Following a review of the procurement options open to the Department, approval for a revised, single source, procurement strategy for BOWMAN and the remainder of the Risk Reduction work was granted in March 1997. A risk reduction contract was placed with ACSL in July 1997.

A further package of work (Package 0) valued at £189m was placed with ACSL in October 1998. This will enable ACSL to build on current work to define systems integration requirements and demonstrate technical progress prior to major production commitment (Package 1).

Revised options for scheduling delivery of the BOWMAN capability are currently under consideration. Significant future milestones on the project include:

Approval for Supply Phase Sought:	September 1999
Supply Contract Placement:	December 1999

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Archer Communications Systems Ltd. (Risk Reduction & Package 0)	Firm Price	Single Source

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total
Current Estimate of Costs	341	-	341
Estimate of Costs at MoD Approval	132	-	132
Difference	+209	-	+209

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	15	3	Final negotiations on software and Integrated Logistics Support (ILS) requirements for PD1. Greater complexity and volume of work associated with assessing options to meet the Requirement (+£3m). Additional support to the project to define the performance requirement. Greater than expected scope of operational analysis work and the need for work to define the proposal to split BOWMAN into 2 stages (+£5m). Changes to PD1 contracts relating to trials, national security policy and Government Furnished Information (GFI) (+£3m). Cancellation of some FS2 tasks and reduced DERA support (-£3m). Increased cost of BOWMAN Risk Reduction Phase (+£4m).
Changed Costing (Package 0)	196	-	Extension of the BOWMAN Risk Reduction contract with industry for the completion of system definition, and for system integration and demonstrations of technical progress prior to award of supply contract (+£189m) bringing overall pre-Main Gate spend up to 15% in line with Smart Procurement practices. £41m was spent on Package 0 during 1998/99 and has been offset by savings later in the programme, for example by a reduction in the quantities of a number of ancillaries. The remaining expenditure on Package 0 will be funded by money brought forward from future years. Package 0 is not expected to increase the overall cost of the programme. Increased cost of DERA, Communications Electronics Security Group (CESG) and External Assistance to Project Office during Package 0 (+£7m).
Accounting Adjustment	1	-	Change in accounting for CESG support (+£1m).
Slippage	5	5	Extension of DERA technical support tasks and retention of technical support staff as PD1 programme slipped (+£5m). Reduction in forward buy requirements of Crypto and Global Positioning System chips in advance of main production contract (-£5m).
Total	217	8	

Total Balance	+209

Expenditure to date (31 March 1999) £185m

Approval	Date	Explanation
First approval:	1988	Feasibility Study stage 1 (FS1)
Latest approval:	1998	Extension of Risk Reduction Phase (Package 0)

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A (Study Contracts Only)
Cost Change since Main Contract Award	N/A (Study Contracts Only)

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	-
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure: 2004/05 & 2005/06 onwards

Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): £1900m

Unit Production Cost (UPC)	Quantities Required
BOWMAN £0.028m*	approx 56,000
VICDS (LAS) £0.028m*	approx 11,500

*Average of an extensive range of equipment

IN-SERVICE DATES
Previous ISD Definition: The date when the first brigade group is fully trained, equipped and logistically supported.
Current ISD Definition: The date when a brigade Headquarters, two mechanised battalions and support troops are capable of engaging in Operations Other Than War.
Reason for change: Change reflects limits on industry's resources to complete platform installation design and certification, particularly for armoured vehicles.

Original ISD (Month/Year)	1995 (Assumed December)
Forecast ISD (Month/Year)	March 2002
Variation (Month(s))	+75

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Technical Difficulties	24	-	Greater complexity and volume of work in development of Performance Requirement and evaluation of options for meeting it. Further work in support of applying the principles of "Learning From Experience" to the project and BOWMAN's selection as a pilot programme for the application of Integrated Logistic Support techniques. Greater level of Operational Analysis in support of robust Performance Requirement in the light of the collapse of the Warsaw Pact (+24 months).
Budgetary Constraints	40	-	The need to match the programme to available resources in the overall pattern of MoD priorities (+40 months).
Programme Changes	7	-	Work in support of changes in VICDS procurement strategy and integration into BOWMAN programme. Need to reconsider BOWMAN Procurement Strategy in light of changes in industry (+7 months).
ISD Redefinition	4	-	Change from, the start of a brigade-group sized Service Acceptance Trial involving elements of all three Services, to the end of the trial and resultant service acceptance (+4 months).
Resource Constraints	12	-	The programme has slipped by 12 months against the original ISD definition. This reflects limits on industry's resources to complete platform installation design and certification, particularly for armoured vehicles, in the time available (+12 months).
ISD Re-definition	-	12	The ISD has been redefined to reflect limits on industry's resources (see above) by including fewer vehicle types. The National Audit Office has agreed that this should be reported as an ISD variation decrease (-12 months).
Total	87	12	

Total Balance	+75

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	£9m

Challenger 2 (including Challenger Armament (CHARM) 3)

Director General Responsible:
DIRECTOR GENERAL LAND SYSTEMS (DGLS)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

CHALLENGER 2 (CR2) Main Battle Tank (MBT) with CHARM 3 ammunition will replace the current eight regiments of CHALLENGER 1 (CR1) MBT. The CHIEFTAIN MBT was withdrawn from operational service in February 1996 and existing CR1 MBT assets were redeployed to allow eight regiments of MBT to continue in-service.

There is a link between CR2 and the CHARM 1 project because, when the decision was made to order a follow-on buy of 259 CR2, the contractor was required to use the 230 CHARM guns already procured from Royal Ordnance. This programme is complete and has been fully reported in previous Major Projects Reports. It has spent £235m against a MoD approval of £211m (at 1999/00 prices).

Following an international competition, a contract was placed in June 1991 for 127 MBTs and 13 Driver Training Tanks (DTTs) to replace CHIEFTAIN. There remained a need to upgrade the rest of the MBT fleet (CR1) and it was decided in 1994 that the most cost-effective solution was to purchase further CR2. Options in the contract were taken up in July 1994 for an additional 259 MBTs and 9 DTTs, making a total order of 386 MBT and 22 DTT. The vehicle development programmes are complete.

A trial during October 1995 established that some early production MBTs did not fully meet the contracted level of reliability acceptable for operational service. A Production Reliability Growth Programme was negotiated with Vickers plc and the company had achieved the four reliability milestones by November 1997. The first Batch Test of regimental tanks was passed in January 1998. The In-Service Date was achieved in June 1998. As at 31 March 1999 four Batch Tests had been completed successfully and a total of 145 MBTs and 22 DTTs had been delivered.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Vickers plc (Development & Production)	Fixed Price	International Competition
Royal Ordnance (CHARM 3 Ammunition Follow-on-Buy)	Firm Price	Competition

PROJECT COSTS SUMMARY CHALLENGER 2 (including CHARM 3)

(At 1999/2000 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development & Production £m	Total £m
Current Estimate of Costs	2378	2378
Estimate of Costs at MoD Approval	2313	2313
Difference	65	65

REASONS FOR COST VARIATION CHALLENGER 2 (Including CHARM 3)

Factor	Increase £m	Decrease £m	Explanation
Inflation	41	-	Due to difference in annual price uplifts between specific indices/LTC uplift and GDP deflator (+£41m).
Exchange Rate	4	-	Increases in the contract Variation of Price (VOP) due solely to exchange rate variations across a basket of currencies (+£4m).
Changed Requirement	41	2	Relaxation of CHARM 3 requirement (- £1m). Reductions in training aids (-£1m). Replacing air conditioning coolant, to comply with Montreal Protocol (+£5m), CHARM 3 stowage modifications and proofing (+£3m), additional Special Test Equipment (+£2m), Fire Control computer chip upgrade (+£1m), minor tank modifications including Active Noise Reduction, and changes to radio fit (+£1m). Armour (+£6m). Desert modifications (+£23m).

continued…

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	22	41	Lower contract prices achieved than earlier estimates for Demonstration Phase Equipment (-£16m), Follow-on buy contract amendment (-£15m), and CHARM 3 Development (-£3m). CHARM 3 increase to reflect tender price (+£16m). Claims for liquidated damages (-£3m) and a reduction in price due to early payment against the follow-on buy (-£1m). Increase in the estimated cost of works services for training aids (+£6m). Receipts (-£3m).
Total	108	43	

Total Balance	+65

Expenditure to date (31 March 1999): £1960m

Approval	Date	Explanation
First approval:	1988	CHALLENGER 2 Demonstration Phase
Latest approval:	1994	CHALLENGER 2 Follow-on-Buy

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£2083m (Development & Production)
Cost Change since Main Contract Award	+£1270m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Inflation	74	-	Difference in price uplifts between specific indices and GDP deflator (+£74m).
Exchange Rates	20	-	Increases in the contract Variation of Price (VOP) due solely to exchange rate variations across a basket of currencies (+£20m).
Changed Requirement	1185	2	Increased procurement of an additional 259 MBTs, 9 DTTs and spares for the CR2 Repair Pool (+£1052m). Procurement/proofing of first tranche of CHARM 3 ammunition (+£22m); CHARM modification kits (+£8m); Advance Order Spares List (AOSL) for DTTs (+£1m); AOSL for Individual Training Organisation (ITO)/DTTs (+£2m) and tranche 2 repair pool (+£31m). Relaxation of the CHARM 3 requirement (-£1m). Reduced requirement for training aids (-£1m). Further tranche of AOSL (+£13m). CHARM 3 stowage modifications (+£2m). Additional Special Test Equipment (+£4m), Fire Control computer chip upgrade (+£2m), minor tank modifications including provision of Active Noise Reduction, and changes to radio fit (+£5m). R12 refrigerant replacement (+£8m). Further AOSL tranche (+£35m).
Changed Costing	-	7	Claims for liquidated damages (-£3m) and a reduction in price due to early payment against the follow-on buy (-£1m). Receipts (-£3m).
Total	1279	9	

Total Balance	+1270

Year(s) of Peak Expenditure: 1996/97 & 1998/99

Further Expenditure in Clear prospect (at 1999/2000 average forecast of outturn prices to the nearest £10m): £90m (Balance of Spares Requirement, armour and desert modifications)

Unit Production Cost (UPC)	Quantities Required
£3.5m Main Battle Tank	386

IN-SERVICE DATES

ISD Definition: Delivery of a proportion of ITO vehicles and one regiment's establishment.

Original ISD (Month/Year)	December 1995
Forecast ISD (Month/Year)	June 1998
Variation (Month(s))	+30 months

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (Months)	Decrease (Months)	Explanation
Unforeseen Technical Difficulties	30	-	Problems with the delivery of certain essential support elements (training and publications) and with the translation of development reliability standards into production vehicles. The 30 month slip was implemented to ensure that the tank should enter service to the required reliability standard and with the necessary support package (+ 30 months).
Total	30	-	

Total balance	+30

COSTS OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/2000 average forecast of outturn prices):	***

Common New Generation Frigate (CNGF)

Director General Responsible:
DIRECTOR GENERAL SURFACE SHIPS (DGSS)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The Common New Generation Frigate (CNGF) was a collaborative programme between the United Kingdom, France and Italy to procure a new class of Anti-Air Warfare (AAW) warship to replace the UK's existing Type 42 AAW Destroyer. It comprised two distinct programmes: the Principal Anti-Air Missile System (PAAMS) and the Ship and its other systems (HORIZON), both derived from a single tripartite Staff Requirement. Memoranda of Understanding (MOU) were signed in July 1994 and March 1996.

For HORIZON, an initial design and validation phase (Phase 1) started in March 1996. This was to have been followed by Phase 2, the detailed design and build of three First of Class (FOC) warships (one for each nation), to be procured under a single Prime Contract. For PAAMS, the next major milestone was to be the start of PAAMS Full Scale Engineering Development and Initial Production (FSED/IP).

On 26 April 1999, shortly after the end of the period covered by this report, ministers of the three nations announced it was their intention to place the PAAMS FSED/IP contract quickly but that it would not be cost-effective to pursue a single Prime Contract for the warship. Work on the warship programme will now be taken forward by a MoD Integrated Project Team working closely with industry in accordance with Smart Procurement principles for the effective management of affordability, timescale and risk. The work completed on HORIZON will be incorporated where possible in the national programme.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
HORIZON Project Definition (Phase 1) International Joint Venture Company (IJVC) comprising: UK: GEC Marconi Ltd; France: DCN International; Italy: Orizzonte	Firm price	Non-competitive
PAAMS Pre-Development Phase UKAMS (a wholly-owned subsidiary of Matra BAe Dynamics (UK))	Firm price	Non-competitive
Warship FSED/IP[4] To be decided	To be decided	To be decided
PAAMS FSED/IP EUROPAAMS composed of UKAMS (a wholly-owned subsidiary of Matra BAe Dynamics (UK)) and EUROSAM (Aerospatiale, Thomson-CSF and Alenia)	Proposed Arrangements: Fixed Price	Non-competitive Prime Contractor with some competition at sub-system level.

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	179	-	179
Estimate of Costs at MoD Approval	201	-	201
Difference	-22	-	-22

4 As at 31st March 1999, the proposed arrangements for warship prime contractorship were under review by the HORIZON Steering Committee. Subsequently, it was decided to adopt separate national purchasing arrangements.

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Slippage	5	-	Extended timetable for HORIZON Phase 1 (+£4m). Extended timetable for PAAMS Risk Reduction/Contract Negotiations (+£1m).
Changed Costing	2	29	Change from national procurement strategy to international collaboration in 1992 (-£3m). Over-estimate of approved costs for the preliminary stages (-£5m). Additional National Risk Reduction Studies (+£2m). Reduced scope of HORIZON Phase 1 (-£21m).
Total	7	29	

Total Balance	-22

Expenditure to date (31 March 1999) **£141m**

Warship:

Approval	Date	Explanation
First approval:	1991	Initial Studies
Latest approval:	1998	HORIZON Phase 1 - Project Definition

PAAMS:

Approval	Date	Explanation
First approval:	1990	Project Definition
Latest approval:	1995	Risk Reduction and negotiation of FSED/IP contract

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A
Cost Change since Main Contract Award	N/A

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	-
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure:	2005/06 & 2007/08
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	£970m for Warship FOC Design and Build[5] £1020m for PAAMS FSED/IP £3790m for Follow-on Build of 11 ships[5]

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition: Completion of Part IV Trials, fit to enter full service[6]

Original ISD (Month/Year)	December 2002
Forecast ISD (Month/Year)	September 2007
Variation (Month(s))	+57

5 This reflects a nationally procured warship with an interim operating capability at ISD, which is a reduced capability compared to the collaborative CNGF which was the basis for the Future Expenditure In Clear Prospect in the Major Projects Report 1998.

