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Defence Committee

The Army's requirement for armoured vehicles: the FRES programme

Seventh Report of Session 2006–07

Report, together with formal minutes, oral and written evidence

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In 1998 the Ministry of Defence (MoD) decided that the UK Army required a fleet of armoured vehicles to fulfil the expeditionary role envisaged in the *Strategic Defence Review*. Experience on operations in Iraq and Afghanistan has underlined the requirement for a vehicle which is manoeuvrable yet has sufficient armoured protection.

To meet urgent operational need the MoD has had to upgrade the armour of a range of existing vehicles. It has also procured UK-made Vector protected patrol vehicles and US-made Mastiff armoured vehicles for deployment to Iraq and Afghanistan. These vehicles, which cost a total of £120 million, do not provide a long-term solution to the requirement for a medium-weight fighting vehicle.

Since 1998 the MoD has sponsored two collaborative programmes to meet this longer-term requirement: the UK / US TRACER programme and the UK / German MRAV 'Boxer' programme. Both programmes ended in their 'concept' stage after the MoD had spent a total of £188 million.

Between 2001 and 2003 the MoD commissioned Alvis Vickers to carry out 'concept work' on a new programme: the Future Rapid Effect System (FRES). There appears to be little tangible output from this concept work which cost the MoD a combined total of £192 million.

In 2004 the MoD announced a two year Initial Assessment Phase (IAP) for the FRES programme—since extended to July 2007. Atkins has been appointed by the MoD as 'Systems House' to the FRES project, and nine Technology Demonstrator Programmes (TDPs) have been awarded. The TDPs will culminate in a 'trial of truth' in the summer of 2007.

The FRES programme is expected to deliver 3,000 vehicles in 16 battlefield roles. It will comprise three families of vehicles: Utility, Heavy and Reconnaissance. The MoD plans to deliver the Utility vehicle first. The MoD has set four key requirements of the FRES Utility vehicle: 'survivability' through the integration of armour; 'deployability' by the A400M aircraft; networked-enabled capability through the integration of digital communication technology, and through-life upgrade potential throughout its anticipated 30 year service life.

The requirement is challenging. There is a tension between the vehicle weight requirement, its upgrade potential over its lifetime and the ability to transport it by air. Additional armour has already increased the weight requirement of FRES from 17 tonnes to between 20–27 tonnes. If the requirement is continually revised a vicious circle of delays to the programme could result.

The expected In-Service-Date for FRES has slipped from 2009 to "the early part of the next decade": the Systems House doubts that it will be achievable before 2017. The MoD will now not announce a target In-Service-Date for FRES until the programme has passed its Main Gate assessment.

The MoD's attempts to meet its medium-weight vehicle requirement have been a sorry story of indecision, changing requirements and delay. It is high time the MoD decided where its priorities lay. We shall take further evidence on the FRES programme in the Autumn of this year.

1 Introduction

1. In this report we examine the progress of the Future Rapid Effect System (FRES): the Ministry of Defence (MoD) programme to equip the Army with a medium-weight armoured vehicle capability. The Defence Committee has considered aspects of the FRES programme as part of wider inquiries on five occasions since 2002: A New Chapter to the Strategic Defence Review;[1] Defence White Paper 2003;[2] Future Capabilities;[3] and, in 2006, The Defence Industrial Strategy: update[4] and The work of the Defence Science and Technology Laboratory.[5]

2. On 26 October 2006 we announced our inquiry into the FRES programme.[6] Our inquiry has examined the Army's operational requirement for a new fleet of medium-weight armoured vehicles and how the MoD plans to meet this requirement in both the short and long term. We investigated the anticipated In-Service Date (ISD) for the FRES fleet and looked at how other nations were meeting their requirement for medium-weight armoured vehicles. Our inquiry also examined how the MoD planned to manage the capability gap in its armoured vehicle fleet between now and the anticipated FRES ISD. We also considered the implications for the FRES programme of the MoD's decision in July 2006 to procure US-made Cougar (Mastiff) and UK-made Vector armoured patrol vehicles for deployment to Iraq and Afghanistan.

3. In undertaking our inquiry, we had a briefing on 5 December 2006 from representatives of some of the companies involved in the FRES programme: Atkins, BAE Systems, General Dynamics UK and Thales UK. This briefing was held in private owing to the commercially sensitive stage of the FRES programme.

4. We took oral evidence on 12 December 2006 from the MoD officials responsible for delivering the FRES programme: Sir Peter Spencer KCB, Chief of Defence Procurement (CDP); Dr Iain Watson, Operations Director of Information Superiority; and Lieutenant General Andrew Figgures CBE, Deputy Chief of Staff (Equipment Capability). We received written evidence from the Ministry of Defence (MoD), some of the companies involved in the FRES Initial Assessment Phase, the European Defence Agency and others.[7]

5. We are grateful to all those who contributed to our inquiry including our specialist advisers.

1 Defence Committee, Sixth Report of Session 2002–03, *A New Chapter to the Strategic Defence Review*, HC 93-I

2 Defence Committee, Fifth Report of Session 2003–04, *Defence White Paper 2003*, HC 465-I

3 Defence Committee, Fourth Report of Session 2004–05, *Future Capabilities*, HC 45-I

4 Defence Committee, Sixth Report of Session 2006–07, *The Defence Industrial Strategy: update*, HC 177

5 HC (2006-07) 84

6 http://www.parliament.uk/parliamentary_committees/defence_committee/def061026___no__73.cfm

7 Ev 22–45

2 The medium-weight vehicle requirement

Current armoured vehicle fleet

6. The UK's Land Forces comprises a mix of heavy and light vehicles.[8] Heavy forces, such as the Challenger 2 tank and the Warrior armoured fighting vehicle, provide the firepower and protection necessary in high intensity warfare.[9] Light forces, typically soft skin vehicles, can be deployed more rapidly than heavy forces but "lack the firepower and protection to conduct decisive operations against an enemy equipped with armour".[10] The number and types of armoured fighting vehicles which were in service as at December 2005 is shown in Table 1.

Capability gap

7. The 1998 Strategic Defence Review (SDR) White Paper made clear the MoD's policy that the UK's Armed Forces should switch from their Cold War posture of static deployments to a more flexible posture in which forces were capable of being deployed rapidly on expeditionary war-fighting and peace-support missions. The 2003 Defence White Paper stated that the Armed Forces should be configured to support this changed posture and identified the requirement for a medium-weight armoured vehicle fleet to improve the UK's ability to undertake expeditionary operations.[11]

8. The MoD's submission to this inquiry describes its 'Balanced Force' concept which seeks to bridge the capability gap between heavy and light forces. It aims to create "a medium force which provides better protection and firepower than light forces but without the deployment, logistic and mobility penalties associated with heavy force".[12]

9. The Army's need for medium-weight armoured vehicles, providing sufficient protection and mobility, has been highlighted by operations in Iraq and Afghanistan. This was made clear to us by Service personnel during our visits to Iraq and Afghanistan in the summer of 2006. In South East Iraq, we were told that Snatch Land Rovers were fast and manoeuvrable but were particularly vulnerable to attack from Improvised Explosive Devices (IEDs) and Rocket Propelled Grenades (RPGs).[13] Similar concerns were expressed to us during our visit to UK forces deployed in Afghanistan. The vulnerability of the soft skinned Snatch Land Rover to IEDs is made clear by the fact that, as at December 2006, 24

8 Ev 22, para 3

9 Ministry of Defence, *Delivering Security in a Changing World*, Defence White Paper, Cm 6041 – 1, December 2003, para 4.11

10 *Ibid.*

11 CM 6041-I

12 Ev 22, para 4

13 Defence Committee, Thirteenth Report of Session 2005–06, *UK Operations in Iraq*, HC 1241, para 51

Service personnel had been killed in roadside bomb attacks while patrolling in Land Rovers since 2000.[14]

10. On 6 July 2006, during a debate on Armed Forces Personnel, the Secretary of State for Defence, Rt Hon Des Browne MP, acknowledged the need to provide Snatch with greater armoured protection and electronic counter measures.[15] On 11 July 2006, in evidence given to us, Mr Browne said that the threat of IEDs

> has generated a set of circumstances where…we need to look at whether there is a need for something between…Snatch Land Rovers as a form of land transport and the Warrior.[16]

On 24 July 2006, the Secretary of State announced that the MoD had procured "around 100" US-made Mastiff and 100 UK-made Vector armoured vehicles to "address the gap between Warrior and lighter patrol vehicles such as Snatch in the…short term"[17] (the procurement of Mastiff and Vector is covered in paragraphs 15–22).

11. The impression that the Army's current armoured vehicle fleet lacks sufficient capability for expeditionary operations was reinforced by General Figgures who told us that recent operational experience in Iraq and Afghanistan had demonstrated that the Army needs a medium force "in order that we can fight as we would wish to fight".[18]

12. The requirement for a new medium-weight fleet of vehicles was identified in the 1998 Strategic Defence Review. The experience of operations in Iraq and Afghanistan has strengthened the urgent operational need for this requirement. The Snatch Land Rover is very mobile but has proved vulnerable to attack from Improvised Explosive Devices and Rocket Propelled Grenades, whereas the Warrior is sufficiently armoured against most threats but lacks mobility. If the UK is to execute its expeditionary policy effectively, the Army urgently requires a fleet of vehicles which are rapidly deployable yet provide sufficient protection for Service personnel.

14 HC Deb, 4 December 2006, col 84W

15 HC Deb, 6 July 2006, col 1009

16 HC (2005–06) 1241, Q 90

17 HC Deb, 24 July 2006, col 75WS

18 Q 132

Table 1: Army's fighting vehicle fleet

Vehicle	Fleet size	Role
Challenger 2	385	Main battle tank
AS 90	146[19]	Self-propelled artillery
Challenger Armoured Repair and Recovery Vehicle (CHARRV)	81	Repair and recovery vehicle
Chieftain AVRE/AVLB/ARRV	119	Engineer recovery vehicles
Combat Engineer Tractor (CET)	73	Used to clear obstacles, dig gun pits, prepare barriers and tow vehicles
Warrior	793	Infantry fighting vehicle
CVR(T) *	1,255	Roles include engineer recovery, engineer reconnaissance, armoured ambulance and armoured command vehicle
Shielder	30	Creates anti-tank barriers
FV430 series	1,492	Roles include armoured personnel carrier, recovery and repair vehicle, mortar carrier and radar vehicle
Saxon	622	Armoured personnel carrier
Fuchs	11	Armoured personnel carrier
Viking	108	Amphibious armoured all-terrain vehicle
Hippo	4	Beach armoured recovery vehicle
Spartan	478	Engineer reconnaissance vehicle
Striker	48	Overwatch and anti-armour guided weapon

Source: MoD[20]

**Spartan, Scimitar, Samson, Samaritan and Sultan are variants of the Combat Vehicle Reconnaissance (Tracked) (CVR (T))*

19 As at June 2005 (http://www.army-technology.com/projects/as90/)

20 Ministry of Defence, *Defence Industrial Strategy*, CM 6697, December 2005, p 78

3 Meeting the requirement in the short-term

Upgrade of existing vehicles

13. The MoD's submission to us states that it has adopted a two track approach to meeting its armoured fighting vehicle requirement.[21] The longer term approach—the FRES programme—is discussed in Chapter 4 of this report. In the short term, the MoD has begun a programme of upgrading its current fleet of vehicles through "protection improvements" to medium-weight vehicles (such as the FV430 series of vehicles, Saxon, CVR(T), and Challenger Armoured Repair and Recovery Vehicles (CHARRV)). A total of £147 million has been spent by the MoD on protection measures for vehicles deployed in Iraq and Afghanistan.[22]

14. The Minister for the Armed Forces, Rt Hon Adam Ingram MP, announced on 16 January 2007 that the first batch of upgraded FV 430s (now to be known as "Bulldogs") had been deployed in Iraq and that delivery of the full fleet would be complete by May 2007.[23]

Procurement of Mastiff and Vector armoured vehicles

15. In addition to the upgrade of its existing fleet of vehicles, the Secretary of State for Defence announced on 24 July 2006 that the MoD had procured 100 Cougar armoured wheeled patrol vehicles (to be known by the UK Army as "Mastiff") and 100 Vector force protection vehicles[24] (in addition to the 66 already on order) for deployment in Iraq and Afghanistan. General Figgures told us that the vehicles would be deployed in theatre in 2007.[25] The Minister for the Armed Forces subsequently announced to the House that, on current plans, fully operational Vector vehicles "should be delivered to Afghanistan by February 2007 and delivery of the full fleet by August 2007".[26]

16. The MoD told us that Mastiff and Vector did not possess the capability the Army required in the long-term. General Figgures told us that Mastiff and Vector

> are not armoured fighting vehicles, they are a means of conveying people from A to B [with reduced risk] so they would not do what we require from FRES. They would not be able to carry out offensive action in the way that we would anticipate.[27]

21 Ev 22, para 1

22 www.mod.uk/DefenceInternet/DefenceNews/MilitaryOperations/DefenceSecretaryOrdersNewVehiclesForTroopsInIraqAndAfghanistan.htm

23 HC Deb, 18 January 2007, col 1260W

24 HC Deb, 24 July 2006, col 74WS

25 Q 82

26 HC Deb, 18 January 2007, col 1260W

27 Q 144

17. During our inquiry into the MoD's Annual Report and Accounts 2005-06, the MoD told us that the cost of procuring Mastiff and Vector was expected to be in the region of £120 million.[28] The MoD added that the funding of the procurement of Vector had been drawn from its own resources, but funds for the procurement of Mastiff, some £70 million, had been made available by the Treasury.[29]

18. During this inquiry we asked the MoD whether the funds used to procure Mastiff had been drawn from funds allocated to the FRES budget. The Chief of Defence Procurement (CDP) told us that the funds allocated for Urgent Operational Requirements (UORs) such as Mastiff, and funds for future development programmes were separate.[30] He told us categorically that "These UORs have not impacted on the budget for FRES, full stop".[31]

19. We asked the MoD where the financial burden for maintaining these vehicles over the long term would fall. The MoD stated that:

> while Vector and Mastiff are deployed on operations, support costs will be funded by the Treasury as a net operational cost of the operation. When the vehicles are no longer needed on the operation the support costs will fall to the MoD.[32]

Once the vehicles were no longer deployed on operations, CDP told us that that the on-going maintenance cost of the vehicles would not impact on the budgets for other procurement projects.[33]

20. **We welcome the MoD's action in meeting the immediate operational need for a medium-weight armoured vehicle in Iraq and Afghanistan. But the procurement of Mastiff and Vector does not provide a long-term solution to the Army's medium-weight vehicle requirement.**

21. **We welcome the fact that the Treasury has funded the procurement of Mastiff but are disappointed that it did not make the funds available for the Vector procurement. On present plans the post-operations, through-life maintenance costs for Vector and Mastiff will fall on the defence budget. The Treasury should make additional funds available to the MoD for the through-life support and maintenance of Vector and Mastiff.**

22. **The procurement of Mastiff and Vector must not deflect the MoD from working to meet the requirement for medium-weight vehicles over the longer term.**

28 Defence Committee, Second Report of Session 2006–07, *Ministry of Defence Annual Report and Accounts 2005–06*, HC 57, Ev 34, para 9

29 HC 57 (2006–07), para 4

30 Q 148

31 Q 150

32 HC 57 (2006–07), para 4

33 Qq 145-154

4 Meeting the requirement in the longer-term

TRACER and MRAV Boxer programmes

23. The MoD's first approach to meeting the requirement for a medium-weight vehicle was to enter a collaborative programmes with other nations: firstly TRACER and secondly the MRAV 'Boxer' programmes.

24. The Tactical Reconnaissance Armoured Combat Equipment Requirement (TRACER) programme was a UK-American collaborative project, begun in 1998, which intended to produce a land command vehicle fitted with Information Surveillance Target Acquisition Reconnaissance (ISTAR) equipment.[34] The TRACER programme was terminated in October 2001[35] following a "joint UK / US decision".[36] The Chief of Defence Procurement (CDP) told us that the US pulled out of the project because it "was not what they wanted and we were left stranded".[37] In total, the MoD had spent £131 million on the TRACER project before it was terminated at its concept stage. CDP told us that this expenditure was not entirely wasted because work on TRACER was fed into the initial work on FRES:

> …the project teams that were available at Abbey Wood would have drawn on the documents and the information which was learned from that work and used it as part of …their fund of knowledge as to what the requirement was and what sort of technologies were going to be needed to meet it.[38]

25. The Multi Role Armoured Vehicle (MRAV) 'Boxer' programme, which began in 1999, was initially a UK-German development programme joined later by the Netherlands. The programme was intended to provide a replacement capability for the Army's armoured and mechanised force roles currently provided for by "Saxon, the Combat Vehicle Reconnaissance (Tracked) (CVR(T)) and the FV430 armoured personnel carrier series of vehicles".[39] The MoD's submission states that the MoD withdrew from the MRAV programme in 2002 "because it was judged that MRAV would not be ideally suited to the type of operations envisaged under the Strategic Defence Review New Chapter and other developing policy work" and "the need for rapid deployability in expeditionary operations" as borne out by the experience of operations.[40] MoD expenditure on the MRAV programme totalled £57 million.[41]

26. **The TRACER and MRAV programmes cost a combined total of £188 million. The MoD asserts that output from these programmes has informed work on the FRES**

34 Ev 27

35 HC Deb, 19 September 2002, col 329W

36 Ev 27

37 Q 67

38 Q 64

39 Ev 27

40 Ev 27

41 HC Deb, 17 July 2003, col 70W

programme, but it is not clear how. The MoD should explain in its response to this report how the work carried out on the TRACER and MRAV programmes has contributed to the FRES programme.

FRES 2001–2003: "the in-house concept phase"

27. In 2001, the MoD began a UK programme to meet the requirement, FRES. The MoD described this initial work as "in-house concept studies".[42] In October 2002 the MoD let a non-competitive contract to Alvis Vickers (as the prime contractor) to work on FRES[43] in partnership with BAE Systems (as Systems Engineers) and General Dynamics UK (providing network-enabling expertise).[44] During our evidence session on 12 December 2006, CDP at first stated that he was unsure of the exact purpose of the Alvis Vickers contract, but subsequently described it as a "pre-initial gate concept phase contract".[45]

28. According to the MoD, the Alvis Vickers contract was completed in July 2003 at a cost to the MoD of £4million.[46] Press reports stated that in addition to that expenditure, Alvis Vickers had invested "considerable amounts of their own funds….[and] developed a dedicated FRES facility in Leeds".[47] BAE Systems, which bought Alvis Vickers in June 2004,[48] have told us that "the contract was terminated in July 2003 by the Defence Procurement Agency after the procurement strategy for a non-competitive approach was not approved by the Investment Approvals Board".[49]

29. When we asked CDP what tangible output had resulted from the work carried out by Alvis Vickers, he told us that "this is a typical piece of procurement where we do some pre-initial gate work and then we decide what the parameters are going to be for the assessment phase".[50] The MoD's further written submission states that the work by Alvis Vickers produced "the development of initial cost estimates and a programme schedule, which formed the baseline for planning future activities with a particular focus on the Assessment Phase".[51]

30. Following the completion of the work carried out by Alvis Vickers, the Initial Gate Business Case was approved in April 2004. This is the date regarded by the MoD as "formally the start point of FRES as a programme".[52] On 5 May 2004 the Minister of State

42 Ev 27

43 Ev 37

44 *Jane's International Defence Review*, "Future Rapid Effect System leads British forces' transformation", 1 September 2003

45 Q 56

46 Ev 27

47 *Jane's Defence Weekly*, "Change of track throws FRES plan into confusion",12 November 2003

48 http://news.bbc.co.uk/1/hi/business/3775713.stm

49 Ev 37

50 Q 66

51 Ev 27

52 *Ibid.*

for the Armed Forces announced that the FRES programme would begin a two year initial Assessment Phase.[53]

31. **Following the completion of the work carried out by Alvis Vickers between 2001–03, and over six years after the requirement for medium-weight forces was articulated in the Strategic Defence Review, FRES remained no more tangible than a concept.**

The requirement

32. The MoD states that the FRES programme is expected to deliver over 3,000 vehicles in up to 16 battlefield roles and comprise three families of vehicles: Utility, Reconnaissance and Heavy.[54] The FRES programme is currently focused on delivering variants of the Utility family of vehicles: the Protected Mobility, Command and Control and Medical vehicles. The Reconnaissance and Heavy vehicles will be delivered "sometime thereafter".[55] CDP told us that the current working estimate for delivering the three vehicle variants of FRES was £14 billion.[56]

33. The FRES Utility vehicle will "equip UK Armed Forces with new medium-weight armoured vehicles that will be effective across the full spectrum of operations including rapid intervention, enduring peacekeeping and peace enforcement".[57] The MoD's submission states that:

> FRES will deliver increased capability with higher levels of strategic deployability, survivability and lethality than our existing lighter armoured vehicles, with the potential to further enhance its capability as new technology becomes available.[58]

34. The MoD told us that FRES must deliver four core capabilities:[59]

- **Survivability**: through the integration of "passive and active armour and other vehicle protection technologies";
- **Deployability:** it must be able to be transported by an A400M;
- **Networked enabled capability**: it must incorporate Bowman and ISTAR[60] and other advanced digital communication systems (both data and voice) to allow full integration of the vehicles into the wider military network; and
- **Through-life upgrade potential:** It must be capable of being developed and throughout its expected battlefield life of 30 years.

53 HC Deb, 5 May 2004, col 80WS

54 Ev 23, para 7

55 Ev 23, para 10

56 Q 189

57 Ev 22, para 1

58 EV 22, para 2

59 Ev 22 and Q 16

60 Intelligence, Surveillance, Target Acquisition and Reconnaissance

35. In addition to providing a new capability, FRES is expected to replace the Army's ageing Saxon, Scimitar and elements of the FV430 series of vehicles.[61] According to the MoD, the average age of its FV430 vehicle is 41 years; for the CVR(T) it is 34 years; and for the Saxon it is 17 years.[62]

36. The MoD describes the FRES requirement as "complex and challenging".[63] The scale of the challenge is illustrated by the expectation that each FRES vehicle will have "an on-board [electronics] system of similar complexity to a small aircraft".[64]

The weight challenge

37. CDP told us that operational experience in Iraq and Afghanistan, in particular the threat posed by the latest generation of IEDs, had resulted in an adaptation of the FRES requirement. In particular, it had been decided that FRES should be more heavily armoured than originally envisaged:

> [FRES]...in 2001, was conceived largely to be a capability which would be used in conventional, high-intensity operations. What we have seen over the last few years is a much greater use of this sort of capability in peace-keeping and peace enforcement operations. It puts you into a totally different position vis-à-vis your ability to defend against a threat, and we have uncovered a whole lot of much more difficult threats in the last few years than had previously been anticipated.[65]

38. The requirement for additional armour inevitably added to the weight of the FRES requirement. MoD notes that some of its capability requirements can be contradictory and that trade-offs between them have to be made.[66] General Figgures told us that:

> if we wish to provide protection against every known anti-armoured weapon we would end up (and it is absurd) with something that might weigh 160-odd tonnes. That is of no military use so we are going to have to make some judgments about survivability, capacity and so on, against what is possible and what has military utility in the hands of the soldiers.[67]

39. Increasing the armour of the proposed FRES vehicle has increased the weight specification from 17 tonnes to between 20-27 tonnes.[68] The increased weight specification in turn resulted in the MoD dropping its requirement that the Utility vehicle be transportable by a C-130J Hercules transport aircraft and instead specifying that it be transportable by the proposed C-130J replacement, the A400M.[69] CDP told us that:

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61 Ev 22, para 4

62 HC Deb, 6 October 2003, col 1162W

63 Ev 22, para 6

64 Ev 25

65 Q 40

66 Q 28, Q 132

67 Q 28

68 Q 30

69 *Ibid*.

> There is no nation in the world today that has a plan for being able to produce a vehicle that light which has the degree to be able to be transported in a C-130J and to be able to have the protective mobility when it is deployed and goes on operations.[70]

40. The A400M project has itself been subject to programme delays. CDP told us that any further delays to the A400M project would delay the deployment of FRES.[71] We intend to examine the progress of the A400M project shortly, as part of an inquiry into strategic lift.

41. **A vital requirement for FRES is that the vehicle will provide sufficient protection against Improvised Explosive Devices and Rocket Propelled Grenades. In the light of operational experience in Iraq and Afghanistan, the MoD has revised upwards its armour requirement for FRES. Consequently, the weight requirement for the vehicle has increased from 17 tonnes to between 20–27 tonnes. We consider it vital that UK troops are provided with sufficient protection and that the FRES requirement must be adapted to reflect this.**

42. **We note the tension between the requirements that the FRES Utility vehicles provide sufficient protection and that they be quickly deployable. The requirement that the FRES Utility vehicle should be transportable by the Hercules C130J proved over-ambitious. It remains to be seen whether transportability by A400M is achievable.**

43. **We are concerned that there could be a vicious circle of delays as the requirement is continually revised. It is unrealistic for the MoD to seek a perfect solution to its medium-weight vehicle requirement. If it is impossible to develop sufficient armoured protection for the FRES Utility vehicle while remaining within current weight requirements, the MoD should make a decision as to which is its priority. Failing to make the decision will simply cause further delay.**

An off-the-shelf solution?

44. In January 2006 the Army held a "Fleet Review" to consider whether any current armoured vehicles met the FRES requirement.[72] Dr Watson, Operations Director of Information Superiority, told us that Piranha III, manufactured by Mowag, a Swiss company owned by General Dynamics,[73] was rejected because "it does not meet the protection, mobility or capacity needs that we require".[74] The US Stryker vehicle, a variant of Piranha, developed and deployed to Iraq within 24 months, was also considered but rejected owing to "its limited development potential".[75] We asked the MoD what credible options had been considered when deciding whether or not to procure an off-the-shelf vehicle. CDP told us:

> you could not go and buy something off-the-shelf today which would meet that. We have tested it. We did the research, we held a fleet review with the Army, with

70 Q 34

71 Q 37

72 Q 137

73 Ev 42

74 Q 138

75 Q 152

> representatives of all parts of the Army who had an expert view on this, and presented to them what the products available today are. On the Utility variant the Army unanimously said that it did not want to go for one of those products.[76]

45. CDP told us that the key issue was the capacity of a vehicle to be developed through its life (estimated as 30 years) to meet future operational threats.[77] General Figgures told us that the MoD was looking for a vehicle which could withstand the additional weight of armour and new technology over the vehicle's lifetime "in the order of between ten and fifteen per cent" without compromising the vehicle's manoeuvrability.[78]It is the MoD's judgment that no vehicle currently in production meets that requirement.

46. **The MoD considers that there is no off-the-shelf vehicle available which would be capable of meeting its FRES requirement. It bases this judgment on its requirement that the chosen platform should be capable of supporting upgrades for the next thirty years.**

47. **The MoD must ensure there is scope to upgrade FRES in the future. This must include the scope to insert new technologies which must increase the vehicle's protection. Without this, the MoD would have to procure vehicles off-the-shelf every time operational threats changed. This would be unacceptable.**

48. Operations in Iraq and Afghanistan have seen UK Forces deployed alongside the forces of the United States and other NATO countries. We asked the MoD whether it had ruled out collaborating with other nations on developing a vehicle such as the USA's Future Combat System (FCS) or other European projects. CDP told us that:

> …the Americans fight in a very different way, their doctrine is different, so we are responding to a requirement which is set by the British Army and there will be a lot of the technology which is potentially relevant, certainly it is vital that we remain interoperable, but there are no plans at the moment to do a co-operative programme based on FCS with the Americans.[79]

49. The European Defence Agency (EDA) submission provides a list of European armoured vehicles currently in use or being developed for deployment within the next ten years (including the MRAV programme which the UK had been a partner until 2002).[80] The EDA submission notes that collaborative projects within Europe on armoured vehicles are rare at the system level with cooperation more commonly occurring "on sub-system programmes".[81]

50. A further submission stated that the user requirement for FRES is "very similar" to Sweden's SEP (Spitterskyddad Enhets Platform) armoured vehicle programme being

76 Q 32

77 Q 73

78 Q 77

79 Q 164

80 Ev 33

81 Ev 32

developed by BAE Systems Hägglunds. The submission also states that for the Swedish Government "a bilateral co-operation with the UK has a high priority".[82]

51. **We consider it surprising that the MoD has found no scope for collaboration with international partners on developing FRES, particularly at the sub-systems level. The MoD should consider whether there is any scope for exploiting synergies with the programmes of other nations aimed at meeting a similar requirement to FRES.**

FRES 2004 to date

The Initial Assessment Phase

52. On 5 May 2004 the Minister for the Armed Forces announced a two year Initial Assessment Phase (IAP) for the FRES Utility vehicle programme. The MoD describes the objectives of the IAP as: defining the requirement; understanding and mitigating the risk; and recommending an optimum acquisition strategy.[83] There is a wide range of interests involved in the delivery of the FRES IAP: the MoD, the Army, the Systems House and defence companies.

53. The IAP was originally scheduled to be completed by November 2006. It was subsequently extended until July 2007 "to take full account of the outputs from the Technology Demonstrator Programmes contracts which were awarded later than originally planned".[84] The MoD submission states that it expects to spend £120 million on the IAP phase of FRES Utility vehicle.[85]

The role of the MoD

54. Within the MoD, the responsibility for delivering the FRES programme falls on the Defence Procurement Agency (DPA) led by CDP.[86] CDP told us his main role with regard to FRES was to provide the resources for FRES and sit as a member of the Investment Approvals Board.[87] Reporting to CDP, the Operations Director oversees the FRES Integrated Project Team (IPT).[88] The project sponsor and 'customer' for FRES is the Deputy Chief of Staff (Equipment Capability), Lieutenant General Andrew Figgures. General Figgures told us that as project sponsor he had to "identify the requirement and ensure that we have optimised it; and then ensure that I put enough…money to it to ensure that we deliver it".[89]

55. CDP told us on 12 December 2006 that 42 DPA staff were working on the FRES programme: 29 civilians and 13 Army personnel. Including Service personnel and

82 Ev 44

83 Ev 23, para 12

84 Ev 23, para 14

85 Ev 23, para 16

86 On 2 April 2007 the Defence Procurement Agency and the Defence Logistics Organisation will merge to form a new body within the MoD called Defence Equipment & Support

87 Q 3

88 Q 1

89 Q 3

secondees from industry the FRES team totals 125.[90] He added that he anticipated recruiting a further 14 staff in the near future.[91]

56. Staff from the Defence Science and Technology Laboratory (Dstl), the MoD agency responsible for providing scientific and technical research and advice to the MoD, provide technical support to the IPT in the areas of armoured vehicle engineering.[92] We are currently examining the work of Dstl in a separate inquiry.[93]

57. In our Defence Procurement 2006 inquiry, CDP acknowledged that front-line users were not consulted regularly enough on equipment procurement projects.[94] We were keen to determine whether the ultimate front-line user of FRES, the soldier, was consulted adequately throughout the FRES programme. General Figgures told us that representatives of people at all levels were involved in specifying the FRES requirement including gunners, infantrymen, radio operators and command post operators.[95]

58. **The success of the FRES programme is dependent on the knowledge and experience of a wide range of Army personnel, including those who will use the vehicles, being applied to the programme. The MoD must ensure that the interests of the soldiers who will use FRES are considered fully when defining the FRES vehicle requirement.**

The role of the Systems House

59. The Integrated Project Team (IPT) is assisted by Atkins Defence, the defence arm of Atkins, a management and engineering consultancy.[96] Atkins' role is 'Systems House' to the FRES project. Atkins was appointed to the Systems House role in November 2004.[97] Dr Watson of the MoD told us that the purpose of the Systems House was to:

> provide us with a significant volume of expert help in order to undertake the detailed engineering and technical assessment that was necessary to define the solutions base for the FRES requirement. Their principal work has been in helping us with detailed system engineering and, …with risk assessment of meeting the FRES requirement.[98]

60. The MoD told us that Atkins was appointed as Systems House owing to its independence from the armoured vehicles supply.[99] We asked the MoD whether Atkins' lack of experience in armoured vehicle production had brought any disadvantages. The MoD told us that it had not and Dr Watson told us:

90 Q 8

91 *Ibid*.