6 Definition has since (May 99) been revised to Operational Availability Date, adding a further 2 months.

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Programme Adjustments	18	-	The need to synchronise the programme related to the combat system with that of the warship. In particular, the need to achieve a realistic and well developed programme for PAAMS, which is a determining factor for the warship ISD (+18 months).
Programme Adjustments and Contract Negotiations	12	-	Placement of the PAAMS FSED/IP contract was delayed due to disagreements between the partner nations over the initial level of performance, a common industry structure and an acceptable tri-national contract. This led to corresponding and parallel delays to HORIZON in order to prevent misalignment between the two programmes (+12 months).
Contract Negotiations	3	-	Longer than anticipated contract negotiations with the HORIZON contractor (the IJVC) and extended timetable for delivery of certain outputs (+3 months).
Programme Adjustments and Contract Negotiations	15	-	National assumptions about delivery of collaborative programme and time taken in contract negotiations on the PAAMS programme to contain risk and cost to acceptable levels (+15 months).
Programme Adjustments	9	-	Difficulties over HORIZON Prime Contractorship required resolution before PAAMS FSED/IP contract placement (+9 months). (In the event this resulted in decision to procure warship from a national prime contractor).
Total	57	-	

Total Balance	+57	

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	£537m[7]

7 Based on difference between forecast Equivalent Annual Costs for Type 42 AAW Destroyer and its replacement over 57 month period.

Conventionally Armed Stand-Off Missile (CASOM)

Director General Responsible:
DIRECTOR GENERAL WEAPON & ELECTRONIC SYSTEMS (DGWES)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

Storm Shadow is a Conventionally Armed Stand-Off Missile which will enhance our stand-off precision attack capability against strategic, tactical and infrastructure targets without exposing our aircraft and crews to unacceptably high levels of aircraft attrition. As well as maximising military effectiveness, precision attack limits the risk of collateral damage and civilian casualties. It will be fitted on Tornado GR4, Harrier GR7 and Eurofighter.

Approval was given in 1982 for a feasibility study into Naval, Ground and Air Staff Target 1236 (NGAST 1236), the Long-Range Stand-Off Missile (LRSOM) programme undertaken jointly with the US and Germany. In 1986, LRSOM was subsumed in favour of the Modular Stand-Off Weapon (MSOW) seven nation collaborative programme. The MSOW programme collapsed in 1989 when the US and UK withdrew. Following this withdrawal the Requirement was reviewed as part of Options for Change. In 1993 the Requirement was revived in the form of Staff Requirement (Air) 1236 (SR(A) 1236) and an invitation to tender was issued in 1994 with bids received from seven companies. In February 1997 a development and production contract was placed with Matra BAe (UK) Ltd. and the development phase is progressing satisfactorily with all milestones achieved on time. It is planned that the design will be frozen in preparation for production in January 2001 and the first operational missile will be delivered in July 2001.

France has a requirement for a similar missile, SCALP EG, for which a contract was awarded to Matra British Aerospace Dynamics (France) in December 1997. Although each government has placed their own separate contracts, a Memorandum of Understanding was signed in April 1997 covering the exchange of information which will enable both countries to secure the maximum benefit of working in parallel on the two programmes.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
Tornado GR4	1998

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Matra BAe Dynamics (UK) Development & Production	Firm Price until December 1998 Fixed Price from January 1999 onwards	International Competition

PROJECT COSTS SUMMARY
(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total
Current Estimate of Costs	227	632	859
Estimate of Costs at MoD Approval	237	638	875
Difference	-10	-6	-16

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Inflation	24	12	Difference between inflation assumed at contract award and GDP deflators used at time of approval for development and production (+£24m). Difference between specific indices and GDP deflator in calculating annual price uplift (-£12m).
Exchange Rates	-	14	Reduction reflects better rate obtained by Matra BAe in buying forward French Francs than originally estimated (-£14m).
Changed Costing	8	22	Reassessed estimates for: Harrier Integration (-£4m); DERA support to Defence Procurement Agency sponsored tasks (-£5m); Tornado Integration (-£2m); Loading System (-£2m); Government Furnished Equipment Items (-£1m); Funding provision to support development programme (-£8m); Funding provision to support production programme (+£8m).
Total	32	48	

Total Balance	-16

Expenditure to date (31 March 1999) **£113m**

Approval	Date	Explanation
First approval:	1982	Feasibility Study
Latest approval:	August 1996	Full Development/Production

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£718m (Development & Production)
Cost Change since Main Contract Award	-£5m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Exchange Rates	-	14	Reduction reflects better rate obtained by Matra BAe in buying forward French Francs than originally estimated (-£14m).
Changed Costing	9	-	Contract option exercised to permit integration of Storm Shadow onto Harrier, together with the provision of two sets of First Line Electronic Units for use as Government Furnished Equipment items (+£9m).
Total	9	14	

Total Balance	-5

Year(s) of Peak Expenditure: 2000/01 & 2001/02
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): NIL

Unit Production Cost (UPC)	Quantities Required
***	***

IN-SERVICE DATES
ISD Definition: First * weapons in-service with support equipment.**

Original ISD (Month/Year)	December 1994
Forecast ISD (Month/Year)	December 2001
Variation (Month(s))	+84

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Collaborative Process	51	-	LRSOM and MSOW programmes both abandoned leaving requirement to lapse (+51 months).
Project Re-definition	8	-	Requirement revived following review as part of Options for Change (+8 months).
Budgetary Constraint	12	-	Issue of RFP delayed until outcome of Defence Cost Study was known (+6 months) To match programme with available Departmental resources (+6 months).
Project Definition	12	-	Bid selected offered five year development programme with an ISD of December 2001. Original planning assumptions were based on a four year programme (+12 months).
Contract Negotiations	1	-	Contract placed one month later than planned due to final pricing negotiations (+1 month).
Total	84	-	

Total Balance	+84

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	NIL

Eurofighter

Director General Responsible:
DIRECTOR GENERAL AIRCRAFT SYSTEMS 1 (DGAS1)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

EUROFIGHTER will be an agile fighter aircraft. Air superiority is the primary design driver, but the aircraft will also have an air-to-ground capability. EUROFIGHTER will thus be able to offer operational capability in response to the uncertain demands of the post-Cold War strategic environment, and will enable the RAF to replace the TORNADO F3 and JAGUAR aircraft. An all EUROFIGHTER fleet is substantially more cost-effective than any alternative aircraft option or aircraft mix when this multi-role capability is considered alongside costs. It is being developed in a collaborative project with Germany, Italy and Spain, and is managed on behalf of the nations by a NATO agency, NETMA.

The Memoranda of Understanding for the Production and Support Phases were signed on 22 December 1997 and contracts covering Production Investment and Production placed on 30 January 1998. The contracts for the first tranche of 148 aircraft, of which 55 are for the RAF, valued at some £2.2bn to the UK, were signed on 18 September 1998. The first RAF aircraft is due to be delivered in June 2002. Support of the aircraft throughout its life will be conducted using Integrated Logistics Support principles under a series of separate contracts the first of which, covering initial support and valued at some £600m, were placed at the same time as the Production Investment and Production contracts.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
ASRAAM	1999

PURCHASING ARRANGEMENTS

DEVELOPMENT

Contractor	Contract Type	Procurement Route
Eurofighter GmbH Airframe consortium comprising: Alenia BAe CASA DASA	Fixed Price for Airframe and Target Cost Incentive Arrangement for Aircraft Equipment	Non-competitive but with international sub-contract competitive elements, the value of which amounts to some 30% of the overall value of the Prime Contract
Eurojet GmbH Engine consortium comprising: FIAT ITP MTU Rolls Royce	Fixed Price	Non-competitive but with international sub-contract competitive elements, the value of which amounts to some 10% of overall value of the Prime Contract

PRODUCTION INVESTMENT/PRODUCTION

Contractor	Contract Type	Procurement Route
Eurofighter GmbH Airframe consortium see details under development above	Overall Maximum Prices for Production Investment and Production of Airframes and Overall Firm Prices for Production Investment and Production of Aircraft Equipment	Non-competitive but with international sub-contract competitive elements, the value of which amounts to some 30% of the overall value of the Prime Contract
Eurojet GmbH Engine consortium see details under development above	Overall Maximum Prices for Production Investment and Production of Engines	Non-competitive but with international sub-contract competitive elements, the value of which amounts to some 10% of the overall value of the Prime Contract

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total
Current Estimate of Costs	4593	10134	14727
Estimate of Costs at MoD Approval	3126	10230	13356
Difference	1467	-96	1371

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Requirement (Development)	239	-	Provision for integration of new weapons and sensors not contained within original approval (includes Conventionally Armed Stand-Off Missile (CASOM), Advanced Anti-Armour Weapon (AAAW), Low Level Laser Guided Bomb (LLLGB), Thermal Imaging Airborne Laser Designator (TIALD)) (+£239m).
Changed Costing (Development)	1004	-	Changes in accounting rules (inclusion of intramural costs) (+£275m); German withdrawal from certain equipments (+£106m); higher than expected Development costs, notably for equipments (+£316m). Reorientation Development Assurance Programme (DAP) to bridge gap between Development and Production Investment (+£28m), extension of the Integrated Logistic Support (ILS) programme (+£45m), Eurofighter/Eurojet GmbH management costs (+£30m), contract price increases (+£87m), risk provision (+£117m).
Changed Costing (Production)	-	218	Transfer of costs of industrial consortia management activities from production phase to support phase (-£218m).
Inflation	378	-	Difference in annual price uplift between specific indices and GDP deflator for Development (+£224m) and Production (+£154m).
Exchange Rate Variation	-	32	Improvement in exchange rate since production approval given (from 2.1958DM to 2.80 to £), has reduced costs to UK of management agency (-£32m).
Total	1621	250	

Total Balance	+1371

Expenditure to date (31 March 1999) £3797m

Approval	Date	Explanation
First approval:	1984	Feasibility Study
Latest approval:	1997	Production Investment/Production/Initial Support

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	Airframe Development £1527m
Cost Change since Main Contract Award	£49m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Inflation	49	-	Difference in annual price uplifts between specific indices and GDP deflator (+49m).

Total Balance	+49

Year(s) of Peak Expenditure:	2002/03 & 2003/04
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	NIL

Unit Production Cost (UPC)	Quantities Required
£41.7m	232

IN-SERVICE DATES
ISD Definition: Date of delivery of first aircraft to the Royal Air Force.

Original ISD (Month/Year)	December 1998
Forecast ISD (Month/Year)	June 2002
Variation (Month(s))	+ 42

EXPLANATION OF ISD SLIPPAGE

Factor	Increase	Decrease	Explanation
Procurement Delay	22	-	Reorientation of the Development phase in response to the changed strategic environment and budgetary pressures of the four nations and delays in signature of the Memoranda of Understanding for the Production and Support phases (+22 months).
Technical Difficulties	20	-	Resulting from the application of complex technologies required to enable the equipment to meet the original Staff Requirement (+20 months).
Total	42	-	

Total Balance	+42

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	£107m

Future Carrier Borne Aircraft (FCBA)

Director General Responsible:
DIRECTOR GENERAL AIR SYSTEMS 1 (DGAS1)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

UK is examining options, following the Strategic Defence Review, for a successor to both the Royal Navy's Sea Harrier and the Royal Air Force's Harrier GR7 from 2012. FCBA is to provide the Joint Force 2000 (joint command for all Harrier forces), with a multi-role fighter/attack aircraft. The current planning assumption is the Short Take-Off Vertical Landing (STOVL) version of the Joint Strike Fighter (JSF) being developed for the US Air Force, Navy and Marine Corps. UK is contributing $200m as a full collaborative partner during the $2bn JSF Concept Demonstration Phase under a Memorandum of Understanding (MOU) signed in December 1995. The phase began in November 1996 and will last four years.

During this phase, the contractors will design and fly Concept Demonstration Aircraft, evolve their Preferred Weapon System Concepts for the production designs and submit competing proposals for Engineering and Manufacturing Development (E&MD - equivalent to UK Demonstration Phase). Providing the UK decides to contribute to E&MD as a full collaborative partner, the intention would be to agree an MOU for E&MD participation and to be fully involved in the contractor downselection process, due to commence late in 2000.

MoD is also conducting feasibility studies into alternative options for a cost-effective solution to the FCBA requirement.

Significant milestones are:

Oct. 1999:	Notification to Ministers of way ahead for E&MD MOU negotiation and FCBA option selection;
Oct. 2000:	Ministerial approval for selected FCBA option and (if JSF) signature of MOU; and
May 2001:	Notification to Ministers of JSF downselect (for a JSF option for FCBA).

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
Carrier Vessel Future (CVF)	2012

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Boeing Military Aircraft Company, Seattle, Washington, USA	Cost Plus Fixed Fee subject to maximum price.	US contracts are not placed by the UK but by the US JSF Program Office. Concept Demonstration Phase contract placed in December 1996.
Lockheed Martin Tactical Aircraft Systems, Fort Worth, Texas, USA	Cost Plus Fixed Fee subject to maximum price.	US contracts are not placed by the UK but by the US JSF Program Office. Concept Demonstration Phase contract placed in December 1996.
Pratt & Whitney Government Engine Business, West Palm Beach, Florida, USA	Cost Plus Fixed Fee subject to maximum price.	US contracts are not placed by the UK but by the US JSF Program Office. Concept Demonstration Phase contract placed in December 1996.

PROJECT COSTS SUMMARY
(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	149	-	149
Estimate of Costs at MoD Approval	155	-	155
Difference	-6	-	-6

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Exchange Rates	-	2	Exchange rate change from $1.5541 to $1.6269 = £1 resulting in a reduction in the estimated total project cost (-£2m).
Changed Costing	-	4	Revisions to estimated cost profile (-£4m).
Total	-	6	

Total Balance	-6

Expenditure to date (31 March 1999) £101m

Approval	Date	Explanation
First approval:	1996	US Concept Demonstration Phase and UK Feasibility Phase
Latest approval:	1996	US Concept Demonstration Phase and UK Feasibility Phase

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A
Cost Change since Main Contract Award	N/A

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure: 2013/14 & 2014/15

Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): ***representing collaborative development and procurement of up to 150 aircraft to replace the Sea Harrier and Harrier GR7.

Unit Production Cost (UPC)	Quantities Required
Not Applicable to Phase	Not Applicable to Phase

IN-SERVICE DATES
ISD Definition: The Royal Navy's receipt of the 10th aircraft.

Original ISD (Month/Year)	December 2012
Forecast ISD (Month/Year)	December 2012
Variation (Month(s))	0

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
N/A	-	-	
Total	-	-	

Total Balance	-

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	N/A

Future Offensive Air System (FOAS)

Integrated Project Team Responsible:
FOAS

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The Future Offensive Air System (FOAS) programme will provide the UK with a long-range offensive air capability to replace that currently provided by the Tornado GR fleet. In 1996 Ministers approved feasibility studies into a wide range of FOAS options, including a manned aircraft study, two Unmanned Air Vehicles (UAV) concept studies and two Conventional Air-launched Cruise Missiles (CALCM) concept studies, and an initial programme of technology demonstration. These studies have progressed well and are nearing completion.

A further series of concept studies and Technology Demonstration Programmes (TDP) (some of which will be collaborative with France) has been approved by Ministers. These selected programmes will provide essential information on future technology capability, risk and cost as the project approaches the Initial Gate in March 2001 and the subsequent Assessment Phase. During this Phase the most cost-effective technical and procurement solutions will be identified and the level of risk reduced consistent with delivering an acceptable level of performance to time and cost. This work will lead into the Main Gate decision point in 2008 when solutions to be taken forward to the Demonstration Phase will be selected. A key area of current and future activity is the demonstration of the ability of government and industry to work effectively across national boundaries and draw the value for money benefits that should arise. At the moment, collaborative activity is limited to the acquisition of technology information.

In late 1998 the FOAS project was selected as an Integrated Project Team to pilot the Smart Procurement initiative. The FOAS programme is aligned with the Smart acquisition cycle.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
British Aerospace		
Manned Aircraft study	Target Cost Incentive Fee - Maximum Price	Non-competitive at Prime and sub-contract levels due to the specific expertise required in this specialist area
UAV concept study	Firm Price	International Competition
Matra BAe Dynamics (UK)		
CALCM concept study	Firm Price	International Competition
Logica UK		
UAV concept study	Firm Price	International Competition
Aerosystems International		
CALCM concept study	Firm Price	International Competition

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	39	-	39
Estimate of Costs at MoD Approval	38	-	38
Difference	1	-	1

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	1	-	Reassessment of study work required to provide data required for Initial Gate (+£1m).
Total	1	-	

Total Balance	+1

Expenditure to date (31 March 1999) £22m

Approval	Date	Explanation
First approval:	November 1996	Feasibility: Option Studies, initial Technology Demonstration Programme, TDP Definition
Latest approval:	June 1997	As above - re-approval following General Election change of Government

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A
Cost Change since Main Contract Award	N/A

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure:	2017/18 & 2018/19
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	16130m Total Programme Costs i.e. acquisition and logistic support costs

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition: Formation of the first front line squadron. The specific details of the ISD will be defined fully at the Initial Gate submission in 2001.

Original ISD (Month/Year)	October 2015
Forecast ISD (Month/Year)	October 2017
Variation (Month(s))	24

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Budgetary Constraints	24	-	The need to match programme to available Departmental resources during the Strategic Defence Review (+24 months).
Total	24	-	

Total Balance	+24

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	Not readily identifiable

The Out of Service date of the existing Tornado aircraft capability was deferred by 2 years to 2020 to allow for the deferral of the FOAS ISD to 2017. The costs associated with running on the Tornado cannot be reliably estimated as decisions on the number of aircraft required have not yet been made. Similarly, the savings in the same period that can be attributed to fewer FOAS systems being in service will be heavily dependent on the solution(s) selected, and this will not be known until the Main Gate decision in 2008.

Hercules C-130J

Director General Responsible:
DIRECTOR GENERAL AIRCRAFT SYSTEMS 2 (DGAS2)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The Royal Air Force HERCULES tactical transport fleet is over 30 years old. Aircraft availability has declined and operating costs have risen. A decision was taken in 1994 to replace the older aircraft and a fixed-price contract was placed with Lockheed-Martin in March 1995 for the purchase of 25 Hercules C-130J aircraft together with comprehensive packages for Training and Contractor Logistic Support. The new aircraft embodies many improvements in electronics and propulsion and will return considerable benefits in costs of ownership. However, the development and certification programmes have been delayed due to unforeseen flight handling and system engineering problems. Moreover, the baseline and RAF specific software development programmes are continuing to take longer than anticipated. MoD accepted delivery of the first 2 UK aircraft for test and evaluation, in August and November 1998 respectively. In parallel the programme of subsequent deliveries to the RAF was revised to incorporate a further eight months delay. MoD now estimate that the in-service date (delivery of the 12th aircraft), will be around May 2000 - some 22 months late. Liquidated Damages are being recovered from Lockheed and the cash is being used to cover the unplanned run-on costs of the current aircraft and other consequences of late delivery.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Lockheed Martin Aeronautical Systems, USA (Development & Production)	Fixed	International Competition

PROJECT COSTS SUMMARY
(At 1999/2000 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development & Production £m	Total £m
Current Estimate of Costs	***	***
Estimate of Costs at MoD Approval	***	***
Difference	-14	-14

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Inflation	65	-	The difference in annual price uplift between specific indices and the GDP deflator (+£65m).
Exchange Rate	-	85	Variation in the value of Sterling against the US Dollar (-£85m).
Changed Costing	64	55	Increased provision for Mission Planning System (+£5m) C-130K RAF peculiar modifications to J (+£2m), Wing Fatigue Test (+£6m), Communication Navigation Identification System (+£1m), ANR headsets (+£1m), support spares (+£2m), provision for funding transfers to Support Authority to cover run on costs of C-130K fleet (+£37m), DERA Farnborough (+£1m), Cargo Handling System (+£9M). Above items offset by Fill Gun Port (-£2m), forecast receipts for Liquidated Damages (-£49m) and Commercial Exploitation levy (-4m).
Changed Requirement	3	-	Additional requirement for 8.33KHz Channel Spacing in VHF radio (+£3m).
Slippage	-	33	Reduced financing charges and delays to programme resulting in revised funding profile (-£33m).
Accounting Adjustment	27	-	Inclusion of DERA Boscombe Down costs disaggregated since approval (+£27m).
Total	159	173	

Total Balance	-14

Expenditure to date (31 March 1999): £473m

Approval	Date	Explanation
First approval:	1994	Development & Production Package
Latest approval:	1994	Development & Production Package

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	***
Cost Change since Main Contract Award	-£75m

REASONS FOR COST VARIATION SINCE LAST CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Inflation	61	-	Difference in annual price uplift between specific indices and the GDP deflator (+£61m).
Exchange Rate	-	81	Variations in the value of Sterling against the US Dollar (-£81m).
Changed Costing	27	53	Known requirements for which there was too much uncertainty to agree a price at main contract award (+£23m), Cargo Handling System (+£4m). Offset by forecast receipts for Liquidated Damages (-£49m) and Commercial Exploitation Levy (-£4m).
Changed Requirement	3	-	Additional requirement for 8.33KHz Channel Spacing in VHF radio (+£3m).
Slippage	-	32	Reduced financing charges and delays to the programme resulting in revised funding profile (-£32m).
Total	91	166	

Total Balance	-75

Year(s) of Peak Expenditure:	1998/99 & 1999/00
Further Expenditure in Clear prospect (at 1999/2000 average forecast of outturn prices to the nearest £10m):	NIL

Unit Production Cost (UPC)	Quantities Required
***	25

IN-SERVICE DATES

ISD Definition: Delivery of first twelve aircraft off contract.

Original ISD (Month/Year)	July 1998
Forecast ISD (Month/Year)	May 2000
Variation (Month(s))	22

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (Months)	Decrease (Months)	Explanation
Technical Difficulties	22	-	Late delivery of sub-contracted avionic equipments and difficulties with their integration causing delay to start of the contractor's flight test programme. Further difficulties were experienced during the flight test programme and included: ongoing hardware/software integration problems, unacceptable stall characteristics, engine lubrication problems, cracking of wing web structure, insufficient de-icing coverage on the vertical tail fin, unsatisfactory throttle lever characteristics and excessive 2 pilot workload (+22 months).
Total	22	-	

Total Balance	+22

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/2000 average forecast of outturn prices):	N/A

Landing Platform Dock (Replacement) (LPD(R))

Director General Responsible:
DIRECTOR GENERAL SURFACE SHIPS (DGSS)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

This project covers the replacement of the existing amphibious assault ships HMS FEARLESS and HMS INTREPID, which are over 30 years old. In 1991 Project Definition (PD) studies for the ship design and the Combat and Command Systems were approved and these showed that the programme was unaffordable. Further PD studies were undertaken in 1993 and these identified an affordable solution without compromising key operational and safety requirements.

In 1994 approval was obtained to invite competitive bids for the detailed design and build of the Ships. As a result of the complexity of the Integrated Communications System (ICS) and in order to reduce risk to the ship programme, approval was given to a contract with limited financial commitment to ensure the start of essential design work. The assumption was for the warship contract to be placed in December 1995, but it became apparent that only Vickers Shipbuilding and Engineering Ltd. (VSEL) would bid. Approval was therefore given to proceed on a single tender basis. VSEL's offer exceeded the funding available. Joint MoD/VSEL teams were formed to explore the realism of the estimates and the scope for modifying the specification to achieve cost reductions. These proved successful and approval was given to enter formal No Acceptable Price No Contract (NAPNOC) negotiations. This led to agreement on a final price and a contract for 2 ships being awarded to VSEL in July 1996. In addition approval was given for the procurement of six associated specialised landing craft. Since contract award to BAe SEMA in May 1998, design and other planning work for these craft has proceeded on schedule.

Marconi Naval Systems (formerly VSEL) have forecast a delay to the Programme Acceptance Date (PAD) for LPD(R)01 and LPD(R)02. This will result in delay to the In-Service Dates (ISDs); although the extent of the unrecoverable slippage is not yet identified. Detailed discussions are currently being held with the company to determine an acceptable remedial strategy with the aim of minimising programme delay. The effect on ISD of both ships is being evaluated as part of this work.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
Command Support System	1998

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
VSEL (GEC Marine) (warship Design, Build & Command System)	Fixed price	NAPNOC
REDIFON MEL Ltd (Integrated Communication System)	Fixed Price	UK Competitive

PROJECT COSTS SUMMARY
(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	44	591	635
Estimate of Costs at MoD Approval	39	580	619
Difference	+5	+11	+16

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Inflation	5	-	VOP indicies escalating faster than the GDP Deflators (+£5m).
Changed Costings	5	-7	Reassessment of the cost for the Integrated Communications System (ICS) (+£2m). Revised estimate for risk provision (+£2m) and reductions in the estimated cost of external contractor assistance activities (-£1m). Reassessment of the level of risk provision (-£4m). Reassessment of the cost of UPC for LCVPs (+£1m). Reassessment of the level of DERA support (-£1m). Reassessment of the cost of GFE refurbishment (-£1m).
Changed Requirement	13	-	Need to undertake additional PD studies to produce an affordable solution by VSEL without significantly reducing the operational capability (+£6m). Increase in associated spares holdings following the 1997 decision to increase the readiness state of LPD(R) 02. This restores readiness coherence of the Maritime Rapid Reaction Force (+£7m).
Total	23	7	

Total Balance	+16

Expenditure to date (31 March 1999) £223m

Approval	Date	Explanation
First approval:	1991	Project Definition Studies
Latest approval:	1996	Placement of contract for the design and build of two LPD(R)s, associated specialist landing craft and approval to proceed to Full Production of the Integrated Communications System.

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£493m
Cost Change since Main Contract Award	£8m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Changed Costings	3	-	Further work identified as a result of detailed reconciliation necessary to meet approved requirement (+£3m).
Inflation	5	-	VOP indices escalating faster than the GDP Deflator (+£5m).
Total	8	-	

Total Balance	+8

Year(s) of Peak Expenditure: 1999/00 & 2000/01

Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): NIL

Unit Production Cost (UPC)	Quantities Required
LPD(R)01 - £359m	1
LPD(R)02 - £272m	1

IN-SERVICE DATES

ISD Definition: The dates when each vessel becomes fully operational.

	LPD(R) 01 (HMS ALBION)	LPD(R) 02 (HMS BULWARK)
Original ISD(Month/Year)	October 1998	December 2000
Forecast ISD (Month/Year)	March 2002	March 2003
Variation (Month(s))	+41	+27

EXPLANATION OF ISD SLIPPAGE

LPD(R) 01 (HMS ALBION):

Factor	Increase	Decrease	Explanation
Need for Project Re-Definition	14	-	The need to undertake essential Project Re-definition work to ensure the LPD(R) programme was affordable (+14 months).
Budgetary Constraints	4	-	The need to match the programme to the available resources (+4 months).
Extended Tendering Process	12	-	The loss of competition at a late stage in the tendering process resulted in delay, as VSEL revisited their bid to reflect the revised NAPNOC situation (+12 months).
Extended Warship Build Programme	11	-	Information obtained from industry as part of PD studies indicated that the original estimate for the warship build period was too short, and the MoD programme was adjusted accordingly (+8 months). Additionally, as a risk reduction measure and part of the NAPNOC contract negotiations, agreement was reached on a further extension to the build period to give VSEL further time to develop the warship design before starting fabrication (+3 months).
Total	41	-	

Total Balance	+41

LPD(R) 02 (HMS BULWARK):

Factor	Increase	Decrease	Explanation
Budgetary Constraints	18	-	The need to match the programme to the available Departmental resources (+18 months).
Extended Warship Build Programme	9	-	Information obtained from industry as part of PD studies indicated that the original estimate for the warship build period was too short, and the MoD programme was adjusted accordingly (+6 months). Additionally, as a risk reduction measure and part of the NAPNOC contract negotiations, agreement was reached on a further extension to the build period to give VSEL further time to develop the warship design before starting fabrication (+3 months).
Total	27	-	

Total Balance	+27

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	£26m

Medium Range TRIGAT

Director General Responsible:
DIRECTOR GENERAL WEAPONS ELECTRONIC SYSTEMS (DGWES)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

Medium Range (MR) TRIGAT is a crew-portable anti-tank guided weapon system, for the infantry and Royal Marines, which will be capable of defeating improved enemy armour at a maximum range of 2400m. It will replace MILAN, and comprises a firing post, a missile and a thermal sight, allowing effective operation at night and in adverse weather conditions. MR TRIGAT is a multi-lateral project with the United Kingdom, France and Germany as Pilot Nations and Belgium and the Netherlands as Associate Nations. It is currently nearing the end of full development.