92 Q 6

93 HC (2006-07) 84

94 Defence Committee, First Report of Session 2006–07, *Defence Procurement 2006*, HC 56, Q 148

95 Q 21

96 Ev 29, para 3

97 Ev 29, para 4

98 Q 182

99 Q 183

> I think they have added a significant technical expertise. They have added some pretty hard questioning of timescales and technical judgments. They have also provided us with a more flexible resource pool than we would have been able to provide from Ministry sources.[100]

Dr Watson identified the advice provided by Atkins on the acquisition process as an area where the input from the Systems House had been weaker.[101]

61. **We note with interest the appointment of a Systems House and recognise the potential benefit to the MoD of a source of independent project management expertise. We recommend that the MoD publish the performance criteria by which the contribution by Atkins to the FRES project will be judged and their subsequent performance in meeting them.**

Technology Demonstrator Programmes

62. Following the fleet review of vehicles in January 2006, Atkins recommended an assessment of the technology programmes currently in development. Atkins' submission states that it recommended

> running parallel prototype contracts between two competing consortia during the demonstration phase, and moving the main investment approval, Main Gate, from its planned point at the end of the assessment phase to the end of the demonstration phase—so that it could be based on the evidence of proven prototypes when a much better view of performance, cost, time and risk would be available.[102]

63. Beginning in February 2005, Atkins awarded, following open competition, nine Technology Demonstrator Programme (TDP) contracts to UK and international defence companies.[103] The MoD states that the purpose of the TDP contracts is to "de-risk, through rigorous testing, the potential technologies for FRES".[104] The contracts awarded to date are shown in Table 2.

100 Q 185

101 *Ibid*.

102 Ev 29, para 10 (d)

103 Ev 24

104 Ev 30, para 1

Table 2: FRES Technology Demonstrator Programmes

Title	Contractor	Status
Stowage & Capacity	Defence science and technology laboratory	Contract placed: Feb 05 Completed: in May 06
Hard Kill Defensive Aid System	Akers Krutbruk	Contract placed: May 05 Completion due: Dec 06
Chassis Concept TDP (AHED)	General Dynamics UK	Contract placed: August 05 Completion due: Feb 07
Chassis Concept TDP2 (SEP)	BAES	Contract placed: December 05 Completion due: Sep 07
Electronic Architecture TDP 1	Lockheed Martin	Contract placed: Aug 05 Completion due: March 07
Electronic Architecture TDP 2	Thales	Contract placed: August 05 Completion due: March 07
Electric Armour	Lockheed Martin / Insys	Contract placed: December 05 Completion due: June 07
Integrated Survivability	Thales UK	Contract placed: December 05 Completion due: Nov 06
Gap Crossing	BAE Systems	Contract placed: December 05 Completion due: October 07

Source: MoD[105]

64. During this inquiry we received submissions from BAE Systems and General Dynamics UK who are working on the two "chassis concept" TDPs, developing prototypes for the FRES chassis.[106] The chassis development is fundamental to the whole FRES solution because it is the framework within which the technology is incorporated.

65. BAE Systems' prototype for the FRES Utility vehicle is an 8x8 wheeled vehicle capable of carrying a 2-man crew and 8 infantrymen. The BAE Systems submission states that its prototype is a conventional-drive vehicle adapted from the "BAE Systems / Hägglunds SEP programme to develop 6x6 wheeled and tracked electric drive vehicles" for the Swedish Army.[107] The BAE Systems 8x8 conventional drive prototype vehicle was due to commence trials in January 2007.

66. The FRES Utility solution proposed by General Dynamics UK is the "Piranha Evolution", a 26 tonne 8x8 wheeled armoured fighting vehicle which it describes as having "outstanding survivability and considerable growth potential".[108] The Piranha Evolution is a modified version of the "Piranha V".

105 Ev 24

106 Ev 36, Ev 40

107 Ev 39

108 Ev 41

67. The chassis TDP is expected to culminate in 'vehicle proving trials' to be undertaken by the Army in the summer of 2007. The MoD refers to these trials as the 'trial of truth'. The MoD submission states that a winner of the trials will be announced in November 2007 and that the chosen vehicle from the trial will be "fitted with the necessary systems and vehicle modifications required to meet the UK need".[109]

Acquisition strategy

68. The MoD's written submission states that the acquisition strategy will be consistent with the framework provided by the Defence Industrial Strategy (DIS).[110] Specifically with regard to FRES the DIS states:

> The most likely solution (for FRES) will be a team in which national and international companies co-operate to deliver the FRES platforms, including the required sub-systems, led by a systems integrator with the highest level of systems engineering, skills, resources and capabilities based in the UK.[111]

On the face of it, this approach is similar to the Alliance strategy adopted by the MoD for the future carrier programme.[112]

69. Despite the clear expectation that the FRES solution will be delivered by a number of companies, some of which might be internationally based, the MoD submission states that it requires the intellectual property and design authority for FRES to be controlled by the MoD.[113] Hence, agreement to deliver 'UK residence' of all intellectual property and design authorities will be a pre-requisite for companies to enter into the FRES procurement process. It is our understanding that BAE Systems, General Dynamics UK, and Thales UK have agreed to this. The importance of the MoD retaining intellectual property rights for FRES has been highlighted by the MoD's difficulties in negotiating with the USA over access to the technology know-how for the Joint Strike Fighter (JSF) programme. This is an issue which we examined most recently in our report: *The Defence Industrial Strategy: update*.[114]

70. CDP told us that a further advantage of retaining intellectual property rights was the potential to exploit marketing opportunities for FRES abroad, "the first priority is to meet the needs of the Army and the second is to maximise export potential".[115]

71. **We welcome the MoD's insistence that intellectual property rights to FRES should remain in the UK. For such a vital project, the UK must retain the essential systems knowledge within the UK.**

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109 Ev 25

110 Ev 25

111 Cm 6697, chapter B3.32

112 Defence Committee, Second Report of Session 2005–06, *Future Carrier and Joint Combat Aircraft Programmes*, HC 554

113 Ev 25

114 HC (2006-07) 177

115 Q 172

72. **Retaining the intellectual property rights within the UK will enable the MoD and defence companies residing in the UK to exploit fully the potential export market for FRES. UK-based companies producing the FRES vehicle for export would not only benefit the UK economy but also help support the UK's defence industrial base.**

73. During our inquiry we were told that the Minister for Defence Procurement, Lord Drayson, had in November 2006 written to the companies involved in the TDPs outlining the MoD's Acquisition Strategy for FRES. The submission we received from BAE Systems described the key points of the strategy as: a "three tier acquisition strategy…with a Systems of Systems Integrator, Platform Designer, and a Vehicle Integrator / Manufacturer".[116]

74. In December 2006 we asked the MoD for a copy of Lord Drayson's letter to the companies identifying the MoD's acquisition strategy. In response, the MoD declined to provide the letter on the grounds that it "could be prejudicial to the effective conduct of public affairs" as "Premature disclosure of information can lead to pressure to conclude studies in unrealistic timescales".[117] On 25 January 2007 we wrote again to Lord Drayson expressing our dissatisfaction that a Committee of the House of Commons had been denied information made available to companies. In response, the MoD agreed to provide us with the letter in confidence.

In-Service Date and Main Gate Approval: Utility variant

75. There remains no clear indication of when FRES will enter service. The ISD for FRES has been a matter of great interest to us and our predecessors since the initial work on the programme by Alvis Vickers began in 2001. Over the years, Ministers and MoD officials have provided us with different target ISDs for FRES that have moved progressively into the future.

76. In May 2004, the then Minister for Defence Procurement (Lord Bach) told our predecessors that he expected that the Utility variant of FRES would be in-service in 2009.[118] A year later, during our inquiry, *Future Capabilities*, General Sir Mike Jackson, then Chief of the General Staff, told the Committee that he doubted FRES would be available by 2010.[119] The MoD's Defence Industrial Strategy, published in December 2005, gives an ISD for "initial variants in the early years of the next decade".[120]

77. The MoD's submission does not commit to a specific FRES ISD. It states "Industry and the MoD FRES procurement team will be incentivised to meet the target date for the delivery of the first vehicles (Utility variants) to the British Army in the early part of the next decade".[121] The submissions from both BAE Systems and General Dynamics (UK)

116 Ev 40

117 Ev 28

118 Defence Committee, Sixth Report of Session 2003–04, *Defence Procurement,* HC 572-II, Q 311

119 HC (Session 2004-05) 45-II , Q 719

120 Cm 697, para, B3.13

121 Ev 25

make clear that their planning assumptions for the delivery of the FRES Utility variant is nearer 2012 than 2017.

78. This optimistic assessment was undermined by the submission from Atkins:

> It is Atkins's and the MoD's view that the FRES requirement can be met within the planned budget in a 2017-18 timeframe, and whilst it would clearly be desirable to achieve the required performance at the earlier date of 2012 there is currently little evidence to support this view.[122]

79. Atkins' submission also states that the Systems House "has had to be careful to ensure that the MoD is not lured into a 'conspiracy of optimism' for which it has been so often criticised in the past".[123]

80. During our evidence session on 12 December we asked CDP whether he agreed with Atkins' assessment of a 2017-18 ISD. He cautioned us not take Atkins' prediction "at face value"[124] and told us that:

> My personal view is that it was pessimistic and that we ought to be able to do better, but how much better we can do will depend upon the further work we do in the next 12 months.[125]

81. **The FRES Utility vehicle ISD must be challenging but achievable. Although the Defence Industrial Strategy states a planning assumption of delivery by "the early part of the next decade", the Systems House, appointed by the MoD for its project management expertise, considers there to be little evidence that FRES will be in-service before 2017.**

82. **The Army's lack of suitable medium-weight armoured vehicles has meant that the MoD has had to devote considerable sums on the ad hoc purchase of Mastiff and Vector armoured vehicles and upgrading the FV430 series of vehicles. If FRES does not enter service until 2017-18 further interim purchases are likely to be necessary at considerable cost.**

83. CDP told us that it was no longer MoD policy to announce in-service dates for equipment procurement projects until they had passed their Main Gate review. On 19 December 2006, Lord Drayson told us he had changed policy in regard to announcing in-service dates for procurement projects in an attempt to improve the MoD's procurement process by strengthening MoD's position with industry: "Until Main Gate decision has been taken we do not publish, talk about, in-service dates because there is a negotiation [with companies] that takes place right up until the conclusion of the Main Gate".[126]

122 Ev 30

123 *Ibid*.

124 Q 201

125 Q 95

126 HC 177 (2006-07) , Q 27

84. When we asked CDP about this change of policy in announcing Main Gate, he told us:

> When I arrived in this job ministers had made a habit of announcing in-service dates before they finished the assessment phases and then found themselves in political difficulty when they announced changes. So Ministers were very clear in defining a policy that in-service dates would not be announced until a main gate decision was taken. [127]

85. **We acknowledge the increased rigour that Lord Drayson's leadership has brought to the MoD's procurement process and note the reasons he gives for not announcing the ISD for FRES before it has passed its Main Gate review. However there is a legitimate public interest in knowing at least the planning assumptions of when equipment is expected to be delivered to our Armed Forces and the MoD should be more transparent about this.**

86. **We acknowledge the need for Ministers to have bargaining power with industry. However, sparing Ministers from political difficulties is not a sound reason to not announce targets for the delivery of programmes. The decision not to announce a target Main Gate for FRES might give the impression that the programme is being driven by the concerns of the DPA rather than by military need. In its response to this report, the MoD should explain its overall approach to negotiating procurement contracts.**

The Heavy and Reconnaissance variants

87. It is the MoD's intention that the Heavy and Reconnaissance variants of FRES will be developed after the Utility variant enters production.

88. The Reconnaissance vehicle will be expected to fulfil a range of roles which the MoD describes as "Scout Ground Based Surveillance, Indirect Fire Control and Formation Reconnaissance capability".[128]

89. The Heavy variant is also expected to fulfil a number of roles: "Direct Fire and Indirect Fire Support roles; Manoeuvre Support covers the earth moving, obstacle breaching and bridge laying roles. As with the Utility and Reconnaissance families, the heavy family vehicles will have its own repair and recovery capability and a driver training vehicle".[129]

90. Development work on the Heavy and Reconnaissance variants is at an early stage. The MoD submission states that:

> The preliminary scoping and planning work for the Assessment Phases for the Reconnaissance and Heavy roles has begun but substantial work is subject to further departmental approval.[130]

127 Q 97

128 Ev 23, para 9

129 Ev 23, para 10

130 Ev 24, para 16

Although the MoD's submission does not give an indication of when the IAP for the Heavy and Reconnaissance variants will be begin, it states that it is likely to cost in "several hundreds of million pounds".[131]

91. **The MoD gives no indication of when the Heavy and Reconnaissance variants of FRES will enter their Initial Assessment Phase. As with the Utility variant, it remains unclear when the Heavy and Reconnaissance variants of FRES will enter service. The procurement of a successor reconnaissance vehicles is particularly important owing to the ageing fleet of the CVR(T) vehicle.**

131 Ev 24, para 16

5 Conclusion

92. Nine years on from the Strategic Defence Review, the Army's requirement for a medium-weight vehicle remains unmet. Despite having spent £188 million on the TRACER and MRAV programmes and at least £120 million so far on FRES, the solution is nothing more tangible than a concept.