Industrial qualification trials began in February 1994 and completed in spring 1998. Multi-national evaluation/user trials and national trials completed in early 1999. These trials tested the performance of the missile system, demonstrating its capability against potential targets. Whilst the programme is behind schedule and areas of technical difficulty remain, there is confidence that the final developed system will meet the requirement. Changes in the force structure arising from the Strategic Defence Review have resulted in a decrease in the number of firing posts and missiles.

Ministers are currently considering whether the UK should commit to the production phase of MR TRIGAT[8]. France, Germany and Belgium have already confirmed that they wish to proceed with the programme. It is understood, however, that the Netherlands are unlikely to make a decision on whether to remain in the programme before September 1999.

Key future events: it is hoped to place a contract for Industrialisation and Production (I&P) in late Summer 1999 to meet the forecast ISD of June 2005.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

8 Approval for MR TRIGAT Industrialisation and Production was received in June 1999.

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Euromissile Dynamics Group (EMDG), comprising: Matra BAe Dynamics (UK) Limited, Aerospatiale and Lenkflugkorpersysteme	Fixed Price	Single source, non-competitive Development Contract (French MOD are the Contracting Authority)

PROJECT COSTS SUMMARY
(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development[9] £m	Production £m	Total £m
Current Estimate of Costs	122	-	122
Estimate of Costs at MoD Approval	127	-	127
Difference	-5	-	-5

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Exchange Rates	12		Sterling has devalued against the Deutschmark and French Franc since the beginning of the programme (+£12m).
Inflation		7	Difference in annual price uplifts between specific indices and GDP (-£7m).
Changed Requirement		25	Reduction in trials and contingency costs reflecting evolution of the programme (-£25m).
Changed Costing	22	7	Greece, Spain and Italy did not join the programme as had been expected at the time of approval (+£22m). Realism adjustment to reflect expected future expenditure (-£7m).
Total	34	39	
Total Balance		-5	

Expenditure to date (31 March 1999): £102m

9 The Feasibility Study and Project Definition phases were combined for both the Medium Range and Long Range TRIGAT projects and meaningful separation of costs is not possible for these phases. These costs are for Full Development only.

Approval	Date	Explanation
First approval:	1979	Feasibility Study
Latest approval:	1988	Full Development

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£106m (Development)
Cost Change since Main Contract Award	-£6m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Exchange Rate Variation	10	-	Sterling has devalued against the Deutschmark and French Franc since contract placement (+£10m).
Inflation	-	6	Difference in annual price uplifts between specific indices and GDP (-£6m).
Changed Costing	-	10	Belgium and Netherlands joined the programme (-£6m). Realism adjustment to reflect expected future expenditure (-£4m).
Total	10	16	

Total Balance	-6

Year(s) of Peak Expenditure:	2003/04 & 2004/05
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	£640m

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition: First Battalion fully equipped with all firing posts and first line missile stocks.

Original ISD (Month/Year)	December 1995
Forecast ISD (Month/Year)	June 2005
Variation (Month(s))	+114

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Unforeseen Technical Difficulties	66	-	Problems with warhead integration and guidance (+12 months). Late equipment deliveries for service trials as a result of further technical problems, and validation of the design against the specification (+32 months). Unresolved risk remaining for future phases, including the potential need for additional reliability and acceptance trials (+22 months).
Procurement Delays	24	-	An under-estimation of the time required to reach a satisfactory agreement between nations on the arrangements for future phases, resulting in delays to national approvals processes (+24 months).
Budgetary Constraints	24	-	The need to match the programme with available Departmental resources (+24 months).
Total	114	-	

Total Balance	+114

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	-£59m

Merlin HM Mk1 Helicopter

Director General Responsible:
DIRECTOR GENERAL AIRCRAFT SYSTEMS 2 (DGAS 2)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

MERLIN HM MK1 (formerly MERLIN EH101) is an anti-submarine (ASW) variant of the Anglo-Italian EH101 helicopter. It entered service in 1998 replacing ASW SEA KING. The collaborative programme began in 1979 through EH Industries (EHI) - the company formed by Agusta of Italy and GKN Westland in the UK. It is the largest collaborative helicopter project in history and the most powerful helicopter in terms of military capability yet designed in Western Europe. The mission system is world leading and the weapons system is a significant force multiplier compared with existing capability.

In 1991 the United Kingdom selected IBM-ASIC (subsequently Loral-ASIC, now Lockheed Martin ASIC (LMA)) as Prime Contractor to complete Royal Navy development, integration of the Mission System and production of 44 aircraft. Since then progress has been made on the programme through the award of the Collaborative Production Investment contract in March 1992 to EHI. Awards were also made to LMA for the Merlin Training System (MTS) in July 1994 and the Merlin Support and Spares Availability System (MSSAS) in July 1996.

Progress on the project has been hampered by accidents on the collaborative programme to 3 prototype aircraft in 1993, 1995 and 1996. However the first flight by a production MERLIN was on 6 December 1995 and the first Mission System fitted MERLIN flew in January 1997. The Royal Navy Intensive Flight Trials Unit (IFTU) was commissioned in December 1998. The latest endorsed ISD was met on 29th March 1999 with the delivery of the twelfth aircraft. Four aircraft are with IFTU, the remainder are being used for proving trials. The production rate is due to be one per month from September 1999.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
EH Industries Ltd. (Collaborative Development EH101)	Target Cost + Incentive Fee with a Maximum Price	Non-competitive with no competition for sub-contracts. Reflects 50/50 workshare agreement between Westland and Agusta
GKN Westland Helicopters Ltd. (Aircraft Development & Production)	-	Workshare agreement Principal EHI sub-contractor
EH Industries Ltd. (Production Investment EH101)	Target Cost Incentive Fee	Non-competitive, with no competition for sub-contracts
Lockheed Martin ASIC (Completion of Specific Development, Integration of Mission Systems and Aircraft Production)	Fixed Price	International Competition
Lockheed Martin ASIC (Development & Production, Merlin Training System)	Fixed Price	Non-competitive
Lockheed Martin ASIC (Merlin Support and Spares Availability System (MSSAS))	Fixed price	Non-competitive

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development & Production £m	Total £m
Current Estimate of Costs	5028	5028
Estimate of Costs at MoD Approval	3867	3867
Difference	+1161	+1161

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	934	171	Over-optimism in the collaborative Development programme, specific technical problems, the loss of Pre-production Aircraft No 2 and substantial restructuring of the Development programme caused by accidents to Pre-production Aircraft No 4 and No 7 (+£379m). Accidents to Pre-production Aircraft No 4 (+£32m) and No 7 (+£90m). Reassessment of the expected cost of the Merlin Prime Contract (MPC) (+£44m) and the Merlin Training System contract (+£81m). Correction of an error in LTC97 in the calculation of VOP and VAT on the MPC (+£35m). Revision of DERA & DTEO costs, Alternative Assumption and transfer to MK2 (+£6m). Recovery in relation to EH101 Target and Maximum Price agreements (-£54m). Reassessment of costs and contract negotiations across the project (-£104m). Revised CESG proposal (-£4m). Review of the Specific Development programme (-£3m). Military Aircraft Release revisions to fund task to MAR5 on time to maintain Merlin Operational Capability (+£11m). Revised costing for Reverse Levy (+£23m). MSSAS redeployment (+£10m[10]). Revised deployment pattern resulting from cancellation of Batch 2 (+£151m[10]). Reduced spares risk provision (-£6m), MSSAS. Analysis of Safety Critical Software (+£12m). Reduction in MPC contract savings (+£8m). VAT on Reverse Levy (+£10m). Concurrency risk provision (+£28m). Forecast Integrated Development Programme (IDP) savings not achieved (+£14m).
Accounting Adjustments	30		The introduction of funding (previously intramural) for Defence Test and Evaluation Organisation (DTEO) work (+£26m) and Communications Electronics and Security Group (CESG) work (+£2m). Disaggregation of MOdular Data Acquisition System (MODAS) costs to meet RAB requirements (+2m).
Changed Requirement	61		Procurement of safety enhancements: specialised Emergency Lighting (+£7m) and the purchase and integration of an Accident Data Recorder (+£15m). Additional funding for Aircraft Special Servicing Equipment and Ground Support Equipment (+£6m) and Merlin Support and Spares Availability System (MSSAS) (+£33m).
Inflation	307		Difference in annual price uplift between specific indices and the GDP deflator (+£307m).
Total	1332	171	

Total Balance	+1161

10 These are transfers from the Merlin HM Mk1 Batch 2, therefore not a net addition to MoD's costs.

Expenditure to date (31 March 1999) £3805m

Approval	Date	Explanation
First approval:	1975	Feasibility
Latest approval:	1998	Financial re-approval of Development & Production Package

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£2551m
Cost Change since Main Contract Award	£373m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	226	38	Reassessment of the cost of the MERLIN Prime Contract (MPC) resulting from contract negotiations (+£44m). Additional cost from the loss of Pre-production Aircraft No 4 (+£32m) and No 7 (+£52m). Correction of an error in LTC97 in the calculation of VOP & VAT on the MPC (+£35m). Price negotiations with sub-contractors (-£32m). Revised costing for Reverse Levy (+£23m). Reallocation of Communications funding for priority avionics (+£10m). Transfer to ASSE to cover PP7 impact (-£6m). Analysis of Safety Critical Software (+£12m). Reduction in contract savings (+£8m). VAT on Reverse Levy (+10m).
Changed Requirement	22	-	Procurement of safety enhancements: specialised Emergency Lighting (+£7m) and the purchase and integration of Accident Data Recorder (+£15m).
Inflation	163	-	Difference in annual price uplifts between specific indices and the GDP deflator (+£163m).
Total	411	38	

Total Balance	+373

Year(s) of Peak Expenditure:	1995/96 & 1999/00
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	Nil

Unit Production Cost (UPC)	Quantities Required
Not available (Development and Production Package)	44

IN-SERVICE DATES

ISD Definition: The date by which the twelfth helicopter is delivered to the Royal Navy.

Original ISD (Month/Year)	December 1993
Forecast ISD (Month/Year)	March 1999
Variation (Month(s))	+63

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Unforeseen Technical Difficulties	32	-	Technical problems in the early stages of the collaborative programme, the integration of the Automatic Flight Control System and the engine proving more complex than originally expected (+29 months). The accident to Pre-production Aircraft No 7 (+3 months).
Need for Project Redefinition	24	-	Restructuring the collaborative Development programme and the competition to select a Prime Contractor (+24 months).
Redefinition of ISD	-	5	Redefinition of the ISD from 17 to 12 Aircraft. The National Audit Office has agreed to reflect this as an ISD variation decrease (-5 months).
Budgetary Constraints	12	-	The need to match the programme to the available Departmental resources (+12 months).
Total	68	5	

Total Balance	+63

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	£14m - £18m[11]

11 Lack of experience of operating Merlin HM Mk1 plus certain deficiencies in historic accounting information make precise comparisons difficult, but on the basis of available data, running on Sea King Marks 5 & 6 to compensate for the late arrival of the Merlin may have resulted in a cost of £14m - £18m over the period in question. Subject to reservation regarding the assumptions which have been necessary in order to produce the amended cost of ISD delay.

Merlin HC Mk3 Helicopter

Director General Responsible:
DIRECTOR GENERAL AIRCRAFT SYSTEMS 2 (DGAS 2)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The Merlin HC Mk3 helicopter (previously known as the EH101 Support Helicopter) is based on the Utility version of the Anglo-Italian EH101 helicopter. It is designed to carry 24 troops, or a range of vehicles internally or as underslung loads.

A fixed price contract for 22 Merlin HC Mk 3 helicopters was signed on 9 June 1995 with GKN Westland Helicopters Limited (GKNWHL). This followed a parallel No Acceptable Price No Contract (NAPNOC) competition between GKNWHL and Boeing Helicopters (bidding the Chinook) for the RAF's Medium Support Helicopter requirement.

Satisfactory progress is being made on the contract, with the critical Design Review completed in July 1997. However, the ISD has slipped due to a delay in the Anglo-Italian development programme following the loss of Pre-Production EH101 No. 4 in an accident in 1995 and also as the result of resource problems within industry.

The first production aircraft, RAF01, flew on 24 December 1998 and RAF02 achieved its first flight on 14 June.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
Merlin HM Mk1 helicopter	1999
Medium Support Helicopter Aircraft Training Facility	2000

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
GKN Westland Helicopters Limited, Yeovil, Somerset (Development & Production)	Fixed price	Parallel NAPNOC negotiations with Boeing Defense & Space Group, Helicopters Division, Philadelphia, USA (Chinook)

PROJECT COSTS SUMMARY
(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development & Production £m	Total £m
Current Estimate of Costs	758	758
Estimate of Costs at MoD Approval	773	773
Difference	-15	-15

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Inflation	29	-	Difference in annual price uplifts between specific indices and GDP deflator (£29m).
Changed Requirement	8	-	Revised specification to accommodate safety and airworthiness features covered by the Staff Requirement but not in the original contract (+£3m). Decision to deploy aircraft detachment to Cyprus (+£5m).
Exchange Rate	-	14	Increase in value of Pound compared to Italian Lira and French Franc (-£14m).
Accounting Adjustment	16	-	Cost of trials at the Directorate of Test and Evaluation Organisation (DTEO), previously intra-mural (+£15m), disaggregation of MODAS equipment (+£1m).
Changed costing	55	109	Omission from EAC submission of Spares Packaging (+£5m) and Ground Support Equipment (+£11m). Under-estimation of costs of Directable Infra-Red Counter Measures (DIRCM) (+£13m). Reduction in estimate of Continuing Design Services (-£7m), risk provision (-£12m), contractors trials (-£1m) and DTEO provision (-£2m). Reassessment of resources required to meet spares requirement (-£17m), additional Defensive Aids Suite changes (+£9m), Reverse Levy (+£4m), and reduction in estimated GFE component (-£2m). Addition of funds for minor requirements (+£4m), increase in Ground Support Equipment and HUDS (+£9m), allocation of ILS funding to specific items (-£25m), correction of an overestimation of ILS provision in LTC98 (-£10m), reduction in IP spares and non-Prime Contract items (-£33m).
Total	108	123	
Total Balance		-15	

Expenditure to date (31 March 1999) £281m

Approval	Date	Explanation
First approval:	1995	Development and Production package
Latest approval:	1995	Development and Production package

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£602m (Development & Production)
Cost Change since Main Contract Award	+£47m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Changed Requirement	8	-	Revised specification to accommodate safety and airworthiness features covered by the staff requirement but not in the original contract (+£3m). Decision to deploy up to three aircraft to Cyprus from 2003 (+£5m).
Changed Costing	28	-	Defensive Aids Suite added to contract. Could not be incorporated at outset because of need to study and define optimum configuration (+£28m).
Inflation	25	-	Difference in annual price uplift between specific indices and GDP deflator (+£25m).
Exchange Rate	-	14	Increase in value of Pound against French Franc and Italian Lira (-£14m).
Total	61	14	

Total Balance	+47

Year(s) of Peak Expenditure:	1999/00 & 2000/01
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	Nil

Unit Production Cost (UPC)	Quantities Required
Not available (Development & Production Package)	22

IN-SERVICE DATES

ISD Definition: Delivery of 6 aircraft to the RAF.

Original ISD (Month/Year)	December 1999
Forecast ISD (Month/Year)	June 2000
Variation (Month(s))	6

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Technical Difficulties	6	-	Delay in the EH101 Development programme caused by the loss of Pre-Production Aircraft No 4 in 1995 (+3 months). Delays due to industrial resource problems (+3 months).
Total	6	-	

Total Balance	+6

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	N/A

Replacement Maritime Patrol Aircraft (RMPA) - Nimrod MRA Mk 4

Integrated Project Team Responsible:
NIMROD MRA4

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The Nimrod MRA4 will replace the current MR2 as the RAF's new maritime patrol aircraft, providing significantly enhanced Anti-Submarine and Anti-Surface Unit Warfare capability through improved aircraft and sensor performance, a greater degree of system integration and better Human Machine Interface design. The new aircraft will also provide a substantial improvement in availability and supportability. The aircraft, training system and initial support is being procured from British Aerospace as Prime Contractor. The contract was placed in December 1996. Responsibility for the project moved to the Nimrod MRA4 Integrated Project Team from 2 November 1998.

In late 1998, BAe acknowledged that they would not be able to meet the contractual programme. As a result, the main development and production contract has been re-negotiated incorporating the revised contractual programme. The Equipment Approval Committee (EAC) approved the changes in April 1999 and a contract amendment was agreed with BAe in May 1999. First flight is scheduled for December 2001 with delivery of the first aircraft in August 2004.

BAe are now focused on achieving the next major technical milestone, which is the Air Vehicle Critical Design Review (AV CDR) in September 1999.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
British Aerospace Defence Ltd. Military Aircraft Division (Development & Production)	Fixed Price	Prime Contractor International competition
Boeing Defence & Aerospace Group, USA (Tactical Command System and Sensors)	-	Major sub-contractor

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development & Production £m	Total £m
Current Estimate of Costs	2317	2317
Estimate of Costs at MOD Approval	2409	2409
Difference	-92	-92

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Accounting Adjustment	1	-	Increase in cost owing to the creation of trading fund for the Communications Electronic Security Group (CESG) (+£1m) after original approval had been granted.
Changed Costings	27	171	Reduction in programme costs between original approval and original contract (-£37m). Original contract let at provisional indices that were below actual indices (+£16m). Reduction owing to reassessment of Project FS & PD costs (-£5m). Reductions following re-negotiation of contract (-£26m) and recovery of Liquidated Damages (-£46m). Reduction in risk provision (-£57m). Increase in DERA estimate (+£11m).
Price Base/Inflation	51	-	Difference in annual price uplift between specific indices and GDP deflator (+£51m).
Total	79	171	
Total Balance	-92		

Expenditure to date (31 March 1999) £326m

Approval	Date	Explanation
First approval:	1992	Release to industry of Request For Information (RFI)
Latest approval:	1999	Procurement of 21 NIMROD MRA4 aircraft together with an associated package of Synthetic Training and initial Logistic Support, incorporating re-negotiation of contract as a consequence of ISD slippage (EAC approval on 30 April 99)

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£2071m (Development & Production)
Cost Change since Main Contract Award	-£5m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Changed Costings	-	72	Change of contract price subsequent to re-negotiation (-£72m).
Price Base/Inflation	67	-	Difference in annual price uplift between specific indices and GDP deflator (+£51m). Original contract let at provisional indices that were below actual indices (+£16m).
Total	67	72	

Total Balance	-5

Year(s) of Peak Expenditure:	2003/04 & 2004/05
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	Nil

Unit Production Cost (UPC)	Quantities Required
Not available - Development & Production package.	21

IN-SERVICE DATES

ISD Definition: Delivery of seventh production standard aircraft to the Royal Air Force.

Original ISD (Month/Year)	2000 (Assumed December)
Forecast ISD (Month/Year)	March 2005
Variation (Month(s))	+51

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Redefinition of Programme	21	-	Original ISD was determined by expected equipment obsolescence. Subsequent responses to Request for Information (RFI) from industry indicated that the earliest ISD industry could achieve was September 2002 (+21 months).
Outcome of Competition	7	-	Earliest date offered in outcome of tender competition (+7 months).
Programme Slippage	23	-	Resource and technical problems at BAe (+23 months).
Total	51	-	

Total Balance	+51

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	Nil[12]

12 The additional run-on costs on the Nimrod MR2 (up to its out of service date) caused by the slippage in delivery of Nimrod MRA4 are offset by the reduction in the cost of operating Nimrod MRA4 over the same period.

SKYNET 5 - UK Military Satellite Communications System

No Picture

Director General Responsible:
DIRECTOR GENERAL COMMAND INFORMATION SYSTEMS (DGCIS)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

SKYNET 5 will replace SKYNET 4 Stage 2 early next century and provide continuity of military satellite communications for the armed forces. This capability is essential to support intra and inter-theatre operational requirements, and ensure that mobile forces (sea, land and air) are not constrained by the need to remain within the range of terrestrial radio communications.

Two feasibility study contracts were placed with Matra Marconi and BAe Space Systems Ltd. (BAeSSL). In April 1994 Matra Marconi purchased BAeSSL and formed Matra Marconi Space Systems Limited (MMSSL). Work was completed in April 1995 and assessment was completed in January 1996. Following discussions with France and Germany to establish a collaborative programme (TRIMILSATCOM), a Memorandum of Understanding for a Project Definition (PD) phase was signed in December 1997. Tenders for a competitive PD phase were received from two European Prime Contractors in February 1998. Tenders were also sought for alternative, National PD and PFI programmes.

Following detailed evaluation of the PD phase bids it was clear that TRIMILSATCOM would be unable to meet the UK's requirements in a timely and affordable way, whereas a National PFI approach offered the potential to do so. The UK, therefore decided in August 1998 not to proceed with TRIMILSATCOM. Two competitive National PFI Design Phase contracts have now been placed with industry.

Significant future milestones on this project include:

Completion of Design Phase	End 2000
Placing of Implementation Phase contract	Mid 2002
Commencement of Enhanced Military Satellite Comms Service	Mid 2006

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Matra Marconi Space UK Ltd. (PFI Design Phase Study)	Firm Price	International Competition
Lockheed Martin Missiles and Space (PFI Design Phase Study)	Firm Price	International Competition

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	109	-	109
Estimate of Costs at MOD Approval	116	-	116
Difference	-7	-	-7

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costings	7	14	Cost of additional studies to examine the effects of Germany joining the programme (+£3M). Cost of studies to examine in more detail the effects of moving to a PFI programme (+£1M). Cost of additional Defence Evaluation and Research Agency (DERA) work (+£2m). Cost of CESG work (+£1m). Reduction due to competitive negotiations for Feasibility Study (-£8m). Reassessment of what is involved to deliver the Technology Demonstrator Programme work (-£2m). Reduction due to revised estimate of cost for the PFI Design Phase Studies (-£4m).
Total	7	14	
Total Balance		-7	

Expenditure to date (31 March 1999) £30m

Approval	Date	Explanation
First approval:	1993	Approval for Feasibility
Latest approval:	1998	Approval for PFI Design Phase Studies

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A
Cost Change since Main Contract Award	N/A

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	-
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure:	2007/08 & 2008/09
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	***

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition: Original ISD Definition was acceptance of first satellite in orbit. The revision of the ISD is for the Initial Military Operational Capability being provided by the service provider. Both ISDs are determined by the end of the operationally useful life of SKYNET 4 Stage 2 and provides for seamless continuity of service.

Original ISD (Month/Year)	May 2003
Forecast ISD (Month/Year)	April 2006
Variation (Month(s))	+35

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Procurement Delays	28	-	Additional time required to explore a common requirement with potential international partners (+28 months).
Revision of Programme	7	-	Additional time required to secure approval for a revised national PFI based procurement strategy (+7 months).
Total	35	-	

Total Balance	+35

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	N/A. Satellites in-orbit require no maintenance action. Once in-service they are used until such time as they can no longer provide operational benefit. The Satellite ground stations for use by the in-service UK Military Satellite Communications System are operated by Defence Communication Services Agency (DCSA) and maintained by the Defence Logistics Organisation (DLO). It is currently assumed that the SKYNET 5 ground stations support costs and operating costs will be equivalent to those for the SKYNET 4 programme therefore the later transfer from the current system SKYNET 4 to SKYNET 5 will not result in any increase in costs. This assumption will be reviewed after the completion of the design phase.

Sonar 2087

Director General Responsible:
DIRECTOR GENERAL SURFACE SHIPS (DGSS)
Sonar 2087 will be retro-fitted to Type 23 Frigates

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The Sonar 2087 project was formed in 1993 after the cancellation of the 2057 and 2080 sonar projects.

Sonar 2087 is a tactical, variable depth, passive and active sonar system. It will significantly improve the Type 23 Frigates' ability to detect, classify and track nuclear and conventional submarines. It will be retro-fitted to all Type 23 Frigates during refit replacing the current passive towed array Sonar 2031 (where fitted) and integrating with the existing bow-mounted active sonar.

Following endorsement of the project in April 1994, parallel feasibility study contracts were let with three UK Prime Contractors. Feasibility reports were received in April 1996 and, following six months of risk reduction work, this phase was completed in October 1996.

The two Prime Contractors listed below commenced a competitive, parallel Project Definition (PD) study in April 1997, which completed in February 1999 with the delivery of firm priced bids for the Full Development, Production and Support (FDP&S) phase. Subject to final agreement on how best to meet the requirement, award of the FDP&S contract to the winning contractor is expected in early 2000. The first production set is still expected for delivery in 2002, with the Type 23 retrofit programme due to be completed in 2011.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Thomson Marconi Sonar (TMS) Thomson Marconi Sonar SAS	Firm Price	Prime Contractor - UK Competitive Principal Sub-Contractor
Babcock Defence Systems (BDS) Lockheed Martin Northrop Grumman	Firm Price	Prime Contractor - UK Competitive Principal Sub-Contractor Principal Sub-Contractor

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	49	-	49
Estimate of Costs at MoD Approval	52	-	52
Difference	-3	-	-3

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Requirements	1	6	Fewer than planned support contracts let in PD phase (-£6m). Additional support from DERA in FS phase (+£1m).
Changed Costing	2	-	More DERA support (+£2m) needed for environmental studies during PD phase.
Total	3	6	
Total Balance		-3	

Expenditure to date (31 March 1999) £45m

Approval	Date	Explanation
First approval:	April 1994	Feasibility Study Phase
Latest approval:	April 1997	Project Definition

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A
Cost Change since Main Contract Award	N/A

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	-
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure:	2003/04 & 2006/07
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	£340m - Full Development and Production. 16 full sea-based sets & five shore based part sets (Training, Reference & Integration)

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition: ISD as the date at which the equipment contributes to force effectiveness in its main role, and when the first Type 23 system has been cleared for operational use.

Original ISD (Month/Year)	July 2003
Forecast ISD (Month/Year)	December 2004
Variation (Month(s))	+17

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Procurement Delays	4	-	Delays experienced in obtaining Feasibility approval delayed contract placement (+3 months). One month realism slip in Project Definition approval delayed contract (+1 month).
Budgetary Constraints	13	-	The impact of a savings measure to delay Type 23 refits by 12 months was partly offset by reprogramming the first fit to another ship, resulting in a 6 month delay to installation (+6 months). The need to match expenditure to available resources (+7 months).
Total	17	-	

Total Balance	+17

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	N/A

Spearfish Heavyweight Torpedo

Director General Responsible:
DIRECTOR GENERAL SUBMARINES/CHIEF STRATEGIC SYSTEMS EXECUTIVE (DGSM/CSSE)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

SPEARFISH is an advanced anti-submarine and anti-ship torpedo. Designed primarily to counter the threat from fast, deep manoeuvring submarines, its speed and endurance enable it to out-manoeuvre fast and deep diving targets. It will replace the TIGERFISH torpedo in all Royal Navy submarines.

A contract for the Development and Initial Production (D&IP) of 100 torpedoes was placed with GEC-Marconi in 1982. Deliveries were subsequently suspended for 62 months until 1993, when reliability problems with the torpedo were resolved. In 1994 the design was accepted and SPEARFISH entered service.

In December 1994 a contract was placed with GEC-Marconi for the SPEARFISH Main Production Order (MPO). To minimise MoD liability and risk, GEC-Marconi are responsible for the In Service Support (ISS) of the Initial Production and MPO weapons until 2004. The Royal Naval Armament Depot at Beith is the major sub-contractor for this element of the contract.

The Royal Navy's requirements have been met to date using Initial Production Torpedoes and will continue to be met by MPO warshot deliveries.