93. **This is a sorry story of indecision, constantly changing requirements and delay. We are concerned that the FRES requirement may simply be unachievable without a major technical breakthrough. The tension between the survivability and deployability is particularly acute: satisfying both requirements may prove impossible. It is high time the MoD decided where its priorities lay. We shall take further evidence on the FRES programme in the Autumn of this year.**

Conclusions and recommendations

1. **The requirement for a new medium-weight fleet of vehicles was identified in the 1998 Strategic Defence Review. The experience of operations in Iraq and Afghanistan has strengthened the urgent operational need for this requirement. The Snatch Land Rover is very mobile but has proved vulnerable to attack from Improvised Explosive Devices and Rocket Propelled Grenades, whereas the Warrior is sufficiently armoured against most threats but lacks mobility. If the UK is to execute its expeditionary policy effectively, the Army urgently requires a fleet of vehicles which are rapidly deployable yet provide sufficient protection for Service personnel.** (Paragraph 12)

2. **We welcome the MoD's action in meeting the immediate operational need for a medium-weight armoured vehicle in Iraq and Afghanistan. But the procurement of Mastiff and Vector does not provide a long-term solution to the Army's medium-weight vehicle requirement.** (Paragraph 20)

3. **We welcome the fact that the Treasury has funded the procurement of Mastiff but are disappointed that it did not make the funds available for the Vector procurement. On present plans the post-operations, through-life maintenance costs for Vector and Mastiff will fall on the defence budget. The Treasury should make additional funds available to the MoD for the through-life support and maintenance of Vector and Mastiff.** (Paragraph 21)

4. **The procurement of Mastiff and Vector must not deflect the MoD from working to meet the requirement for medium-weight vehicles over the longer term.** (Paragraph 22)

5. **The TRACER and MRAV programmes cost a combined total of £188 million. The MoD asserts that output from these programmes has informed work on the FRES programme, but it is not clear how. The MoD should explain in its response to this report how the work carried out on the TRACER and MRAV programmes has contributed to the FRES programme.** (Paragraph 26)

6. **Following the completion of the work carried out by Alvis Vickers between 2001–03, and over six years after the requirement for medium-weight forces was articulated in the Strategic Defence Review, FRES remained no more tangible than a concept.** (Paragraph 31)

7. **A vital requirement for FRES is that the vehicle will provide sufficient protection against Improvised Explosive Devices and Rocket Propelled Grenades. In the light of operational experience in Iraq and Afghanistan, the MoD has revised upwards its armour requirement for FRES. Consequently, the weight requirement for the vehicle has increased from 17 tonnes to between 20–27 tonnes. We consider it vital that UK troops are provided with sufficient protection and that the FRES requirement must be adapted to reflect this.** (Paragraph 41)

8. **We note the tension between the requirements that the FRES Utility vehicles provide sufficient protection and that they be quickly deployable. The requirement that the FRES Utility vehicle should be transportable by the Hercules C130J proved over-ambitious. It remains to be seen whether transportability by A400M is achievable.** (Paragraph 42)

9. **We are concerned that there could be a vicious circle of delays as the requirement is continually revised. It is unrealistic for the MoD to seek a perfect solution to its medium-weight vehicle requirement. If it is impossible to develop sufficient armoured protection for the FRES Utility vehicle while remaining within current weight requirements, the MoD should make a decision as to which is its priority. Failing to make the decision will simply cause further delay.** (Paragraph 43)

10. **The MoD considers that there is no off-the-shelf vehicle available which would be capable of meeting its FRES requirement. It bases this judgment on its requirement that the chosen platform should be capable of supporting upgrades for the next thirty years.** (Paragraph 46)

11. **The MoD must ensure there is scope to upgrade FRES in the future. This must include the scope to insert new technologies which must increase the vehicle's protection. Without this, the MoD would have to procure vehicles off-the-shelf every time operational threats changed. This would be unacceptable.** (Paragraph 47)

12. **We consider it surprising that the MoD has found no scope for collaboration with international partners on developing FRES, particularly at the sub-systems level. The MoD should consider whether there is any scope for exploiting synergies with the programmes of other nations aimed at meeting a similar requirement to FRES.** (Paragraph 51)

13. **The success of the FRES programme is dependent on the knowledge and experience of a wide range of Army personnel, including those who will use the vehicles, being applied to the programme. The MoD must ensure that the interests of the soldiers who will use FRES are considered fully when defining the FRES vehicle requirement.** (Paragraph 58)

14. **We note with interest the appointment of a Systems House and recognise the potential benefit to the MoD of a source of independent project management expertise. We recommend that the MoD publish the performance criteria by which the contribution by Atkins to the FRES project will be judged and their subsequent performance in meeting them.** (Paragraph 61)

15. **We welcome the MoD's insistence that intellectual property rights to FRES should remain in the UK. For such a vital project, the UK must retain the essential systems knowledge within the UK.** (Paragraph 71)

16. **Retaining the intellectual property rights within the UK will enable the MoD and defence companies residing in the UK to exploit fully the potential export market for FRES. UK-based companies producing the FRES vehicle for export would not only benefit the UK economy but also help support the UK's defence industrial base.** (Paragraph 72)

17. **The FRES Utility vehicle ISD must be challenging but achievable. Although the Defence Industrial Strategy states a planning assumption of delivery by "the early part of the next decade", the Systems House, appointed by the MoD for its project management expertise, considers there to be little evidence that FRES will be in-service before 2017.** (Paragraph 81)

18. **The Army's lack of suitable medium-weight armoured vehicles has meant that the MoD has had to devote considerable sums on the ad hoc purchase of Mastiff and Vector armoured vehicles and upgrading the FV430 series of vehicles. If FRES does not enter service until 2017-18 further interim purchases are likely to be necessary at considerable cost.** (Paragraph 82)

19. **We acknowledge the increased rigour that Lord Drayson's leadership has brought to the MoD's procurement process and note the reasons he gives for not announcing the ISD for FRES before it has passed its Main Gate review. However there is a legitimate public interest in knowing at least the planning assumptions of when equipment is expected to be delivered to our Armed Forces and the MoD should be more transparent about this.** (Paragraph 85)

20. **We acknowledge the need for Ministers to have bargaining power with industry. However, sparing Ministers from political difficulties is not a sound reason to not announce targets for the delivery of programmes. The decision not to announce a target Main Gate for FRES might give the impression that the programme is being driven by the concerns of the DPA rather than by military need. In its response to this report, the MoD should explain its overall approach to negotiating procurement contracts.** (Paragraph 86)

21. **The MoD gives no indication of when the Heavy and Reconnaissance variants of FRES will enter their Initial Assessment Phase. As with the Utility variant, it remains unclear when the Heavy and Reconnaissance variants of FRES will enter service. The procurement of a successor reconnaissance vehicles is particularly important owing to the ageing fleet of the CVR(T) vehicle.** (Paragraph 91)

22. **This is a sorry story of indecision, constantly changing requirements and delay. We are concerned that the FRES requirement may simply be unachievable without a major technical breakthrough. The tension between the survivability and deployability is particularly acute: satisfying both requirements may prove impossible. It is high time the MoD decided where its priorities lay. We shall take further evidence on the FRES programme in the Autumn of this year.** (Paragraph 93)

List of Abbreviations

AVRE	Armoured Vehicle Royal Engineers
AVLB	Armoured Vehicle Launcher Bridge
ARRV	Armoured Repair and Recovery Vehicle
CDP	Chief of Defence Procurement
CHARRV	Challenger Armoured Repair Recovery Vehicle
CVR (T)	Combat Vehicle Reconnaissance (Tracked)
DPA	Defence Procurement Agency
Dstl	Defence Science and Technology Laboratory
EDA	European Defence Agency
FRES	Future Rapid Effect System
IAP	Initial Assessment Phase
IED	Improvised Explosive Device
IPT	Integrated Project Team
ISD	In-Service Date
MoD	Ministry of Defence
MRAV	Multi Role Armoured Vehicle
RPG	Rocket Propelled Grenade
SEP	Spitterskyddad Enhets Platform
SDR	Strategic Defence Review
TDP	Technology Demonstrator Programme
TRACER	Tactical Reconnaissance Armoured Combat Equipment Requirement
UOR	Urgent Operational Requirement

Formal minutes

Tuesday 6 February 2007
[Second afternoon sitting]

Members present:

Mr James Arbuthnot, in the Chair

Mr David Crausby	Mr Kevan Jones
Linda Gilroy	Robert Key
Mr Dai Havard	Willie Rennie
Mr Brian Jenkins	John Smith

The Army's requirement for armoured vehicles: the FRES programme

The Committee considered this matter.

Draft Report (The Army's requirement for armoured vehicles: the FRES programme), proposed by the Chairman, brought up and read.

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

Paragraphs 1 to 93 agreed to.

Annexes (Summary and List of Abbreviations) agreed to.

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

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

Ordered, That the Appendices to the Minutes of Evidence taken before the Committee be reported to the House.

A paper was ordered to be reported to the House.

Ordered, That the provisions of Standing Order No. 134 (select committee (reports)) be applied to the Report.

[Adjourned till Tuesday 20 February at 10.00 am.

List of witnesses

Tuesday 12 December 2006

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List of written evidence

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List of unprinted written evidence

An additional paper has been received from the following and has been reported to the House but to save printing costs it has not been printed and copies have been placed in the House of Commons library where it may be inspected by members. Other copies are in the Parliamentary Archives, Houses of Parliament and are available to the public for inspection. Requests for inspection should be addressed to the Parliamentary Archives, Houses of Parliament, London SW1 0PW. (Tel 020 7219 3074) hours of inspection are from 9:30am to 5:00pm on Mondays to Fridays.

Julian Nettlefold

Defence Committee Reports in this Parliament

Session 2005–06

First Report	Armed Forces Bill	HC 747 (*HC 1021*)
Second Report	Future Carrier and Joint Combat Aircraft Programmes	HC 554 (*HC 926*)
Third Report	Delivering Front Line Capability to the RAF	HC 557 (*HC 1000*)
Fourth Report	Costs of peace-keeping in Iraq and Afghanistan: Spring Supplementary Estimate 2005–06	HC 980 (*HC 1136*)
Fifth Report	The UK deployment to Afghanistan	HC 558 (*HC 1211*)
Sixth Report	Ministry of Defence Annual Report and Accounts 2004–05	HC 822 (*HC 1293*)
Seventh Report	The Defence Industrial Strategy	HC 824 (*HC 1488*)
Eighth Report	The Future of the UK's Strategic Nuclear Deterrent: the Strategic Context	HC 986 (*HC 1558*)
Ninth Report	Ministry of Defence Main Estimates 2006–07	HC 1366 (*HC 1601*)
Tenth Report	The work of the Met Office	HC 823 (*HC 1602*)
Eleventh Report	Educating Service Children	HC 1054 (*HC 58*)
Twelfth Report	Strategic Export Controls: Annual Report for 2004, Quarterly Reports for 2005, Licensing Policy and Parliamentary Scrutiny	HC 873 (*Cm 6954*)
Thirteenth Report	UK Operations in Iraq	HC 1241 (*HC 1603*)
Fourteenth Report	Armed Forces Bill: proposal for a Service Complaints Commissioner	HC 1711 (*HC 180*)

Session 2006–07

First Report	Defence Procurement 2006	HC 56
Second Report	Ministry of Defence Annual Report and Accounts 2005–06	HC 57
Third Report	Costs of operations in Iraq and Afghanistan: Winter Supplementary Estimate 2006–07	HC 129
Fourth Report	The Future of the UK's Strategic Nuclear Deterrent: the Manufacturing and Skills Base	HC 59 (*HC 304*)
Fifth Report	The work of the Committee in 2005 and 2006	HC 233
Sixth Report	The Defence Industrial Strategy: update	HC 177

Oral evidence

Taken before the Defence Committee

on Tuesday 12 December 2006

Members present:

Mr James Arbuthnot, in the Chair

Mr David Crausby	Mr Bernard Jenkin
Linda Gilroy	Mr Kevan Jones
Mr Mike Hancock	Willie Rennie
Mr Adam Holloway	John Smith

Witnesses: **Sir Peter Spencer KCB,** Chief of Defence Procurement (CDP), **Dr Iain Watson,** Operations Director of Information Superiority, and **Lieutenant General Andrew Figgures CBE,** Deputy Chief of Staff (Equipment Capability), Ministry of Defence, gave evidence.

Q1 Chairman: Good morning and welcome to this evidence session on FRES. Sir Peter, I wonder if you would like to introduce your team for the record.
Sir Peter Spencer: General Figgures, whom you all know, represents the sponsor for the requirement as DCDS (EC), and Dr Iain Watson is the Operations Director in the DPA who has the FRES team in his cluster of projects.

Q2 Chairman: And DCDS (EC) means Deputy Chief of Staff (Equipment Capability).
Sir Peter Spencer: Correct.

Q3 Chairman: And can you break down exactly how your roles relate to the FRES programme please? Would you like to each explain your own role in relation to the FRES programme?
Lieutenant General Figgures: I am a sponsor, in our parlance; so what does that mean? It means I am responsible for establishing the requirement in the context of our defence capability and balancing the resource that I put to that requirement against the resources required for other requirements across the defence capability. So I have two things to do: identify the requirement and ensure that we have optimised it; and then ensure that I put enough resource, enough money to it to ensure that we deliver it when it is possible to deliver it.

Q4 Chairman: And, Sir Peter, what is your role exactly in relation to FRES in comparison with General Figgures?
Sir Peter Spencer: In comparison with General Figgures I provide the resources in the DPA to deliver against that requirement and I take the money which he gives to me and we then deploy that on the various contracts. I delegate that responsibility to the IPT leader who works for Dr Watson, who is Operations Director, and he oversees the delivery of that work. As Chief of Defence Procurement I play a major role in agreeing the procurement strategy. I am a member of the Investment Approvals Board so I am part of a team of five who consider the proposals which come from the project sponsor and the team leader.

Q5 Chairman: And Dr Watson, what is your role in this?
Dr Watson: As Sir Peter has said, the IPT is within my cluster of IPTs. I act as the line manager. Principally my role is to mentor and ensure that the team is undertaking its work in accordance with best practice, to carry out periodic review and assurance to make sure that we are actually achieving our goals as we set out.

Q6 Chairman: What is DSTL's role?
Dr Watson: DSTL is the Defence Science and Technology Laboratory. They are a support to the technical investigations that we undertake in delivering any programme. In the context of FRES, their principal areas are in armoured vehicle engineering, in associated systems, and in the operational analysis to support the requirement. So they are advisers to the IPT.

Q7 Chairman: How many people in the DPA are working on this project?
Sir Peter Spencer: 42 today; that is 29 civilians, 13 Army and that team will build up as we go into next year.

Q8 Mr Hancock: To what level will it build up?
Sir Peter Spencer: At the moment we are looking at an uplift of 14 posts but that is only the DPA component of the team. If you add the DSTL and the Systems House and the various embedded members from the military community and from industry, then the team itself is 125 as an integrated team with industry.

Q9 Mr Hancock: The ones you are recruiting to come into post next year; what is their purpose? What would they be doing specifically that is not being done now?
Sir Peter Spencer: What they will be doing is, as you will have seen with the acquisition strategy—and we are going to be launching four competitions—they will be preparing the documentation which initiates those competitions; they will be involved in the assessment of the tenders that come back; and they

will be involved in putting together the detailed sets of proposals which the IAB will subsequently take as the next stage of this programme.

Q10 Mr Hancock: So how long will that take and should not some of these posts have been filled before now? That work seems to me to be the sort of work that should have been done by now.
Sir Peter Spencer: No, I do not think so.

Q11 Mr Hancock: You do not think so but I am just asking why it has not.
Sir Peter Spencer: Because we have needed to understand in considerable detail precisely what the requirements are going to be and what technologies are going to be matured, and to determine the right balance between meeting the long-term requirements as well as a relatively early introduction into service, and to get the right sort of incremental strategy in place. That has required us, if you recall from the brief we sent to you, to understand the outcome of nine technology demonstrator programmes.

Q12 Chairman: We will come on to what the requirement is going to be in a few minutes. General Figgures, would you describe yourself as in a sense the "customer" for this vehicle?
Lieutenant General Figgures: Yes I would.

Q13 Chairman: And how do you ensure that your requirements are going to be met? In what forum do you argue the case for the customer?
Lieutenant General Figgures: Well, first of all there is the establishment of the requirement which is a balance of demand and supply. There is no point in asking for something that cannot be met from our potential suppliers. The first part of that is establishing the requirement with respect to the Army, and it is not just the Army Board but we establish the requirement through the directors of the arms and services, through the front-line command, and so there is an element of balancing what is required in terms of a perfect solution and what is required in terms of a robust solution that meets all those individual users. That having been done we then discuss with the DPA, in particular the Integrated Project Team Leader, and the Ops Director, and finally at my level with the Chief of Defence Procurement, just how we are going to balance that requirement against the ability to meet it and the time-frame in which we are going to meet it. How do we test that we have got it when we eventually get it? We build up an integrated test evaluation assessment plan which addresses all the lines of development such that when it does come into service we can test it to see that we have got what we intended to get or we are aware of any shortfalls which we can develop over time through a through life capability management plan.

Q14 Chairman: Do you know what you expect to get?
Lieutenant General Figgures: Do I know in terms of the acceptance criteria?

Q15 Chairman: I mean in terms of the vehicle, do you know what you expect to get?
Lieutenant General Figgures: I know what I expect to get in terms of the characteristics of that vehicle.

Q16 Chairman: Can you explain that to us?
Lieutenant General Figgures: The characteristics that we are looking for are survivability, capacity, tactical and operational mobility, the ability to generate power and the ability to deliver information to the crew, and the overarching piece is the ability for growth through life because what is required today will change over time, and we have seen that in our recent experience.

Q17 Mr Jones: General, you are the advocate for the customer I think you described to the Chairman. With no disrespect to yourself because you are a General of long standing (although possibly coming up for retirement soon); where does the front-line squaddie, the people who actually use these vehicles fit into this process?
Lieutenant General Figgures: He fits in at several stages. He fits into the requirement capture.

Q18 Mr Jones: And how do you do that?
Lieutenant General Figgures: By the requirements being drawn together under the Director of Equipment Capability, who does that through the arms and services directors, who has at his disposal subject matter experts—

Q19 Mr Jones: That is the point. I am asking about the people who use the equipment?
Lieutenant General Figgures: Yes we do. We employ soldiers in the requirement capture, we employ officers and soldiers in the Integrated Project Team, and we employ soldiers in the armoured trials and development unit, soldiers who have significant operational experience, and we employ soldiers, both individuals and formed units, when it comes to accepting it into service.

Q20 Mr Jones: So are you saying that throughout this process you have got somebody of the lowest rank who uses this equipment as part of that process?
Lieutenant General Figgures: Throughout this process we have people at all levels who have a valid view on the requirement.

Q21 Mr Jones: That is not my question.
Lieutenant General Figgures: Well, I can answer your question: we have drivers, we have gunners, we have infantrymen, we have radio operators, we have command post operators; everybody is engaged in terms of determining the requirement.

Q22 Mr Jones: And their input is on an equal par with yourselves and other senior officers or are they dismissed if it is not something that you agree with, for example?
Lieutenant General Figgures: I would not dismiss an opinion of a private soldier with respect to his area of competence.

Q23 Mr Hancock: General, I was very intrigued by your opening answer where you said that they could not ask for something that could not be delivered. I am interested to know who makes that judgment and how do the people who are doing the asking know what can be delivered if somebody is not telling them what is available or what the time-frame you are working in is? To me it seemed a bit of a strange response to give.
Lieutenant General Figgures: Well, in the first instance I would turn to the Defence Procurement Agency and I would turn to the scientific community. They in turn would look to industry. I think then this becomes Sir Peter's part of the ship and he would be best to answer that. In terms of the scientific community, I run a research programme which enables me to prove in principle technology which I can then put forward as a proposition to the DPA to mature such that it can be incorporated into the supply base.

Q24 Mr Hancock: You went on to explain what your requirement was because you explained what would be expected of this vehicle. There must be a factor where that vehicle can either be supplied or it cannot. I want to know when does the decision have to be made, by whom, and what is taken into account? Is it simply at the end of the day that cost is the prevailing factor, that at the end of the day you cannot have it because it costs too much to do what you want it to do? It cannot simply be that it is not available or cannot be done because if the price is right people will do it, will they not? Defence procurement has a track record of proving that point.
Sir Peter Spencer: This is what the assessment phase is there to do. It is a fact that today the requirement that is asked for could not be bought off-the-shelf from anywhere in the world. So what we are looking at is the balance between—

Q25 Mr Hancock: Sir Peter, my question is not what can be bought off-the-shelf. If the requirement is known, and this is what our Armed Forces need, and it cannot be bought off-the-shelf, is price then a key factor in delivering what the Armed Forces want; yes or no?
Sir Peter Spencer: Price is always a factor. It is never the only factor because, as you well know, we balance performance, time, cost and risk. My point is that if you cannot buy something immediately off-the-shelf you then have to look at the degree of development which is required against a sensible timescale. This is the whole purpose of what we have been doing during the assessment phase.

Q26 Chairman: You were asked if price was a key factor and you said it was a factor but not the only factor. So from the sound of things you are saying yes, it is a key factor.
Sir Peter Spencer: There are four key factors—performance, time, cost and risk. Neither dominates.

Q27 Chairman: So cost is one of the key factors?
Sir Peter Spencer: As with any other procurement activity.

Q28 John Smith: The General referred to the capability requirement. To what extent has that requirement changed over the last eight years, five years, or whatever it is, and in what way?
Lieutenant General Figgures: I think one must consider the way that we carry out our procurement. We have a concept phase and then we have an assessment phase. We are now in the assessment phase. We started our concept phase in 2000–01 and we got to the start of the assessment phase in 2003.[1] We did a lot of work in the concept phase on whether this was going to be one single family of vehicles, whether it was going to be a single family of sub-systems, whether they were all going to have the same level of survivability, the same capacity and so on and so forth. I will not say we came to firm conclusions but we narrowed it down such that there were a number of questions that could be sensibly answered in the assessment phase. We did not have a firm requirement and at the start of the assessment phase we had some, you might say, headline requirements which as a consequence of the assessment phase we can firm up such that when we actually decide to make the investment in this capability we can judge the outcome against it. I think one has to understand that this is an area during assessment when we are looking at the risks, we are looking at how much it would cost to buy at those risks to give the required performance, and we have to make some trades in it. Just to go to the ultimate absurdity, if we wish to provide protection against every known anti-armoured weapon we would end up (and it is absurd) with something that might weigh 160-odd tonnes. That is of no military use so we are going to have to make some judgments about survivability, capacity and so on, against what is possible and what has military utility in the hands of the soldiers. They would not thank us for that.

Q29 Mr Jones: I think I am a bit slow. If you do not know what you actually want, how can you then say you cannot buy it off-the-shelf?
Lieutenant General Figgures: We want survivability—

Q30 Mr Jones: You have just said you do not know what FRES is. I get this all the time. I had it off the previous Secretary of State. If you do not know what it is how can you then tell the Committee—
Lieutenant General Figgures: We do know what it is.
Sir Peter Spencer: We do know what it is. It is the medium weight component of the Future Army Structure for the expeditionary force. We have a very clear understanding of the sort of thing we want. The requirement has changed over the last three years in terms of the level of protection which is required because of the experience of current operations. When you took evidence from me two or

[1] *Note from witness:* In house concept studies started in April 2001 marking the start of the Concept Phase; the Initial Gate Business Case was approved in April 2004, which was therefore the start of the Assessment Phase.

three years ago with General Fulton, General Fulton explained that he felt that the sort of weight we were going for was 17 tonnes. At that stage the aspiration was for a single family of vehicles. As we have matured our understanding of the technology which will be required, we have discovered we could not deliver FRES as a single family of vehicles. It will be three families of vehicles with a high degree of commonalty at the sub-system level to take advantage of economies of scale. We have also recognised that we will have to go for a weight which is very much greater—between 27 and 30 tonnes—for the utility vehicle. That is a direct consequence of the requirement being iterated in the light of operational experience, which is a perfectly respectable and legitimate activity in the assessment phase to make sure that we understand what is needed and we do not commit to procurement too early against the wrong requirement.

Q31 Mr Jones: While you are employing all your civil servants at Abbey Wood people are actually dying in action.
Sir Peter Spencer: 30% of the IPT are military, as I said just now. It is not just civil servants.

Q32 Mr Jones: Do not just say that. If you have not clearly defined what it is, how can you tell us that you cannot buy this off-the-shelf or there is not some technology out there that could be ungraded?
Sir Peter Spencer: Because we do have quite explicit statements of what the customer wants to have by way of levels of protection as the capability is introduced into service, and we have clear statements of the amount of growth over time that they wish to see in those levels of protection. What I am telling you is that you could not go and buy something off-the-shelf today which would meet that. We have tested it. We did the research, we held a fleet review with the Army, with representatives of all parts of the Army who had an expert view on this, and presented to them what the products available today are. On the utility variant the Army unanimously said that it did not want to go for one of those products. It wanted us to go for something which could be developed to give greater capability, which is what the whole point of the assessment phase has turned into now.

Q33 Mr Holloway: That is the front end but at the back end in 15 years' time you have spent huge amounts of money tailoring a completely new thing and then the threat has evolved, so it is a bit like going to a tailor and ordering a suit 10 years ahead with a brand new material and new styling when every few years you could buy it off-the-peg relevant to requirements.
Sir Peter Spencer: Which is why we explained in the note that we gave to you that this is an incremental procurement process, so that we go for the 80% solution on day one with the ability to tailor it through time. In terms of the amount of money which has been invested previously, this Committee has actually pressed the case as to where do we stand in terms of under-spending in the assessment phase and has said there is a benchmark of 15%; where do we stand on that? We are looking at an initial acquisition bill of well over £10 billion so you would expect us to spend a lot of intellectual effort and a lot of money researching so that we understand the technology and we understand the requirement, and what we are putting together is an incremental approach which will manage those risks.

Q34 Chairman: Sir Peter, one of the requirements to start with was that these vehicles should be transportable in the C-130J. Is that right?
Sir Peter Spencer: One requirement was that they should be air-transportable and an aspiration was to be transportable in a C-130J. There is no nation in the world today that has a plan for being able to produce a vehicle that light which has the degree to be able to be transported in a C-130J and to be able to have the protective mobility when it is deployed and goes on operations.

Q35 Chairman: What about in the A400M?
Sir Peter Spencer: We are still planning at the moment to be able to make the utility component airportable.

Q36 Chairman: In the A400M?
Sir Peter Spencer: In the A400M.

Q37 Chairman: How would that be affected by any delay in the A400M programme?
Sir Peter Spencer: It would self-evidently be affected by the fact that we would not be able to transport them until the A400M comes into service, but we would have C-17s to be able to transport them *pro tem*.

Q38 Willie Rennie: You have talked about having the flexibility to have incremental changes as time goes on as the requirement changes. I presume that is subtle changes in the requirement. What happens if you face a substantial change, as you have already recognised that you have had in the last few years?
Sir Peter Spencer: This is the whole point. We are aiming to be able to absorb the consequences of quite major changes in requirement because our history has told us that over a period of 30-odd years we will have major changes in operational environment, so we will be looking for something which has the physical and functional margins to be able to adapt over time. One of the major drivers will be to be able to update the vectronics packages and the sensor packages, which is why for economic reasons we are looking for a vendor-independent, open system of architecture so we design for that flexibility from the outset and we do not become captive to a single supplier.

Q39 Willie Rennie: Why was that not recognised at the very start of the process? Why has it taken you this long to recognise that?

Sir Peter Spencer: It was recognised that we needed to improve the logistic support and we needed to improve the logistic footprint, and this is just the articulation of the detail of one of the ways in which that will be achieved.

Q40 Willie Rennie: You said that you had a substantial change in circumstances because of your experience in Afghanistan, et cetera. Why was that not recognised before, because these conflicts are not new, these conflicts have been going on for years?
Sir Peter Spencer: Because we are in the assessment phase and the whole premise of the assessment phase is to make sure that we do understand what the threat is likely to be and we do understand the sorts of operations that we are likely to be conducting in the future. The strategic circumstances have changed in defence. When this was first conceived in 2001, it was conceived largely to be a capability which would be used in conventional, high-intensity operations. What we have seen over the last few years is a much greater use of this sort of capability in peace-keeping and peace enforcement operations. It puts you into a totally different position *vis-à-vis* your ability to defend against a threat, and we have uncovered a whole lot of much more difficult threats in the last few years than had previously been anticipated. Fortunately, we have not committed to the main gate investment decision otherwise we would be in a mess, would we not.

Q41 Willie Rennie: Who else runs a process like this in the world? Why has it taken eight years to go through that process?
Sir Peter Spencer: If I can just put this into context. To correct the General on a point he made, we did not start the assessment phase formally until 2004, so we have been in the assessment phase for two and a half years, and a two and a half year assessment phase for more than £10 billion initial acquisition programme is quite a short space of time and that compares with anybody else doing this sort of business if they are starting to tackle this sort of degree of challenge in their capability. We have benchmarked how long it normally takes to bring a new armoured fighting vehicle into service and the timescales that we are driving towards compare very favourably.

Q42 Mr Hancock: General, you were asked a question and you were just about to answer when Sir Peter eagerly jumped in and gave us a definition of what the requirement was. I was rather surprised that you did not tell us as you were the person who tailored the Army's requirement and you did not seem to know what the requirement was and you seemed to be unable to answer the question. I want you to clarify just where you are with your view of what the requirement was.
Lieutenant General Figgures: I am reassured that my supplier knows the requirement otherwise I would be lost.

Q43 Mr Hancock: I am not reassured as to why you did not answer the question.
Lieutenant General Figgures: I am in danger of repeating what he said but FRES is required as a replacement armoured vehicle in the armoured brigades and to equip the medium weight brigades, now known as the three mechanised brigades. It is required to enable the armoured brigades to fight conventional wars, rather as we saw in Telic 1, and it is required to enable the mechanised brigades to both support the armoured brigades with what we in the Army would say a manoeuvre support brigade, and also to be deployed in peace-keeping and peace enforcement operations. So there is a balance of capability between those two and the tactics, techniques and procedures which are used in those instances are subtly different because of the rules of engagement and so on and so forth.

Q44 Mr Hancock: We can be absolutely sure that when you retire you will not write and say that the DLO did not produce the vehicle that you required? You are in common agreement now that the product they are seeking to give you is exactly what you want?
Lieutenant General Figgures: We are in common agreement.

Q45 Mr Jones: Sir Peter, you said that it is remarkable that this assessment phase has taken two and a half years and how far you have got. Can I just go over the history of this programme. There was a non-competitive contract let to Alvis Vickers to lead a FRES assessment phase with an in-service date of 2009. Can I ask what that cost and why it was ditched?
Sir Peter Spencer: That predates my involvement. Put it this way: when I arrived in 2003 this Committee asked me questions about FRES; FRES had been the subject of an initial gate submission.

Q46 Mr Jones: You actually let a contract to Alvis Vickers.
Sir Peter Spencer: I will go back and research it for you. What I am explaining to you is from personal knowledge. The submission for the initial gate was then resubmitted to the IAB towards the end of 2003. The approval was not given until 2004, so we did not start the assessment phase until spring of 2004. I have no recollection of an assessment phase contract being given to Alvis Vickers but I will certainly go away and look up the detail and if I am wrong I will send you a note.[2]

Q47 Mr Jones: You are wrong because it did take place.
Sir Peter Spencer: In which year?

Q48 Mr Jones: 2002.
Sir Peter Spencer: I am sorry, but this was before the initial gate so it was not an assessment phase contract full stop. It may have been a pre initial gate contract. There may well have been some concept phase work.

[2] See Ev 27

Q49 Mr Jones: So when you came in it was year zero on FRES, was it?
Sir Peter Spencer: In terms of the—

Q50 Mr Jones: Come on. Was it year zero? When you came to your desk—
Sir Peter Spencer:—Year zero on FRES—

Q51 Mr Jones:—was it a blank sheet of paper on FRES? Is that what you are saying? No work had been done before then?
Sir Peter Spencer: No, I am not saying that. I am saying there is work that takes place before an initial gate which is done usually by the future business group and it looks at applied research, concept work and technology demonstration.