Significant future milestones include:

Delivery of the first warshot torpedo	June 1999
Fleet Weapon Acceptance	January 2003

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
GEC-Marconi (Underwater Division) Development & Initial Production	Fixed Price	Selected after comparison with US Mk48 ADCAP torpedo.
GEC-Marconi (now trading as Marconi Electronic Systems Ltd.) Main Production Order	Predominately Fixed Price	Non-Competitive (Competition for sub-contracts amounting to 24 % of the overall value of the Prime Contract)

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development D&IP £m	Production MPO £m	Total £m
Current Estimate of Costs	1162	648	1810
Estimate of Costs at MoD Approval	972	656	1628
Difference	+190	-8	+182

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Slippage (D&IP)	42	-	Programme delays required support costs of first torpedoes to be accounted for against the Project until ISD had been achieved (+£42m).
Inflation D&IP MPO	 148 2	 - -	Difference in annual price uplift between specific indices and GDP deflator (+£148m, +£2m).
Changed Costing	3	13	Approved work added to contract (+£2m). Contract let for less than original approval (-£12m). Change of items from fixed to firm price (-£1m). Post Contract Award Audit adjustment in respect of sub-contract pricing (+£1m).
Total	195	13	

Total Balance	+182

Expenditure to date (31 March 1999) D&IP £1162m
MPO £264m

Approval	Date	Explanation
First approval:	1982	Development & Initial Production (D&IP)
Latest approval:	1994	Main Production Order (MPO)

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£648m
Cost Change since Main Contract Award	+£7m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Changed costings	6	1	Approved work added to contract (+£2m). Transfer of work from ISS Beith element (+£3m). Change of items from fixed to firm price (-£1m). Post Contract Award Audit adjustment in respect of sub contract pricing (+£1m).
Inflation	2	-	Difference in annual price lifts between specific indices and GDP deflator (+£2m).
Total	8	1	

Total Balance	+7

Year(s) of Peak Expenditure: 1987/88 (D&IP)
2002/03 (MPO)

Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): Nil

Unit Production Cost (UPC)	Quantities Required
IP: £1.1m	100
MPO: £1.6m	***

IN-SERVICE DATES

ISD Definition: The availability of the first outload of weapons with Certified Design to an RN Submarine.

Original ISD (Month/Year)	December 1987
Forecast ISD (Month/Year)	March 1994
Variation (Month(s))	+75

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Unforeseen Technical Difficulties	75	-	Problems with the propulsion system (+9 months). During contract acceptance trials it became evident that the reliability requirements of the contract were not being met. Following a design audit, a Reliability Assurance Programme was implemented (+62 months). Problems during environmental trials required for safety acceptance (+4 months).
Total	75	-	

Total Balance	+75

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	Nil

Sting Ray Lightweight Torpedo Life Extension and Capability Upgrade

Director General Responsible:
DIRECTOR GENERAL SUBMARINES/CHIEF STRATEGIC SYSTEMS EXECUTIVE (DGSM/CSSE)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The Sting Ray lightweight torpedo is the main anti-submarine weapon for ships and aircraft. It entered operational service in 1983 with a planned service-life of around 20 years. To provide an opportunity for international collaboration on a replacement, Sting Ray will remain in-service until around 2020 when it is envisaged that other nations will require replacement lightweight torpedoes. Accordingly, the Sting Ray torpedo needs to be life-extended and its capability enhanced.

The Sting Ray Life Extension programme was approved in May 1995 and a contract for full development was awarded to GEC-Marconi on 10 July 1996. The translation of initial designs into hardware for the major torpedo units is now substantially complete with the operation of units being demonstrated individually.

Separately, a study was undertaken into a less sensitive warhead for Sting Ray Mod 1. A submission to the Equipment Approvals Committee is being prepared to seek approval to proceed with Assessment and Demonstration work for the acquisition of a new insensitive munition (IM) warhead.

Future milestones: Main Gate submission to EAC 2001, place Main Production Order 2002, In Service Date May 2005 (N.B. approval given in 1998 to slip ISD by one year).

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
GEC-Marconi Underwater Systems Group (now trading as Marconi Electronic Systems Ltd.) Full Development & Pre Production	Fixed Price	Non-competitive contract placed with design authority of equipment. No sub-contract competition at first tier level

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	81	55	136
Estimate of Costs at MoD Approval	68	46	114
Difference	+13	+9	+22

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Accounting Adjustment	9	-	Inclusion of DERA support previously treated as an intramural charge (+ £9m).
Changed Costing	11	-	Contract price exceeded estimate at approval (+£4m), revised estimate for warhead work (+£2m) and re-assessment of DERA support expenditure (+£5m).
Changes Requirement	1	-	Addition of safety case to comply with new Health & Safety regulations for warships (+£1m).
Price Base/Inflation	1	-	Difference in annual price uplift between specific indices and GDP deflator (+£1m).
Total	22	-	

Total Balance	+22

Expenditure to date (31 March 1999) £39m

Approval	Date	Explanation
First approval:	May 1995	Full Development and Pre-Production (FDPP)
Latest approval:	May 1995	Full Development and Pre-Production (FDPP)

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£118m (FDPP)
Cost Change since Main Contract Award	+£1m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Price Base/Inflation	1	-	Difference in annual price uplift between specific indices and GDP deflator (+£1m).
Total	1	-	

Total Balance	+1

Year(s) of Peak Expenditure:	2006/07 & 2007/08
Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m):	*** To upgrade***torpedoes

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition: The date when the first 100 production standard weapons have been modified and are ready for issue to an operational unit.

Original ISD (Month/Year)	December 2002
Forecast ISD (Month/Year)	May 2005
Variation (Month(s))	+29

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Procurement Delays	17	-	Delay due to contract negotiations taking longer than expected (+9 months) and re-assessment of programme timescales following negotiations (+8 months).
Budgetary Constraints	12	-	The need to match the MoD programme to available resources in the overall pattern of MoD priorities (+12 months).
Total	29	-	

Total Balance	+29

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	£18m

Successor Identification Friend or Foe (SIFF)

No Picture

Director General Responsible:
DIRECTOR GENERAL COMMAND INFORMATION SYSTEMS (DGCIS)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

The purpose of the Successor Identification Friend or Foe (SIFF) programme is to replace the IFF systems currently in use with the UK Armed Forces. SIFF will be fitted to 50 major platforms to provide a modern, NATO-compatible, secure IFF system, enabling swift and accurate identification of friendly forces. The original approval in May 1997 endorsed the SIFF Requirement with an indicative fitting plan covering the period 2001 to 2006, and approved an Integration Study & Planning Phase (ISPP) which began in 1998. The approval noted that an ISD would be proposed as part of the Full Development and Production Phase (FDPP) submission.

Due to the number and diversity of platforms it is not possible to have a single Prime Contractor. As part of the ISPP, tenders will be received from two competing potential Prime Contractors covering the majority of the platforms and from Design Authorities (DAs) for the remainder. Following receipt of these tenders, the Department plans to select a Prime Contractor as part of the FDPP approval in early 2000.

The Strategic Defence Review endorsed the continuing validity of the SIFF Requirement as part of the process of modernisation. It also endorsed the procurement of SIFF for Tornado F3 ahead of other platforms, to achieve cost savings and reduce programme risk through alignment with the aircraft's Capability Sustainment Programme (CSP). An incentivised No Acceptable Price No Contract (NAPNOC) FDPP contract was let in November 1998 with BAe, the aircraft DA. BAe will be responsible for procuring IFF equipment and its integration into the aircraft and for ensuring harmonisation with the CSP.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Marconi Electronic Systems Ltd.* Project Definition Study (ISPP) for the main SIFF programme	Firm Price	International competition
Raytheon Systems Ltd.*	Firm Price	International competition
British Aerospace Ltd. Full Development & Production (FDPP) contract for SIFF for Tornado F3 only.	Firm Price	Non-competitive NAPNOC Prime Contract with the Design Authority, but with competition at sub-contractor level, the value of which equates to 21% of the overall value of the Prime Contract

* These are the most significant of the ISPP contracts; there are, in addition, a total of 16 contracts with Design Authorities.

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development (Integration, Study & Planning Phase) £m	Production (FDPP for SIFF for F3) £m	Total £m
Current Estimate of Costs	25	88	113
Estimate of Costs at MoD Approval	26	87	113
Difference	-1	1	0

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	1	-1	Improvement in prices agreed for ISPP contracts compared with estimates at time of approval (-£1m). Change between estimated index values at approvals and current price (+£1m).
Total	1	-1	
Total Balance	0		

Expenditure to date (31 March 1999) £21m

Approval	Date	Explanation
First approval:	May 1997	Integration, Study and Planning Phase (PD study)
Latest approval:	September 1998	FDPP for SIFF for Tornado F3

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	***FDPP for SIFF for Tornado F3
Cost Change since Main Contract Award	-

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure: 2002/03 & 2003/04

Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): £460m

Unit Production Cost (UPC) - F3 only	Quantities Required - F3 only
Transponder - ***	80
Interrogator - ***	57

IN-SERVICE DATES

ISD Definition: An ISD will be proposed as part of the FDPP Submission. See Project Description for an explanation.

Original ISD (Month/Year)	-
Forecast ISD (Month/Year)	-
Variation (Month(s))	-

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
N/A	-	-	-
Total	-	-	

Total Balance	-

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	N/A

Swiftsure & Trafalgar Class Nuclear Submarine Update (S&T Update)

Director General Responsible:
DIRECTOR GENERAL SUBMARINES/CHIEF STRATEGIC SYSTEMS EXECUTIVE (DGSM/CSSE).

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

Initial Phase. The Initial Phase replaces obsolescent sonar equipment and interfaces the new sonars with the new Submarine Command System (SMCS), provided separately, to achieve an important interim improvement in operational effectiveness. The ISD was successfully achieved in June 1996.

Final Phase. The Final Phase implements acoustic signature measures to reduce counter detection and enhance the submarines' sonar performance. It replaces a number of individual sonar sets with the Sonar 2076 suite and provides the associated equipment and SMCS changes. This constitutes the fully integrated Tactical Weapon System (TWS) and provides the capability to take the submarines into the next century.

The Astute Prime Contractor (Marconi Electronic Systems Ltd.) is now managing the TWS procurement. Production of equipment to support the planned interim (Stage 3) fit on the first and second Final Phase submarines is on schedule to meet revised refit dates. Development of the Stage 4 design and the plans for its introduction into all Final Phase submarines are progressing well. The fitting programme has been modified to allow for delays to refit dates.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
Submarine Command System	1994
D154 - Nuclear Submarine Refit and Refuel Facilities at Devonport	2002
Astute Class Submarine	2005

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
Initial Phase. GEC-Marconi Naval Systems, Sonar Systems Division (Sonar 2074) (now trading as Thomson Marconi Sonar Systems Ltd.)	Firm Price	UK Competitive
BAe SEMA (now trading as BAe Land and Sea Systems)	Firm Price	Non-Competitive
Final Phase. Marconi Astute Class Ltd. (Novated Contracts)	Firm/Fixed	UK Competitive

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	338	367	705
Estimate of Costs at MoD Approval	316	357	673
Difference	+22	+10	+32

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Inflation	-	22	Differences in annual price uplifts between specific indices and GDP deflator (-£22m).
Changed costing	-	53	Changed assessment of what is required reflecting better understanding and definition of the programme (-£48m). Impact of slippage of the SONAR 2076 contract (+£1m). Reduced estimate for Trials Ranges and services (-£6m).
Accounting Adjustment	41	-	Increase in attributable costs following disaggregation of funding for the cost of Trials Ranges and services (+£41m).
Changed Requirement	15	-	Increase resulting from the effects of various Alternative Assumptions (+£15m).
Delays in Associated Projects	51	-	Increase in costs as a result of changes to the submarine refit programme (+£51m).
Total	107	75	

Total Balance	+32

Expenditure to date (31 March 1999) £383m

Approval	Date	Explanation
First approval:	1988	Full Development and Initial Production of Initial Phase following completion of Feasibility Studies for Final Phase
Latest approval:	1994	Procurement of Full Development & Initial Production of four Final Phase sets and a further three Initial Phase sets

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	£217m
Cost Change since Main Contract Award	+£3m

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
Inflation	-	10	Difference in annual price uplifts between specific indices and the GDP deflator (-£10m).
Changed Costing	1	21	Changed assessment of what is required reflecting better understanding and definition of the programme (-£21m). Impact of slippage of the SONAR 2076 contract (+£1m).
Changed Requirement	6	-	Increase following the effects of various Alternative Assumptions (+£6m).
Delays in Associated Projects	27	-	Increase in costs as a result of changes to the submarine refit programme (+£27m).
Total	34	31	

Total Balance	+3

Year(s) of Peak Expenditure: 1994/95 & 1997/98

Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): £67m (Procurement of two Final Phase sets in addition to the four already quoted under 'Quantities Required') Mirrors EP2000 assumptions in line with the latest long term refit plan and the latest estimates indicated by contractors.

Unit Production Cost (UPC)	Quantities Required
Initial Phase - £4.5m	8 Boat Sets
Final Phase - £29.9m	Initial Production of 4 Boat Sets and supporting shore equipment

IN-SERVICE DATES

ISD Definition: The ISD for the Final Phase is the date by which the first Stage 4 system will contribute to the operational capability of the Service.

	Initial Phase	Final Phase
Original ISD (Month/Year)	October 1994	December 1998
Forecast ISD (Month/Year)	June 1996	May 2003
Variation (Month(s))	+20	+53

EXPLANATION OF ISD SLIPPAGE

Initial Phase

Factor	Increase (months)	Decrease (months)	Explanation
Procurement Delays	12	-	Financial constraints delayed the placement of contracts (+12 months).
Delays in Associated Projects	12	2	Changes to fit opportunities resulting from changes to the Submarine Refit Programme (+12 months and -2 months).
Total	22[13]	2	

Total Balance	+20

13 A proportion of the procurement delays and delays to associated projects acted concurrently.

Final Phase

Factor	Increase (months)	Decrease (months)	Explanation
Procurement delays	5	-	Financial constraints delayed the placement of contracts (+5 months).
Delays in associated projects	39	-	Changes to fit opportunities resulting from changes to the Submarine Refit Programme (+39 months).
Other specified factors	9	-	Delay to start of Full Development and Initial Production as a result of the extension to Project Definition (+9 months).
Total	53	-	

Total Balance	+53

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	ISD delays may result in additional costs incurred in maintaining and repairing obsolescent equipment. **However, there is no reliable evidence currently available to confirm the existence of any such costs.**

Tactical Reconnaissance Armoured Combat Equipment Requirement (TRACER)

No picture

Director General Responsible:
DIRECTOR GENERAL LAND SYSTEMS (DGLS)

PROJECT DESCRIPTION, PROGRESS AND KEY FUTURE EVENTS

TRACER will be a component of the Information, Surveillance, Target Acquisition and Reconnaissance (ISTAR) systems to meet the land commander's critical information requirements for the 21st century. It will be a manned, armoured reconnaissance vehicle equipped with a wide range of sensors, incorporating the latest stealth technology and be capable of operating in all conditions. It will replace Scimitar, Sabre and Striker variants of Combat Vehicle Reconnaissance (Tracked) (CVR(T)) vehicles currently in-service.