Q52 Mr Jones: Can I say, Sir Peter, I find it absolutely remarkable that you can come here today in charge of this programme and say that you did not know about a non-competitive contract let to Alvis Vickers. I know about it; industry knows well about it.
Sir Peter Spencer: You called it an assessment phase contract and I challenged the fact it was an assessment phase contract.

Q53 Mr Jones: That is changing it. Are you aware of any non-competitive work given to Alvis Vickers in 2002?
Sir Peter Spencer: I am aware there was non-competitive work done before the initial gate.

Q54 Mr Jones: What was that?
Sir Peter Spencer: It was simply pre initial gate phase work.

Q55 Mr Jones: What was involved in that?
Sir Peter Spencer: To set out what the options would be.

Q56 Mr Jones: A minute ago you told us you did not know about it. Now you are trying to describe what went on.
Sir Peter Spencer: I am sorry, I do not mean to be pedantic but you asked me about an assessment phase contract; it was not an assessment phase contract.

Q57 Mr Hancock: What was it then?
Sir Peter Spencer: For the third time, it was a pre initial gate concept phase contract.

Q58 Mr Hancock: What did you get out of that?
Sir Peter Spencer: You get a broad understanding as to the sort of capability, the sort of aspirations that the customer has, the sort of technology which needs to be matured in order to move towards a solution. It is a perfectly normal part of the cycle. It is unexceptional.

Q59 Mr Jones: Sir Peter, that is not true, I am sorry. If you are sitting here today and telling us that that was just part of this entire process, that is not the case. Alvis Vickers were livid when you severed that contract because they were under the impression that FRES was going to be a non-competitive process and that work was part of what they thought was the start of the actual process. I understand—and they can supply the information to us if you want—that something like £14 to £20 million was spent in that phase. What happened to that work? It is no good coming here trying to wriggle out of it and say to this Committee firstly that you did not know what was going on and the next thing trying to explain what went on.
Sir Peter Spencer: Chairman, do I have to be on the receiving end of quite so much provocation? We could have quite a sensible and illuminating discussion.

Q60 Mr Jones: We could if you answered the questions but you do not.
Sir Peter Spencer: It is the way they are framed, I am afraid, which is extremely provocative.

Q61 Mr Jones: I am sorry, but you cannot come to this Committee if I ask you a question and say to me firstly it did not exist and then in the next breath, when you start trying to wriggle out of it, try to say to me that you were completely aware of this.
Sir Peter Spencer: I am not trying to wriggle out of anything.

Q62 Chairman: Sir Peter, you are drawing a distinction between—
Sir Peter Spencer: I answered a question which was given to me which was an assessment phase contract and plainly because it predated initial gate it was not an assessment phase contract.

Q63 Chairman: What about the work that was done before you came into office? What about the TRACER programme, for example?
Sir Peter Spencer: The TRACER programme work has fed into this work. The Americans pulled out of TRACER and there was no international programme for us to be a part of, so that work was picked up and fed into the pre initial gate.

Q64 Chairman: In what respect was it fed into this programme?
Sir Peter Spencer: Because the project teams that were available at Abbey Wood would have drawn on the documents and the information which was learned from that work and used it as part of the foundation evidence as they built up their fund of knowledge as to what the requirement was and what sort of technologies were going to be needed to meet it.

Q65 Chairman: We seem to be in a programme of constantly shifting sands with the requirement being a series of ideas which are being traded off against each other with nothing actually descending into a vehicle at all. It seems to have been going on for many, many years.

Dr Watson: Can I—

Q66 Chairman: Is this not the way it seems to you?
Sir Peter Spencer: No, it is not. What seems to me is that this is a perfectly typical piece of procurement where we do some pre initial gate work and we then decide what the parameters are going to be for the assessment phase. It is no use you shaking your head, Mr Jones. Perhaps if you came down to Abbey Wood we could explain to you again what the process is. This is a perfectly legitimate way of putting in place the understanding of the technology which is required to deliver a solution. Previously this Committee has been critical that we have not done enough work in establishing our understanding of the technology. This is precisely what we have been doing—

Q67 Chairman: This Committee has also been critical of programmes being started like TRACER, MRAV and Boxer and being abandoned halfway through.
Sir Peter Spencer: Neither was abandoned halfway through. Both were abandoned because the end user decided, in the case of the Americans TRACER was not what they wanted and we were left stranded, and in the case of Boxer the British Army decided that against the evolving threat this was going in the wrong direction and was not the right vehicle for the medium weight force, so from a procurement point of view we responded to that and we exited from that programme and then we ramped up the work on FRES.

Q68 Mr Jones: How much money was actually expended on TRACER and MRAV?
Sir Peter Spencer: I will send you a note because I do not have it.
Chairman: Could you send us a note.[3]

Q69 Mr Jones: Could we also have the figures of how much was spent with Alvis Vickers, I would appreciate that as well. You say, Sir Peter, this is the way we do things. Does it not seem remarkable to you that we are now eight years into this and we have not even got a final concept of what we want? How much longer do we have to wait? Can you really sit there—and I know you are retiring next year—and assure us that FRES will not go the same way as both TRACER and MRAV have gone?
Sir Peter Spencer: I cannot give you an assurance as to whether or not the operational circumstances will change in the next 12 months but it is highly unlikely, and it seems to me that we now know much more about the technical options available to us, and you will have seen from the acquisition strategy that we have launched we are now ready to accelerate the whole process. We have been putting into place in the two and a half years that the assessment phase has been running—

[3] See Ev 27

Q70 Mr Jones: It is eight years.
Sir Peter Spencer: You can be in the concept phase for quite a long time before you go ahead and that is where we are. In the two and a half years of the assessment phase we have now established much greater clarity than we thought possible. We have got a project which draws upon the attributes that we discussed quite recently about what makes the project more agile—which is an incremental approach, which is to go for something which is either on-the-shelf or is being developed on-the-shelf so you reduce the amount of innovation, and we will very definitely be involving the front-line particularly in the "trials of truth". All of those areas are building on best practice. We have also spent a substantial amount of money on technology demonstrator programmes during the assessment phase, all of which you have commented on favourably in the past.

Q71 Mr Holloway: I just do not understand defence procurement generally. Why is it that consistently we have these projects that take a very, very long time? We design things absolutely from scratch to an unknown party 15 years hence and you end up with things like Typhoon and Bowman; late and inappropriate and not the best thing available in the end. Are we not doing the same thing here and compromising between manoeuvres stuff for armoured divisions and peace-keeping roles? Why not just buy the best available at the time, which is three years late rather than 15 years late, which is what you are in danger of being?
Sir Peter Spencer: This is not late because we have not set the parameters yet. We are producing a procurement strategy which will go faster and incrementally and manage the risk. It is not true to say that Typhoon and Bowman have no operational utility; quite the opposite.

Q72 Mr Hancock: I just want you to confirm that there is currently no vehicle off-the-shelf readily available that the British MoD can buy, from whatever source, which will fill 80% of the capability of what is required because your vehicle will only deliver in the first phase 80% of the capability. I want you to confirm that and I would like to know what the world will say when you give your answer, Sir Peter. You said that the Army rejected all of the off-the-shelf proposals and that nothing could deliver 80% of the product. If that is true, why would you use these vehicles in the trials of truth?
Sir Peter Spencer: Because the vehicles we are using are those which are still in development and therefore have the opportunity to be further developed to put in place the stretch potential we need to deliver the long-term capability.

Q73 Mr Hancock: I would like you to answer the question about there not being a single vehicle available today that you could buy because while troops are being bombed and blown up in Afghanistan and Iraq they will be heartened by the fact that we are eight years down the road and we are still at a stage of refreshing the look at what the

requirement is and they are still maybe 10 years away from having a vehicle delivered to them. You are going to answer that question, are you not, that there is no single vehicle available anywhere in the world that we could buy that would give you 80% of the potential that you require?
Sir Peter Spencer: And be able to then be delivered to meet the longer term requirement.
Mr Hancock: You are saying that as a categorical no; there is not a single vehicle anywhere available?

Q74 Chairman: So the issue is about upgrade-ability.
Sir Peter Spencer: The issue is about upgrade-ability because what the Army did not want to have is something which was of no use to them within a few years of having purchased it.

Q75 Mr Hancock: So can you explain to us what is the 20% you cannot deliver in the first phase?
Sir Peter Spencer: The long-term protection against an increasingly demanding threat.

Q76 Mr Hancock: That would be the same with any vehicle, would it not? How can you say that these vehicles are not capable of the same sort of development?
Sir Peter Spencer: Because if you are thinking in terms of the ways in which you protect, a great deal of it comes down to armour and weight, the question of the strength of the chassis, the engine, the drive shaft, braking systems and all the fundamentals which establish the ability of that vehicle to grow in weight over time.

Q77 Chairman: General Figgures, do you have a view on that?
Lieutenant General Figgures: If I may amplify Sir Peter's remarks and really try to simplify it. If one looks at CVRT, the armoured reconnaissance vehicle with the 30 mm gun, that came into service at about seven tonnes; it is now 11 tonnes. We should be thankful to our predecessors that they introduced a vehicle which we have re-engined, we have put new sensors on, we have up-armoured and so on and so forth, which was capable of development and is capable of being of some operational use today. If you take Warrior, it came into service at 25 tonnes; it is now 32 tonnes, and we have improved the sensors on it, we have introduced thermal imagers on it, we have improved the armour and so on. So in the light of what we want to use these vehicles for, the Army is very firm that they need to have growth potential because we cannot foretell the future. So we are looking for something in the order of between 10 and 15% that we can increase the weight.

Q78 Mr Hancock: So none of the vehicles that you have so far looked at is capable of what you want to do? It is a very important question to soldiers on the front-line.
Sir Peter Spencer: As far as I am aware—and a tremendous amount of work is being done on this—if you say off-the-shelf, that means in service today, they are not capable of sustaining that type of weight increase and they do not have the necessary electronic architecture to enable us to upgrade them as we anticipate we will have to in what we see as a very different battlefield in the next 20 years.

Q79 Chairman: General Figgures, Sir Peter said that the Army changed its requirement in 2003 when it withdrew from the MRAV programme. Do you think that that is a correct assessment of what happened?
Lieutenant General Figgures: Yes because I was present and party to that decision and I can tell you from my personal experience in Iraq that I would thoroughly underwrite that decision.

Q80 Chairman: Do you think that it would be better to have had in place now vehicles that have been developed over the last six/eight/ten years so that we would not be looking at a far off in-service date for this programme?
Lieutenant General Figgures: In part we have and I have spoken about Warrior. We have upgraded the 430 Series to produce the Mark III which we have up-armoured and called Bulldog. I have had recent experience of that in Iraq and the Green Jackets speak extremely highly of it, but it will only take us so far. We are introducing into service and have introduced into theatre the protected patrol vehicles and we are bringing into service Mastiff which provides protection, but these are not armoured fighting vehicles, which is what we aspire to, so we are dealing with the most pressing part of the requirement, the need to save lives, but we are not providing the means to deliver offensive action. You cannot just save lives; you have got to be able to strike at the enemy to ensure that you can conduct and fulfil your operational purpose.

Q81 Mr Jones: My final question on this issue to you is you are telling us that we cannot buy a vehicle today which would deliver, in a reasonable time, an off-the-shelf requirement; a vehicle that could be in theatre within six months of purchase that would give our troops what they require today, not what they might require in 10 years' time? I want you to give me a firm assurance that your evaluation of this is that there is no vehicle that we can buy today which will give them something that they require today within a year from now?
Lieutenant General Figgures: I may not have been clear and my apologies for that. We have measures in hand through up-armouring Warrior, up-armouring the 430 Series, bringing into service the protected patrol vehicle, and bringing into service the Mastiff to deal with the most pressing requirement today, which is protection.

Q82 Mr Hancock: And what is the latest that any one of those four would be in service?
Lieutenant General Figgures: They are already deployed now and they will be in service in 2007.

Q83 Mr Hancock: All four of them?
Lieutenant General Figgures: All of those, yes. However, none of them will enable us to fight as we wish to fight in the next 20 years.

Mr Hancock: Fine.
Chairman: Getting on to the in-service date, Kevin Jones.

Q84 Mr Jones: Originally in 2003 ministers told us that the in-service date was going to be 2009. In 2005 when we had General Jackson before us I managed to get him to admit it was going to be 2010. It is now between 2010 and 2012. Is that still realistically the in-service date?
Sir Peter Spencer: We will announce the in-service date when we make the main gate investment decision, as with any other project.

Q85 Mr Hancock: How far away is that decision?
Sir Peter Spencer: I am not prepared to say.
Mr Hancock: The main gate decision; how far away is that?

Q86 Mr Jones: Wait a minute, we have had ministers sat where you are—the previous Defence Minister, General Jackson—giving in-service dates for FRES. Are you saying now you cannot give us that date?
Sir Peter Spencer: Yes I am.

Q87 Mr Jones: So is the assessment Atkins come up with 2017–18 more realistic?
Sir Peter Spencer: We will announce the in-service date when we make our main gate investment decision, as we do on any other project.

Q88 Mr Jones: Can you comment on Atkins' submission that it is going to be 2017–18?
Sir Peter Spencer: I think it rather depends on what set of assumptions you are making about the acquisition strategy.

Q89 Mr Jones: No, I am not asking you that question. That is what they have put in a submission to us. They are the people you have employed to do this work. They are suggesting a date of 2017–18. Are you disagreeing with that?
Sir Peter Spencer: I am noting it.
Mr Hancock: It is not very helpful, is it?

Q90 Mr Jones: It is not very helpful.
Sir Peter Spencer: It is why we do assessment phase work and when we get to the main gate and we then understand the programme in detail and we understand the costings, then we will set the performance, time and cost parameters.

Q91 Chairman: At what date, Sir Peter, did you decide to abandon the 2012 in-service date?
Sir Peter Spencer: I did not say we had.

Q92 Chairman: You are not committing to it, are you?
Sir Peter Spencer: We are not committing to anything until the main gate.

Q93 Chairman: At what date did you decide not to be committed to the 2012 in-service date?
Sir Peter Spencer: I have not decided not to be committed to 2012. I simply have not yet committed to a date.

Q94 Mr Jones: It is very serious what is being said here because we have had Secretaries of State before us giving in-service dates, we have had General Jackson giving in-service dates, and now we have got a policy where the head of the Procurement Agency is saying he cannot give an in-service date on this. I think this is a very serious thing that we need to take up with Ministers, to be honest.
Sir Peter Spencer: I agree with you because the Minister would wish you to take it up with him rather than me.
Mr Jones: You are just being evasive, which is an accepted part of it.

Q95 Chairman: When you saw the Atkins submission that it was likely to be 2017–18, what was your view about that submission, as opposed to just noting it? What is your view about it?
Sir Peter Spencer: My personal view is that it was pessimistic and that we ought to be able to do better, but how much better we can do will depend upon the further work we do in the next 12 months.

Q96 Mr Jones: So are you saying, Sir Peter, when we had Ministers before us who give us in-service dates for FRES, including General Jackson, that they could have picked any figure out of the air and what they told us was untrue?
Sir Peter Spencer: No, I did not say that.

Q97 Mr Jones: Well you are.
Sir Peter Spencer: No, I did not. Let us just put this into context. When I arrived in this job ministers had made a habit of announcing in-service dates before they finished the assessment phases and then found themselves in political difficulty when they announced changes. So ministers were very clear in defining a policy that in-service dates would not be announced until a main gate decision was taken. I am afraid you will have to take that up with the Minister directly because I am not empowered to give you a definite date.