The initial feasibility study for TRACER, approved in May 1992, involved three UK industrial consortia and reported in 1994. A further cost and risk study was approved in July 1995 and, as it neared completion in 1996, a similar US requirement emerged. The UK formally entered a collaborative programme with the US on signing a Memorandum of Understanding (MOU) on 7 July 1998. The TRACER MOU provides for the costs of Project Definition to be divided equally between the UK and US.

Two UK/US industrial consortia formed to participate in the competitive TRACER Project Definition (PD) phase, scheduled to last 42 months. On completion of the tender evaluation exercise, which included a detailed price investigation, in line with No Acceptable Price, No Contract (NAPNOC) principles, Firm Price contracts for Project Definition were awarded on 29 January 1999.

At the end of PD, following evaluation of the technical specifications and costed proposals produced by the consortia, a single Firm Price contract may be awarded to the successful consortium for the Full Development phase. The current planning assumption is to award a single Firm Price contract for Full Development with the successful consortium in early 2003. UK involvement in phases beyond PD will be subject to further approval and will take account of the outcome of parallel studies into the use of Unmanned Air Vehicles for battlefield reconnaissance.

ASSOCIATED PROJECTS CRITICAL TO ACHIEVEMENT OF ISD

Project Title	ISD
N/A	N/A

PURCHASING ARRANGEMENTS

Contractor	Contract Type	Procurement Route
LANCER - Marconi Land and Naval Systems will act as Prime Contractor in a consortium that includes, Alvis Vehicles, United Defence LP and Raytheon SC.	Firm Price	Contracts for PD were awarded non-competitively. The industrial teaming arrangements have limited the scope for competition at sub-contract level
SIKA International - a joint venture company formed by British Aerospace and Lockheed Martin; supported by General Dynamics Land Systems and Vickers Defence Systems	Firm Price	Contracts for PD were awarded non-competitively. The industrial teaming arrangements limit the scope for competition at sub-contract level

PROJECT COSTS SUMMARY

(At 1999/00 average forecast of outturn prices to the nearest £m)

Breakdown of Procurement Costs	Development £m	Production £m	Total £m
Current Estimate of Costs	130	-	130
Estimate of Costs at MoD Approval	124	-	124
Difference	+6	-	+6

REASONS FOR COST VARIATION

Factor	Increase £m	Decrease £m	Explanation
Changed Costing	12	6	Extension to Feasibility Study to allow for further consideration of programme risk (+£5m). Additional funding required to pursue collaborative approach (+£2m). Reduction in costs achieved as a result of placing Firm Price contracts for PD phase (-£6m). Re-assessment of funding required to provide effective DERA Project Support (+£5m).
Total	12	6	
Total Balance	+6		

Expenditure to date (31 March 1999) £18m

Approval	Date	Explanation
First approval:	May 1992	Initial Feasibility for TRACER
Latest approval:	July 1998	Approval for Project Definition Phase

PROJECT CONTRACT SUMMARY

Current Cost of Main Contract	N/A
Cost Change since Main Contract Award	N/A

REASONS FOR COST VARIATION SINCE CONTRACT AWARD

Factor	Increase £m	Decrease £m	Explanation
N/A	-	-	-
Total	-	-	

Total Balance	-

Year(s) of Peak Expenditure: 2000/01 & 2001/02

Further Expenditure in Clear prospect (at 1999/00 average forecast of outturn prices to the nearest £10m): UK involvement in phases beyond PD will be subject to further approval and will take account of the outcome of parallel studies into the use of Unmanned Air Vehicles for battlefield reconnaissance

Unit Production Cost (UPC)	Quantities Required
N/A	N/A

IN-SERVICE DATES

ISD Definition:

Original ISD Definition: The date when one Formation Reconnaissance Regiment is fully equipped and supported.
Current ISD Definition: The date when one complete Formation Reconnaissance Squadron is fully equipped, trained and supportable on operations.
Reason for Change: The re-definition of the ISD reflects the operational need to deploy a Brigade at short notice.

Original ISD (Month/Year)	December 2004
Forecast ISD (Month/Year)	October 2008
Variation (Month(s))	+46

EXPLANATION OF ISD SLIPPAGE

Factor	Increase (months)	Decrease (months)	Explanation
Extended Feasibility Study	24	-	Completion of additional feasibility work and supporting operational analysis to more clearly define the TRACER programme (+24 months).
Changed Strategy	8	-	To allow for negotiation of a collaborative programme with the US (+8 months).
ISD Re-definition	-	5	Using the currently assumed delivery profile a complete Formation Reconnaissance Regiment will be fully equipped by March 2009, some five months after the re-defined ISD of October 2008 has been achieved (-5 months).
Delays in Associated Projects	19	-	Delay in securing programme approvals (+7 months) and a re-assessment of the time required to deliver the programme (+12 months).
Total	51	-5	

Total Balance	+46

COST OF ISD SLIPPAGE

Additional Costs arising as a result of delays to ISD (for delays over 24 months) (at 1999/00 average forecast of outturn prices):	-£35m

Appendix 3: Project Glossary

Project glossary
overleaf

Glossary

AAAW (AIR-LAUNCHED ANTI-ARMOUR WEAPON): Air-launched missile with a limited stand-off capability to attack armoured vehicles, that will be carried by Harrier GR7, Eurofighter and Tornado GR4 aircraft.

ASTOR (AIRBORNE STAND-OFF RADAR): Long-range theatre surveillance and target acquisition system to detect fixed, static, and moving targets, in all weathers by day and night.

ASTUTE CLASS SUBMARINES: Nuclear-powered attack submarines to replace the Swiftsure CLass.

ATTACK HELICOPTER (WAH-64 APACHE): A version of the United States Army's AH-64D helicopter, equipped with Longbow radar, Hellfire missiles, ground suppression rockets, air-to-air missiles and powered by RTM322 engines.

BOWMAN: Combat net radio system to replace the existing CLANSMAN radio.

BVRAAM (BEYOND VISUAL RANGE AIR-TO-AIR MISSILE): Air-to-Air missile, to be carried by Eurofighter, for engagement of targets at beyond visual range.

CASOM (CONVENTIONALLY ARMED STAND-OFF MISSILE): Air-launched stand-off missile for precision attacks against strategic, tactical and infrastructure targets that will be carried by Harrier GR7, Eurofighter and Tornado GR4 aircraft.

CHALLENGER 2: Challenger 2 is the replacement for the Army's Chieftain and Challenger 1 Main Battle Tanks.

CNGF (COMMON NEW GENERATION FRIGATE): New class of Anti-Air Warfare frigate to replace the Type 42 Anti-Air Warfare destroyer.

EUROFIGHTER: Agile fighter aircraft with an offensive support capability.

FCBA (FUTURE CARRIER BORNE AIRCRAFT): Multi-role combat aircraft to replace Sea Harrier, and following the Strategic Defence Review announcement, Harrier GR7. A range of options are being investigated, including collaboration with the United States on the Joint Strike Fighter.

FOAS (FUTURE OFFENSIVE AIR SYSTEM): A long-range offensive air capability to replace that currently provided by the Tornado GR fleet. A range of options including manned aircraft, unmanned aerial vehicles and conventional air-launched cruise missiles are being investigated.

HERCULES C-130J: Replacement fleet of transport aircraft for part of the existing Hercules fleet.

LPD(R) (LANDING PLATFORM DOCK (REPLACEMENT)): Replacements for the amphibious assault ships Fearless and Intrepid. LPD(R) will be used to launch and co-ordinate amphibious operations.

MERLIN MK1: Anti-submarine warfare variant of the Anglo-Italian EH-101 helicopter, which will operate from Type 23 Frigates, and Invincible Class aircraft carriers.

MERLIN MK 3: Support helicopter based on the Anglo-Italian EH-101 utility helicopter. Designed to carry 24 troops or a range of vehicles or underslung loads.

MR TRIGAT (MEDIUM RANGE TRIGAT): Crew-portable laser beam riding anti-tank guided missile that uses a tandem charge warhead and a thermal sight.

RMPA (REPLACEMENT MARITIME PATROL AIRCRAFT) - NIMROD MRA Mk4: Replacement for the current fleet of Nimrod MR Mk2 patrol aircraft, whose principal war roles are anti-submarine and anti-surface ship warfare.

SIFF (SUCCESSOR IDENTIFICATION FRIEND OR FOE): A NATO-compatible, secure, identification friend or foe system allowing rapid and accurate identification of friendly forces.

SKYNET 5: Satellite communications system to replace SKYNET 4 Stage 2.

S&T UPDATE (SWIFTSURE AND TRAFALGAR CLASS NUCLEAR SUBMARINE UPDATE): Update to Swiftsure and Trafalgar Class submarines to improve the sonar, command and tactical weapons systems.

SONAR 2087: Tactical, variable depth, active and passive sonar system to be retro-fitted to all Type 23 Frigates.

SPEARFISH: A submarine-launched heavyweight torpedo with both anti-submarine and anti-surface ship capabilities.

STING RAY TORPEDO LIFE EXTENSION: Life extension and capability enhancement programme for the Sting Ray lightweight torpedo to allow it to remain in-service until 2020.

TRACER (TACTICAL RECONNAISSANCE ARMOURED COMBAT EQUIPMENT REQUIREMENT): A manned, armoured reconnaissance vehicle, which is one of the options under consideration to meet information, surveillance, target acquisition and reconnaissance (ISTAR) requirements.

Appendix 4

Glossary of contractual and procurement terms

Firm Price

An agreed price which is not subject to variation for inflation.

Fixed Price

An agreed price which is subject to variation to take account of inflationary and/or exchange rate movements.

Investment Appraisal

A comparison of the alternative investment options on a purely financial basis.

Liquidated Damages

A contractually pre-agreed sum payable in the event of a specific breach of contract (e.g. late delivery) by way of compensation.

Long Term Costings

The Department's cash budgeting process through which the overall defence programme is adjusted to meet the planned resources available over the next 10 years.

NAPNOC (No Acceptable Price No Contract)

The Department's policy for non-competitive pricing which seeks to replicate the pressures of competitive procurement in which a price is secured at the outset through the tendering process. Under the NAPNOC policy, non-competitive contracts should only be placed when a price has been agreed which reflects what it would cost an efficient contractor to carry out the work. NAPNOC contracts should, therefore, be priced before a contract is placed.

Prime contractor

A contractor having responsibility for co-ordinating and integrating the activities of a number of sub-systems contractors to meet the overall system specification efficiently, economically and to time.

Project Definition

A full examination of the technical issues involved in meeting the stated requirement including the exploration and optimisation of trade-offs between performance, time and cost. Industry is required to produce detailed estimates of the cost and timescale of development and production. At the end of Project Definition there should be no doubt as to the viability of a project.

Request for Proposals (RFP)

A request by the Department for the contractor to supply proposals on how he would meet the requirement.

Technology Demonstrator Programme

A programme designed to demonstrate unproven technology using practical demonstrations, prior to its incorporation into a defence equipment programme.

Appendix 5

Definitions of variance categories

Cost variance

Category	Definition
Programme Changes	Changes to the nature, scope or timetable of a project.
Inflation Adjustment	The differential between outturn inflation on project costs as determined by the Variation of Price clause (in a fixed price contract) and the levels of inflation assumed at project approval.
Specification Changes	Changes to the specification of an equipment.
Under/Over Estimate	The effect of under or over-estimating project costs at first approval of each stage.
Contract Pricing	The difference between estimates of contract costs made at first approval of each stage, and the actual contract price agreed.
Quantity Variations	Changes to the quantity of equipment required after first approval.
Exchange Rates	The impact of movements in exchanges rates (where costs are paid in foreign currencies) relative to the exchange rate(s) assumed at first approval.
Accounting Changes	Costs imported to or exported from a project after first approval of each stage due to changes in accounting rules, e.g. the import of Defence Evaluation and Research Agency costs after its move to Agency status.
Collaborative Process	Cost variance which can be attributed to the impact of collaborating with other nations.

In-service date variance

Category	Definition
Technical Difficulties	Delays caused by technical difficulties in meeting the requirement.
Budgetary Constraints	Deferral of projects to ensure that overall forecast expenditure matches the overall budget.

Collaborative Process	Delays attributable to the impact of collaborating with other nations.
Project Definition	Delays caused by extending Project Definition or the need for project re-definition.
Delay in Associated Project	Delays to project in-service date caused by delays to associated projects which are critical to achievement of in-service date.
Contract Negotiations	Delays caused by the need for longer than anticipated contract negotiations.
Other	Specific individual causes of delay which do not fit into other categories.

Appendix 6

Case examination methodology

The criteria used for selecting projects for examination

1 The National Audit Office examined how project slippage had affected operational capability and costs on four projects. Our purpose was to illustrate how slippage can affect the ability of the three Services to undertake their role effectively and to quantify what slippage can cost. We also wanted to draw out some common problems from looking at the causes of slippage on the four projects and to look at how Smart Procurement was seeking to address them.

2 The four projects we examined were the Common New Generation Frigate (CNGF), the Air-launched Anti-Armour Weapon (AAAW), the Medium Range (MR) TRIGAT anti-tank weapon system, and the BOWMAN communications system. These projects were chosen to reflect the range of different equipments covered by the Major Projects Report, including projects of different ages covering all three environments, where slippage has had a significant effect on either costs or capability, or both. Figure 1 shows how the selected projects met our selection criteria, which were to:

- cover the main operational environments of sea, land, air and communications;
- include projects at various stages of maturity, ranging from 50 to 90 per cent completion;
- select projects that had slipped by at least 24 months where the Department is required to disclose in the Major Projects Report the additional costs arising from slippage;
- cover all of the main causes of delays that have previously been highlighted by the Major Projects Report, namely technical difficulties, budgetary constraints, specification changes, the collaborative process, contract negotiations, industrial adjustments and political factors;

- include a range of financial impacts, from significant additional costs to projected savings; and

- illustrate a range of operational impacts.