Q98 Mr Jones: Well, let us go back to January 2005 when I asked General Jackson and he said 2010. He did not give us any of this nonsense that you are giving us about the fact that it was a policy change or anything like that. The Chairman's question was quite a good one. When did this idea change that somehow you are not going to be able to give an in-service date for FRES? We have had ministers sitting there giving us clear dates, we have had General Jackson giving us clear dates, and now you are saying you are not prepared to do that and that is obviously a major change in policy.
Sir Peter Spencer: It is.
Mr Jones: It has major implications in terms of whether this is absolutely feasible because to date, if you have gone through eight years and you say you cannot give an in-service date, frankly we would be very sceptical about even hitting the 2017 date.

Mr Hancock: Why is it a change in policy, Sir Peter? I am interested in the concept that there is a change in policy. A change in policy to tell this Committee the truth or to—
Chairman: No, that is not an appropriate question.

Q99 Mr Hancock: It is an appropriate question, Chairman, because it was said to us, and hopefully the Minister and former Chief of the Army were well briefed, and when they gave us that answer presumably they believed it to be correct. Sir Peter says it is a change of policy and I think it is a legitimate question to ask when was that policy changed and what does this do for industry trying to plan for what you are trying to deal with? Where does industry stand in this?
Sir Peter Spencer: Industry gets very clear indications of the sort of date for planning purposes that we have in mind. What ministers have found is that if they utter those dates before they have enough information to set them with sufficient confidence it simply becomes a question of debate in this place.

Q100 Mr Hancock: That is unfair, Sir Peter. I was in the room when General Jackson made that comment, he was gung-ho about making that, it was in the context of saying what was going to be delivered for the British Army because he required it for his troops. It was a specific, clear point that he put over and this Committee welcomed it even though we thought at that time it was still some way off. He was very convincing in putting that date to us. I am rather surprised that could slip considerably.
Sir Peter Spencer: It slipped for the reasons I have been explaining, which is that our understanding of the requirement has developed and, therefore, our understanding of the technical challenge has developed.

Q101 Chairman: Sir Peter, would you suggest that in-service dates have been used in the past by the Army to try to hold some sort of a lever over the Ministry of Defence in buying them equipment?
Sir Peter Spencer: No, I do not think so at all. What we have learned over the last four years is we have to be more sensible in the way in which we regard in-service dates for planning purposes because until we have matured our understanding of what the procurement is about we simply do not know enough about the time and cost parameters, so we declare those formally when we make the main gate decision. The specific answers are identical to those surrounding the Aircraft Carrier and we have had that debate previously.

Q102 Chairman: We have. Would you say that the Aircraft Carrier debate that we had was the first occasion on which abandonment of in-service dates became public?
Sir Peter Spencer: I do not think so. If you look at the Major Project Review no main pre-gate projects now have an in-service date recorded.

Q103 Mr Hancock: Typhoon did.
Sir Peter Spencer: That goes back a long way. I am talking about the most recent Major Project Review. This is really a question for ministers, I am afraid.

Q104 Mr Jones: No, it is not, Chairman. Less than a year ago in January 2005, General Jackson sat there and gave us the in-service date. You have just told Mr Hancock that industry will be told when the in-service date is.
Sir Peter Spencer: No. They get an indication where for planning purposes we would like them to be aiming.

Q105 Mr Jones: Why can you not tell us?
Dr Watson: Sorry, can I intervene?

Q106 Mr Jones: Why can you not tell us?
Dr Watson: Can I intervene?
Mr Jones: No, wait a minute. Why can you not tell us? If you are prepared to tell industry what your estimate of the in-service date is, why are you not prepared to tell the House of Commons Defence Committee what your estimate is?

Q107 Chairman: Are you prepared to tell industry what your assessment of the in-service date is or what the planning assumptions are?
Sir Peter Spencer: We provide in confidence dates to aim for to industry to get their feel for how realistic that is and to see to what extent proposals can come forward.
Mr Jones: Why can we not have that?

Q108 Chairman: Are you prepared to provide those planning assumptions to us in confidence?
Sir Peter Spencer: I would be prepared to take the question back to ministers and ask if they are prepared to release that information to the Committee.[4]

Q109 Mr Jones: I am sorry, Chairman, I think that is bang out of order. We have got a civil servant here telling us basically that he is not prepared to give elected Members of Parliament who scrutinise the Ministry of Defence information which he is quite happy to give to outside industry. I think it is disgraceful.
Sir Peter Spencer: It is a question of how you describe—

Q110 Mr Jones: Absolutely disgraceful.
Sir Peter Spencer: No, it is not disgraceful.

Q111 Mr Jones: It is.
Sir Peter Spencer: It is a question of how you describe the date. There is a difference in the date for planning purposes and in terms of what could you do in this sort of region and a date which then gets announced publicly by the Department which is then used as a benchmark against which to get a whole lot of questions when, frankly, we are still at the stage where we are deciding.

[4] See Ev 27

Mr Jones: How are we supposed to scrutinise this?

Q112 Chairman: Sir Peter, can you say whether there is a discrepancy between the planning assumptions that you are using for the in-service of these vehicles and the planning assumptions that industry is putting forward to you?
Sir Peter Spencer: I can say that is what we are going to put to the test in the course of the next 12 months.

Q113 Chairman: Is there a discrepancy? Do you know whether there is one or not?
Sir Peter Spencer: I do not know that there can be a discrepancy until we have got the additional information we need over the next 12 months because we have not yet firmed up finally what the requirements are going to be and until we have made that decision setting a date becomes a rather academic exercise.

Q114 Chairman: So when you say you have not firmed up what the requirements are going to be, what you are really saying, it seems to me, is that you do not know what FRES is.
Sir Peter Spencer: No, I am not saying that at all. This is a question of degree of detail and in terms of the rate at which we can deliver against the long-term capabilities which the Army wants. It is a question of forming a judgment as to how much you can deliver the initial operational capability and then how you frame the incremental steps thereafter to deliver in the longer term.

Q115 Mr Hancock: We are obviously not thinking straight, are we, because 40 minutes ago you told us what the requirement was and told us that you will achieve 80%? I am at a loss to understand how you cannot now tell us when you will expect to get the first phase.
Sir Peter Spencer: It rather depends which vehicle you choose in the trials of truth to see which bit of the requirement is going to be delivered first, and it may be different from another one.

Q116 Mr Hancock: The General told us what he requires first.
Sir Peter Spencer: He does it in the broad sense but when we do this in detail this breaks down into a very large number of different bits of specification, all of which need to be examined quite carefully and put together in an integrated solution.

Q117 Mr Hancock: But you would assume, would you not, and maybe I am completely missing the point here, that the first priority that the General outlined was the safety of the people in the vehicle and its ability to do that. I am at a loss now that you seem to be confusing that answer by saying that other things will be taken into consideration.
Sir Peter Spencer: Protection is not the only requirement parameter here and in the short-term, as is explained, there are other programmes which are dealing with that. This is the longer term capability and investment in something which will be in the inventory for 30-plus years.

Q118 Mr Hancock: I understood that when you answered, Sir Peter. What I am interested in is the first tranche of a vehicle that is 80% fit for requirement. Why can you not tell us when you expect that to be in-service? I accept entirely your point, and I think you are justified in suggesting that you take further time to develop the capability, but why is it not possible if you know that you are going to get 80% of this capability that you cannot give us that date? It is unbelievable that we cannot have that.
Sir Peter Spencer: I am sorry if you cannot believe it but we need to make sure that we test and understand the proposals from industry, that they hang together in a programme with a manageable amount of time and cost. That is the work of the next 12 months.

Q119 Mr Jones: I have two questions I want to ask you on the record because I want your answers. How long after the in-service date would the FRES utility vehicle become fully operational?
Sir Peter Spencer: The in-service date will be defined in such a way that there is a number of vehicles that are operational. There will be an initial operational capability date—

Q120 Mr Hancock: Simultaneous?
Sir Peter Spencer:which means that everything which is needed to operate those vehicles will be in place, including the logistic support.
Mr Jones: Once you have got the in-service date how long will it be after that that the vehicle will become fully operational?

Q121 Chairman: Would there be a gap between the in-service date and the operational availability of the vehicle?
Sir Peter Spencer: No. The in-service date will be defined to be operational capability.

Q122 Mr Jones: Fully?
Sir Peter Spencer: Fully. It depends what you mean by "fully". If you are going to have a programme which is incremental both in quantity and quality then the procurement activity will continue for many years as we roll out. We will not build more than 3,000 vehicles all in one year.

Q123 Mr Jones: There are a number of different vehicles. For the light and the heavy vehicles, what is the operational capability, is it going to be in different phases?
Sir Peter Spencer: We will roll out the utility vehicle first. The expectation is that the reconnaissance variants will come next and the heavy variants will come after that in a phased programme.

Q124 Mr Jones: What timescales are we talking about?
Sir Peter Spencer: That is work which is still being done in the assessment phase.

Q125 Mr Jones: Can I make one point to you, Sir Peter. Can I ask you a question: how should we, as parliamentarians, scrutinising your Department be able to see whether or not you have been successful in delivering this programme to the date which you have not yet come up with, which you are quite prepared to share with industry but not with us, if we are not going to get this information? Do you think it is very difficult for us to try to get the bottom of this if you are being as evasive as you are?
Sir Peter Spencer: I am not being evasive on anything other than the date, which I am not empowered to give. I am very happy to take that message back and I am very happy, through ministers, to provide you with the information that you are asking for if they agree. In terms of where we are going on the assessment phase then you have got ample information in terms of what we have given you to demonstrate the progress which has been made in the assessment phase against the key dates which were set out.

Q126 Mr Jones: The key date is the in-service date, surely.
Sir Peter Spencer: Not during the assessment phase. The assessment phase is the gradual understanding and agreement of what the capability requirement is. We have had Fleet Reviews of the Army which has been an incremental process. We have now informed you as to what the Acquisition Strategy is going to be and that there will be a great deal of activity over the next 12 months which will then lead up to the first decision which will be to go into the demonstration phase for the utility variant in timescales which in armoured fighting vehicles compare pretty favourably with anywhere else that you could find. Certainly they compare favourably with our history in this nation where the average time has been longer. I do not think the pre-initial gate phase counts towards the programme timescales because we are not committing to any dates at that stage, we are just looking at technology. We have concept phase work going on in all sorts of areas.

Q127 John Smith: I just wondered what the military consequences of a considerable slip to the in-service date of this vehicle are. The General tells us that there is a clear military requirement for this concept vehicle but if it slips into 2018–20, are there going to be any capability gaps and what are the general consequences?
Lieutenant General Figgures: Yes, there are going to be gaps and it then becomes my responsibility to manage them as best we can. I think I have given an illustration of where we dealt with the short-term operational requirement in terms of the protected patrol vehicle and Mastiff. We would have to run on the 430 series up-armoured and spend more money on that. It would mean that we would not realise our investment in our command and control and information systems network enabling capability that we would propose and that goes back to my point about we would not fight as we would wish to fight. I go back to the point that the Army, my organisation and the DPA are very closely engaged in this. It is a judgment in which the Army, the Chief of the General Staff and those responsible for delivering the capability of the Army are heavily involved in making that assessment, so a year, two years, are we capable of managing the gap, that we will get something which we can bring into service and which will enable our soldiers to execute their duty in the manner in which they have been trained to do and would wish to do, it is worthwhile.

Q128 Mr Holloway: General, would there be any gaps between yourself and the Admiral's department? Within your organisation is there a more immediate requirement, a greater hunger for this, than perhaps there is with the DPA?
Lieutenant General Figgures: No, because there are people like me in this uniform in the DPA.

Q129 Mr Holloway: Can you answer my question?
Sir Peter Spencer: We follow the requirements which are set by the military. We do not have a view on pace and priority, we resource our drive to the expectations of the military, so why you would imagine that there is a difference between us. I find incomprehensible.

Q130 Mr Holloway: I will tell you why. Having served in the Army, often finding oneself with the wrong equipment, and speaking to soldiers now who find themselves with the wrong equipment, I think it is an entirely reasonable question.
Sir Peter Spencer: So much of the DPA has military people, all I can say is that people are doing their best at the time.
Lieutenant General Figgures: I do not think there is any lack of a sense of urgency. There have been many occasions when in order to provide what is required, urgent operational requirements, integrated projected teams, both in the DPA and the DLO, have worked seven days as many hours as they can, you just eat, drink and get a bit of sleep. There is no lack of will to get what we want. After all, we are all human, we cannot magic these things.

Q131 Chairman: You said there is no lack of a sense of urgency. The talk of the 2017 in-service date will make the soldiers who are serving currently feel that is exactly what is going on there, will it not?
Sir Peter Spencer: The whole purpose of next year will be to see to what extent we can improve on that and we expect to improve on it substantially, but I am not in a position to tell you by how much.

Q132 Chairman: To what extent, General, would you say that the Army will need these vehicles for the idea of 2017 or earlier, if it can be brought back?
Lieutenant General Figgures: I think I have explained—at the risk of repetition—we need them in order that we can fight as we would wish to fight. I believe it was on 19 January that the Army Board, the Chief of Defence Procurement and my predecessor spent the best part of a day scrubbing through all this so we all understood the requirements, the means of satisfying the requirements, the trades we might have to make. Of

course, military men are impatient to get things done. Yes, we want it tomorrow but we do recognise we are dealing with a very complex area and it is the art of the possible. I am in no doubt that the Defence Procurement Agency is under no illusion about the need to bring it into service as quickly as is possible, but which satisfies our requirement. There is nothing worse than having a piece of equipment to which one has looked forward for some time, in which one has invested time and money, and it does not meet the threshold requirement.

Q133 Chairman: Is there not a risk that over the years we will need so many urgent operational requirements and things will be needed so much now that we will end up with a fleet of completely disparate vehicles that are there to solve the immediate problem and all the money will have been spent on Cougars and Mastiffs and we will not have the FRES at all because the best has been the enemy of the good.

Lieutenant General Figgures: I share your concern. The logistic support of the vehicles that we procure to fill gaps complicates the business of the Defence Logistics Organisation and the field army deployed in support of those vehicles, hence I think our sense of urgency and the sense of urgency of the DPA to bring this in as soon as is possible. There is no point in promising us something unless there is a high confidence of it being delivered and, therefore, I respect Sir Peter's reluctance to commit to something that he cannot sign up to in blood.

Q134 Mr Hancock: I do not have a problem with Sir Peter's point of view, I think it is a legitimate one and is based on his integrity, is it not, to not give us information that he does not believe at this stage he can accurately predict, and I think it is right for us to challenge ministers. But we were sent a memorandum by General Dynamics and they raised the issue of the Piranha vehicles and it states quite clearly here that it has an outstanding survivability, considerable growth potential, it is 26 tonnes, it is capable of doing nearly everything you have asked of it, and we have properly evaluated the suitability of this vehicle and we have turned it down as saying that it will not meet our requirements, just the 80% of the requirements we have at the present time. Reading this memorandum, it seems to me that it is clear that this vehicle has everything that we require plus the potential for future development and I am at a loss to understand how you dismissed it from your thinking.

Sir Peter Spencer: They are in the business of wanting to sell us equipment.

Q135 Mr Hancock: Of course they are.

Sir Peter Spencer: They will be judged alongside everybody else. All I can tell you is in terms of their current products they do not have the available potential. They will have the opportunity to compete in the trials of truth and demonstrate that they can produce something which has potential.