Figure 1

Selection criteria for the four case study projects

The case studies were selected to reflect the range of projects in the Major Projects Report.

Project	Environment	Project maturity	In-service date slippage (months)	Main causes	Cost impact (£ million)	Operational impact
CNGF	Sea	50% towards in-service date 2007	57	Collaborative process, contract negotiations	537	Significant
AAAW	Air	90% towards in-service date 2001	118	Political delays, specification changes	(32) saving	High
Medium Range TRIGAT	Land	80% towards in-service date 2005	114	Technical difficulties, budgetary constraints	(59) saving	Potentially low
BOWMAN	Communications	80% towards in-servcie date 2002	75	Budgetary constraints, technical difficulties, industrial adjustments	9	Significant

Source: National Audit Office analysis

The criteria used to examine projects

3 Our examination focused on answering six main questions through a structured audit programme covering review of key Departmental documents and files, and interviews with finance, operational and support personnel. Figure 2 shows how our methodology related to the questions that formed our audit criteria, which were:

- how realistic was the basis on which the originally estimated in-service date was set;

- what were the main reasons for the slippage against the originally estimated in-service date;

- what were the operational impacts of the slippage;

- what were the financial impacts of the slippage; and
- what action had the Department taken to minimise the effects of the slippage.

Figure 2

Audit criteria and methodologies employed

Our methodology was tailored to five key audit criteria.

Key methodologies used	Audit criteria examined				
	Realism of originally approved in-service dates	Reasons for in-service date slippage	Operational impact of in-service date slippage	Financial impact of in-service date slippage	Action taken to minimise slippage and its effects
Document review					
Equipment Approvals Committee submissions and papers	●	●			●
Availability, Reliability and Maintainability reports			●		
Cost Estimate reports and Long Term Costings				●	
Risk Register and Risk Management Plans	●				●
Structured interviews					
Project staff		●			●
Operational Requirement staff	●		●		
Finance and Secretariat staff		●		●	
Equipment Support Management staff			●		

Source: National Audit Office analysis

Appendix 7

Changes to the format of the Major Projects Report from 2000

1 Implementation of Smart Procurement and the introduction of Resource Accounting and Budgeting will change the way that the Department approves and accounts for equipment programmes. From 2000, the format of the Major Projects Report will change to reflect these developments. The template project summary sheets presented at Annex A show the proposed new format for the Report from 2000.

Smart Procurement

2 Under Smart Procurement, the Department intends to clearly distinguish between:

- initial concept and assessment work, aimed at evaluating the options for meeting a stated capability requirement and reducing risk by trading-off performance, time and cost. The assessment phase will be approved through an 'Initial Gate' approval, which will set the broad boundaries of time, performance and cost within which options are to be assessed; and

- the decision to invest in the demonstration and manufacture of the chosen equipment option. The assessment phase will culminate in the major investment decision, known as the 'Main Gate' approval, at which point the procurement route will be decided and firm approved values will be set for time, cost and performance.

3 Smart Procurement will also require a whole-life approach to project management, with a single team managing the project from the early assessment phases thorough to disposal, and investment decisions should be based more on an understanding of the whole-life costs of programmes.

Resource Accounting and Budgeting

4 Under Resource Accounting and Budgeting, the costs of projects (in common with all Departmental expenditure plans) will be measured on a new basis. Costs will be given in forecast outturn prices, not constant prices; and will

include, on an accruals basis, all the resource costs (such as interest on capital and costs relating to government furnished equipment) and the investment in capital assets, rather than focussing only on cash flow as now.

Principles guiding the format of the Major Projects Report

5 Taking account of these changes, the guiding principles for the Major Projects Report from 2000 will be, for an agreed set of projects each year:

- to provide full accountability and visibility to the public and Parliament, through the Committee of Public Accounts, of the Department's performance in managing the projects;
- to provide accountability of major procurement decisions and associated expenditure across the Department irrespective of internal boundaries;
- to reflect the changes in Departmental procurement practices being introduced under Smart Procurement, in particular the intention to focus upon achievement against the time, cost and performance parameters approved at the Main Gate investment decision;
- to include key information on the conduct of major projects between their Initial Gate and their Main Gate investment decisions;
- to include, as appropriate information becomes available on an agreed basis, information on the estimated whole-life costs of the projects;
- to reflect the changes being introduced under Resource Accounting and Budgeting, in particular the intention to focus on resource consumption as well as cash;
- to maintain accountability through transparency of revisions to the presentation of information as a result of the transition to the new format; and
- to present information on project performance in a clear and understandable way.

New features of the Major Projects Report from 2000

6 To fulfil these principles, information on the following areas will need to be introduced into the Major Projects Report:

- conduct of assessment phase pre-Main Gate;
- project performance against key user requirements set at the Main Gate approval;
- costs at outturn prices and on an accruals basis; and
- project whole-life costs.

7 The Report will cover the largest 20 projects post-Main Gate approval, and the largest, up to a maximum of ten, projects pre-Main Gate approval, measured by value based on long term (ten year) forward estimates of procurement expenditure.

Conduct of Assessment Phase pre-Main Gate

8 Expenditure on a project before the Main Gate approval may be significant (about 15 per cent of the total project costs). There must be clear accountability for this expenditure and pre-Main Gate performance will be reflected in the Major Projects Report as follows:

- where a Main Gate approval has not yet been given, the Major Projects Report will provide information on progress on the Assessment Phase;
- for projects that have reached Main Gate, a section summarising pre-Main Gate performance will be included in the project summary sheet; and
- for major projects which have been cancelled at any stage during the Assessment Phase in the year up to the date of the report, the Major Projects Report will include a summary of such projects, explaining why they were cancelled and the associated resources.

9 Information on the Assessment Phase will include information about the cost and duration of the phase compared to the approval given at Initial Gate. It will also give a narrative of the coverage and progress of the phase. In line with the emphasis in Smart Procurement on optimising the trade-offs between military effectiveness, time and whole-life cost, the narrative will include summaries where significant trade-offs have been made, making the action taken to manage the cost, time and capability requirements of projects transparent.

Performance against key user requirements

10 The Department is introducing a new system that will monitor the achievement of a small number of key user requirements for each major project, agreed at Main Gate approval. Information on performance against these requirements will be included in the project summary sheets to give a complete picture of project progress against approvals for time, cost and performance.

Costs at out-turn prices and on an accruals basis

11 The Department will move from reporting only cash costs at constant prices to reporting full resource costs at out turn prices, in line with the Government's policy for the introduction of Resource Accounting and Budgeting. This will be the basis for presenting all other financial information to Parliament. There will be no reduction in cost transparency and, for example, the effects of inflation assumptions will remain clear. There will also be a clear trail of alterations so that costs can be tracked in the transition from constant to out turn prices.

Project whole-life costs

12 The Department wishes to move to include whole-life cost estimates as an integral part of project approvals. When this information is included in approvals, it will also be reflected in project summary sheets, so that the Major Projects Report can record and explain cost performance against these estimates as projects progress.

Additional features and refinements to the Report from 2000

13 The data in the Major Projects Report project summary sheets will also be refined in the following areas from 2000:

- amending the cost and in-service date baselines to reflect the new approach to approvals under Smart Procurement;

- clarifying change during the year as well as cumulative performance by reporting cost and in-service date variations since the last Major Projects Report;

- clearer categorisation of the reasons for cost and in-service date variations;

- additional information on the cost and other impacts of in-service date delay; and

- clarifying the relationship to associated projects.

Cost and in-service date baselines

14 The basis for reporting on projects in the Major Projects Report will be the approved values set at Main Gate. The baselines will be adjusted for existing projects to reflect the approved values set at that point or its nearest equivalent. All of the values estimated at the end of the assessment phase will be shown in the summary of pre-Main Gate performance in each project summary sheet.

Reporting cost and in-service date variations since the last Major Projects Report

15 The project summary sheets will set out not only the variation from the cost and time approvals, but also from the position reported in the previous Major Projects Report. This will allow both overall performance and performance in the last year to be more clearly highlighted.

Categorisation of cost and in-service date variations

16 The categorisation of the reasons for variations between cost and in-service date approvals and current estimates will be revised to make them clearer, and to identify more effectively the real drivers of the variation. The proposed new variation categories are set out in Annex B.

Effect of in-service date delay

17 A narrative will also be provided summarising the key operational effects of in-Service date slippage. Cost implications will be reported in more detail.

Clarifying relationships to associated projects

18 Where several post-Main Gate procurement projects contribute to meeting a Requirement defined at Initial Gate, not all of these projects may qualify for the Major Projects Report. The project summary sheet will name and give the in-service dates of related projects that are critical to satisfying the overall requirement.

Annex A

Proposed post-Main Gate project summary sheet

[INSERT PROJECT TITLE HERE]

Insert Picture Here

Integrated Project Team Responsible:
[INSERT IPT RESPONSIBLE HERE]

Section 1: About the project

1a. Project description, progress and key future events

INSERT TEXT HERE, CAPPED AT c200 WORDS

1b. Associated projects

Critical to Achievement of ISD		Critical to Meet Initial Gate Requirement	
Project Title	Forecast ISD	Project Title	Forecast ISD

1c. Procurement strategy

Contractor(s)	Contract Scope	Contract Type	Procurement Route

Section 2: Project costs

2a. Performance against cost target

£m (outturn prices)	Procurement Cost
Current Forecast of Costs	
Approved Cost at Main Gate	
Variation	
Change since previous Major Projects Report - for the Major Projects Report 2000 including major changes arising from the transition to the new format.	

2b. Reasons for variation from approved cost

Factor	Increase (£m)	Decrease (£m)	Explanation
Total			
Net Variation			

2c. Expenditure to date

Expenditure to 31 March 2000 (£m)	

2d. Years of peak procurement expenditure

2e. Unit production cost (UPC)

Unit Production Cost (£m)		Quantities Required	
at Main Gate	Current	at Main Gate	Current

Section 3: Project timescale

3a. Definition of in-service date

ISD Definition:	*[INSERT BRIEF DEFINITION OF ISD HERE]*

3b. Performance against in-service date target

	Date
Current Forecast of ISD	
Approved ISD at Main Gate	
Variation (Months)	
Change since previous Major Projects Report	

3c. Reasons for variation from approved ISD

Factor	Increase (£m)	Decrease (£m)	Explanation
Total			
Net Variation			

3d. Cost resulting from ISD variation

Type of Cost/Saving	£m	Explanation
Support costs of current equipment		
Forecast support costs of new equipment		
Other		
Total		

3e. Operational impact of ISD variation

[INSERT BRIEF NARRATIVE HERE]

Section 4: Key user requirements

4a. Performance against approved key user requirements

Serial	Key Requirement	Currently forecast to be met (Yes or No)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
	Percentage currently forecast to be met	%
	Change since previous Major Projects Report	

4b. Reasons for variation against approved key requirements

Key Requirement	Factor	Explanation

Section 5: History up to Main Gate approval

5a. Description of the Assessment Phase

INSERT BRIEF NARRATIVE HERE NOT EXCEEDING 200 WORDS

5b. Cost of the Assessment Phase

£m (outturn prices)	Assessment Phase cost	Proportion of total estimated procurement expenditure
Actual Cost		
Approved Cost at Initial Gate		
Variation		

5c. Duration of Assessment Phase

Date of Main Gate Approval	
Target Date for Main Gate Approval	
Variation (Months)	

5d. Time and cost bands at Initial Gate and Main Gate approvals

	Lowest	Most Likely	Highest Acceptable
Cost of Demostration and Manufacture Phase estimated at Main Gate			
Cost of Demostration and Manufacture Phase estimated at Initial Gate			

	Earliest	Most Likely	Latest Acceptable
ISD estimated at Main Gate			
ISD estimated at Initial Gate			

Proposed pre-Main Gate project summary sheet

INSERT REQUIREMENT TITLE HERE

Insert Picture Here

Integrated Project Team Responsible:
INSERT PROJECT TEAM RESPONSIBLE HERE

Section 1: About the Requirement

INSERT BRIEF DESCRIPTION OF THE REQUIREMENT

Section 2: The Assessment Phase

2a. Description of the Assessment Phase

INSERT BRIEF DESCRIPTION OF THE ASSESSMENT PHASE

2b. Cost of the Assessment Phase

£m (outturn prices)	Assessment Phase cost
Forecast of Cost	
Approved Cost at Initial Gate	
Variation	

2c. Duration of Assessment Phase

Assessment Phase duration	
Current Forecast Date of Main Gate Approval	
Target Date for Main Gate Approval	
Variation (months)	

2d. Boundaries of future project costs

	Lowest	Most Likely	Maximum	Range
Current Forecast				
Initial Gate Cost Boundaries				
% Change of current forecast to Initial Gate cost boundaries				

2e. Boundaries of future project in-service dates

	Earliest	Most Likely	Latest	Range
Current Forecast				
Initial Gate ISD Boundaries				
% Change of current forecast to Initial Gate ISD boundaries				

2f. Cancellation of projects

EXPLANATION OF REASONS FOR CANCELLATION

Annex B

Proposed new variation categories

Category	Definition	Used to explain variations in
Technical		
Technical Factors	Variations due to changes in technical ability to deliver project	Time, Cost and Performance
Customer Requirement		
Changed Requirement	Variations due to changes in the customer's requirement for the equipment, flowing from operational reassessment rather than budgetary priority	Time, Cost and Performance
Changed Budgetary Priorities	Variations due to changes in the customer's requirement for equipment, flowing from changed budgetary priorities	Time, Cost and Performance
Economic Conditions		
Inflation	Variations due to changes in inflation assumptions	Cost
Exchange Rate	Variations due to changes in exchange rate assumptions	Cost
Procurement Management		
Receipts	Variations due to changes in expectation of receipts, e.g. Liquidation damages, commercial exploitation levy	Cost
Contracting Process	Variations due to changes associated with the contractual process, including time taken in contract negotiations and placing contracts, effect of contractor bids compared to estimates	Cost and Time
Procurement Strategy	Variations due to changes in overall procurement strategy, e.g. Change to collaborative options, or from competitive to single-source	Cost and Time
Reporting Conventions		
Accounting Adjustments and Re-definitions	Variations that do not reflect any substantive change: including imported or exported costs arising from changes in accounting rules, and adjustments to reflect changes in the definition of terms	Cost and Time
Associated Projects		
Change in Associated Project	Variations due to changes in an associated project, e.g. availability of equipment from another project for trials	Cost