Q136 Mr Hancock: No. You told us you had dismissed these vehicles and that is why you were going for this refined vehicle that we were going to design and build ourselves. We were going for a completely new vehicle. You told us you had already done this evaluation and this vehicle was ruled out. It would be interesting from this Committee's point of view if you would supply us with the evaluation that you did of this vehicle which allowed you to discard it.

Sir Peter Spencer: We can do that. That would be very sensible because it would clarify your own understanding.

Q137 Chairman: That would be extremely helpful.[5]

Dr Watson: May I interject on Piranha. It is the case that in early January we went to the executive committee of the Army Board with the outcome of the Fleet Review. That Fleet Review covered a large number of different ways of trying to meet the FRES requirement. Included in those different ways were a selection of vehicles starting from military off-the-shelf, that is to say vehicles which are in operation today, vehicles which were in current development, that is to say they are not in operation but we are part of a committed programme, and new design and build vehicles. The conclusion of that review was the area we should be operating in is current development vehicles. These are vehicles which are in various stages of maturity which have the opportunity for enhancement to meet the specific needs of FRES but which require additional investment and, critically, proof of their current capability. Piranha 4 falls into that category. We expect to see General Dynamics as one of the bidders offering us a Piranha variant into these trials that we intend to conduct next year. That will provide us with material proof as to whether or not the vehicle is as capable as suggested and, incidentally, the design background to tell us whether we can stretch that vehicle and in what ways, and a proposition for that stretching. We intend to go down exactly this path but we do not know the outcome until we have measured the results. When we have measured the results we will then know what the level of investment needs to be and the timescale. We may then be able to reach an ISD.

Q138 Mr Hancock: Many of the countries who have bought these vehicles are in NATO, allies of the United Kingdom. The latest Piranha that is actually in-service could deliver most of the capability that we have been told the Army require.

Dr Watson: That is not so. The latest variant in-service is the Piranha 3 and it does not meet the protection, mobility or capacity needs that we require.

Q139 Mr Hancock: So their statement that the survivability rate is very high and it has growth potential is not correct?

[5] See Ev 27

Dr Watson: You can see this clearly in operations in Iraq where Stryker, which is a variant of Piranha and derived via a complex development route, is heavily enhanced in a very ad hoc kind of way in order to meet the current threat.

Q140 Mr Jenkin: Could I ask General Figgures what impact recent operational experience, particularly in Afghanistan and Iraq, has had on your perception of the requirement for FRES?
Lieutenant General Figgures: I think the principal impact has been in the area of survivability. I think it was suggested that we would have known about the threat of hollow charges and so on, and indeed we had done a considerable amount of work prior to this with respect to the threats in a war fighting scenario and, indeed, the hollow charge and the medium-range anti-tank guided weapon are the greatest threat. In a war fighting scenario one does have the option of great freedom of action and the ability to deliver lethal force, ie prophylactic fire from the cannon, so you gain a measure of survivability from being able to strike first so you can deal with likely missile posts or you can deal with likely fire positions from which you might be engaged by RPGs in a way that you cannot in peace enforcement or peace support operations. Furthermore, there is the complexity of improvised explosive devices. It is not to say that we have not had experience of those in Northern Ireland, however both the means by which these are initiated and also the nature of them have been very much more demanding than perhaps we had experienced in Northern Ireland, so we have had to take that into account.

Q141 Mr Jenkin: How does that actually impact on the FRES programme or the FRES requirement?
Lieutenant General Figgures: It means that we need to pay attention to hollow charge, explosively formed projectiles, etc.

Q142 Mr Jenkin: Is it this kind of alteration to the requirement that affects, for example, the in-service date and sets the whole programme back?
Lieutenant General Figgures: It is inevitably going to have an impact on when we can match that problem with a particular solution and bring it into service. We are back into Sir Peter's area of how quickly can industry provide that.

Q143 Mr Jenkin: Does that not mean that every time we go on another operation and face a different set of threats we are going to be disrupting this programme again? That seems to be what has been happening.
Lieutenant General Figgures: If one would look at Warrior—Warrior is a very good example—we have developed the protection survivability of Warrior and have plans to continue to do so. Warrior has growth potential. Why does it have growth potential? It has growth potential because we can load the chassis more heavily than we did, and similarly the CVR(T). We need something that gives us freedom of action to develop it. If we have freedom of action both in terms of weight and these days in terms of electronic architecture it is easier to integrate counter-measures and all the rest into it and we do not have the problem of rewiring the thing and so on. It is foresight. Foresight costs money, it is technologically difficult, hence our previous discussion, but, my goodness, if you have a problem that you did not anticipate you can deal with it in a relatively short space of time.

Q144 Mr Jenkin: Now that we have acquired Vector and Mastiff in quite considerable numbers, does that not actually provide some of the capability that FRES is intended to provide and undermine the need for FRES altogether?
Lieutenant General Figgures: No. I go back to my point of we intend to use FRES throughout the spectrum of conflict, from war fighting down to peace support operations. Vector and Mastiff are really tailored for the type of operation. They are not armoured fighting vehicles, they are a means of conveying people from A to B such that we reduce the risk from these various threats that I have explained, so they would not do what we require from FRES. They would not be able to carry out offensive action in the way that we would anticipate.

Q145 Mr Jenkin: Can I ask a more financially oriented question and it may be more appropriate for Sir Peter. How have these urgent operational requirements been paid for in terms of these two vehicle purchases? Presumably that has to come out of somebody's forward budget. We published a report last week which contained the evidence: "Everything has to be paid for, it is all about money", and I am sure you have looked at the report. Where does the money come from for the forward support of these vehicles? Does it come out of the FRES budget?
Sir Peter Spencer: Some has come out of the FRES budget. In terms of UOR action, a great deal of the finance comes additionally from the Treasury in support of the current operation and we make a case out for that.

Q146 Mr Jenkin: I understand that, but of course when the operation is over these vehicles will still be on the inventory and they will have to be paid for.
Sir Peter Spencer: We then have to manage that, correct.

Q147 Mr Jenkin: Presumably you do not have an urgent operational requirement approved until that forward liability has been taken care of which has to come out of an existing allocation, it does not come out of a new allocation. Where does the money come from for those sorts of things?
Sir Peter Spencer: The money comes from the budget in the Defence Logistics Organisation for managing in-service assets.

Q148 Mr Jenkin: So these in-service assets will have to be paid for instead of what other in-service assets, presumably future armoured fighting vehicles of whatever type that might include FRES?

Sir Peter Spencer: No. These are two different budgets. One is the equipment programme budget and one is the resource budget for running the current requirement.

Q149 Mr Jenkin: The reason why these requests arrive so rarely on ministers' desks for approval is because the whole question of financing the forward liability of these vehicles, helicopters or whatever we are trying to put in the front line, gets bogged down in this forward budgeting process. Surely this money which is now going to be spent supporting these vehicles will not be available to support other armoured vehicles, new armoured vehicles under FRES, or will you have you to throw them away, write them off?
Sir Peter Spencer: We will have to manage the consequences in the normal way.

Q150 Mr Jenkin: You are saying you can give me an assurance that this has had absolutely no impact on the financing of FRES whatsoever.
Sir Peter Spencer: These UORs have not impacted on the budget for FRES, full stop.

Q151 Mr Jenkin: They will have had an impact on other budgets somewhere else?
Sir Peter Spencer: Some UORs have limited life and others will come into the inventory and need to be managed and across the whole spectrum of defence within the Defence Logistics Organisation a judgment will be made on something which is of much lower priority which will have to give.

Q152 Mr Jenkin: Exactly, something else has had to give to fund that. Just returning to the whole question of the disruption that these urgent operational requirements have created and the in-service date, I understand that the Stryker programme in the United States took pretty well 24 months from assessment to in-service date. Are you not rather jealous of that kind of achievement? Although Stryker might not be the ideal vehicle, at least it is rough and ready and it is there. Does there not need to be a change of gear when we are effectively at war rather than at peace? Do we not need to move to a much more urgent system for developing capability so that it is there when we need it rather than just a theoretical capability at some very distant date?
Sir Peter Spencer: I think the equivalent will be what we did to Bulldog and the speed with which Vector and Mastiff were provided. As we said earlier, when we looked at something like Stryker it was not the solution that the Army wanted to meet the long-term need and the Americans themselves will not be able to support Stryker for very much longer because of the limit of its development potential.

Q153 Chairman: Arising out of questions that Bernard Jenkin was asking about urgent operational requirements, you say that future servicing costs will have to be managed. Is this one of the main reasons that money has to be found from within the Ministry of Defence budget thus shoving a whole large number of procurement projects to the right?
Sir Peter Spencer: As I said earlier, we do deal separately with the equipment programme and with the resource programme, the short-term programme and capital investment programme. There has been no impact on FRES as a result of this UOR activity.

Q154 Chairman: But the money has to be found from somewhere?
Sir Peter Spencer: Of course.

Q155 Chairman: So when there is an urgent operational requirement there is not a commitment from the Treasury to fund that new equipment through its life, it is just the initial phases that get committed to by the Treasury, is that right?
Sir Peter Spencer: Yes, and then the Department makes a decision as to whether or not it is going to take something into its inventory and because it is a high priority it will then reassess its priorities to spend elsewhere, in which case it will continue to look after it. There are certain cases where something is much less expensive and has a limited life and is no longer used.

Q156 Chairman: Then we will no doubt criticise you for allowing procurement projects or other logistic projects to take longer than they previously would have done because of this urgent operational requirement.
Sir Peter Spencer: Each year as the operational circumstances unfold the Ministry of Defence has to reassess its priorities to spend.

Q157 Chairman: I have one other issue arising out of something John Smith said. If, because the in-service date may turn out to be 2017, unless you can bring it back a little earlier, you will need you said, General Figgures, to upgrade the existing vehicles, the older the vehicles the more that will cost presumably.
Lieutenant General Figgures: Subject to the nature of the upgrade.

Q158 Chairman: Has the cost of upgrading the existing vehicles been taken into account in assessing the FRES programme?
Lieutenant General Figgures: Chairman, in respect of aggregating it to the total sum of the programme?

Q159 Chairman: In respect of getting better value out of getting equipment in early you save money on upgrading the existing vehicles, an increasing amount of money because these vehicles are so old. Has that been taken into account in the budgeting for FRES?
Lieutenant General Figgures: This is partly on my side of the house and partly on Sir Peter's. In terms of our planning we make judgments about that and then, having taken a view, we put it to the DPA and, again, it is the art of the possible.
Sir Peter Spencer: The point you raise is central to the new arrangements on accounting and the enabling acquisition change recommendations

make the point that in future we should plan on through-life capabilities, so these questions are addressed more methodically than they have been in the past. At the moment the General's organisation is drawing up through-life capability plans for armoured fighting vehicles as a class group. When the DPA and the DLO merge to form Defence Equipment and Support, each of the project groupings will then be through-life. We will be announcing quite soon the name of a newly created two star post to be the group leader for all armoured fighting vehicles. He will begin in January on the FRES programme as part of the increase to put the right degree of focus and drive into beating the dates the industry have indicated to us might be almost achievable. There will be a challenge set over the next 12 months to see by how much we can bring forward a sensible date to roll out the initial capability. That will be done very much on the basis of whole life because it will be that individual inside the new organisation dealing with his equivalent in the General's organisation who will be looking at the totality of the budget and ensuring that when timings are being looked at we will look at the downside of what happens to the in-service capability if we delay getting to a new capability. It is because of those considerations that we are determined to drive this programme as hard as we can now that we have got a better understanding of some of the technological issues than we had previously.

Q160 Mr Jenkin: Can I ask you a very general question about what is known as the "procurement bow wave". Does that affect the speed at which these programmes go? If there is a pile-up of carriers, Joint Strike Fighter, Typhoon and so on, is there room in the budget to do FRES in a shorter timeframe if we wanted to or is it just that we do not have enough funds and that is one of the reasons why the in-service date is slipping? May I just say I think you have been very honest with us about the in-service date and if you do not know what the in-service dates are you are quite right not to give us in-service dates.
Sir Peter Spencer: The bow wave has been a major problem in the past. Four years ago when we looked at why the McKinsey reforms had not been implemented consistently, one of the major shortcomings was over-programming which led to a tendency to try and under-call the costs of programmes which then ended in disaster once we had made the main capital investment decision. In the last planning round a great deal of that over-programming was taken out. We are just in the middle of the latest planning round and it will be very important that we get realistic costings on the table so that we do not go back into previous habits of deceiving ourselves about how much a programme will actually cost. This is something which will need to be acted on because the Department will have to determine how it is going to sequence its major investment decisions.

Q161 Chairman: In which year do you see the greatest problems arising in relation to this bow wave?
Sir Peter Spencer: I did not say that there was a bow wave at the moment because we are still putting the programme together. What I am saying is we need to make sure that we do not allow there to be a bow wave and we construct the programme in a different way.

Q162 Chairman: Can you not see in the early part of the next decade a large number of programmes suddenly coming on stream at the same time and suddenly requiring a lot of money?
Lieutenant General Figgures: Chairman, it is my business to manage that to ensure that I match the ability to supply with the ability to pay. To go back to Mr Jenkin's question, have we made an appropriate allocation in the plan, my proposal in this planning round is that we will have enough money to achieve what Sir Peter is capable of achieving, if that is not too Delphic.

Q163 Mr Holloway: What are the Americans doing in this area? How tied in are we with them?
Lieutenant General Figgures: In terms of understanding their future combat system we have very close links with them. In terms of understanding their requirement and understanding the means by which they have generated that requirement and the means by which they have traded and so on, as you might expect from allies we have had good visibility. In terms of the procurement side I will defer to Sir Peter on that. We have had good linkages in terms of co-operation with the United States.

Q164 Mr Holloway: Are we determined to create our own vehicle?
Lieutenant General Figgures: I think this goes back to the discussion we had previously.
Sir Peter Spencer: We are buying a capability which consists of three families of vehicles and 16 variants and, as you will know professionally, the Americans fight in a very different way, their doctrine is different, so we are responding to a requirement which is set by the British Army and there will be a lot of the technology which is potentially relevant, certainly it is vital that we remain interoperable, but there are no plans at the moment to do a co-operative programme based on FCS with the Americans.

Q165 Mr Holloway: Why not?
Sir Peter Spencer: Because we do not believe that it solves the requirement of the British Army.

Q166 Mr Holloway: The Bradley is not desperately different from the Warrior and the Challenger is not desperately different, essentially they do the same job. Why do we always have to create our own things from scratch?
Sir Peter Spencer: We do not always have to create our own things from scratch.

Q167 Mr Holloway: We are in this case.
Sir Peter Spencer: No, because we are looking at vehicles which are already in development elsewhere, so we are not creating something from scratch at all.

Q168 Mr Holloway: That does not answer my question though. If the Americans are developing something that in the end will be broadly similar to what we do, why have we got all this expense?
Sir Peter Spencer: It will not be broadly similar because the requirement is very much more ambitious for the American requirement and it is not something which the British Army has said that it wants to do. I respond to the requirement as it is set out for us. We will look at those areas which we have in common with the Americans, and it is quite possible that American technology will feed in and will be appropriate, but it is quite possible that technologies from other countries will feed in as well because armoured fighting vehicles are designed and made elsewhere in the world. Furthermore, we are not just looking at the vehicle as a vehicle, we are looking at its total capability, particularly communication, data, sensors, defence systems, and the ability to integrate. All of that NEC type integration into the order of battle for the rest of the assets in defence has to be optimised to be integrated with the UK but remain interoperable for coalition operations.

Q169 John Smith: Do you anticipate, therefore, any intellectual property rights issues? Will we want UK sovereignty in terms of the intellectual property rights for this product? Will there be any technology transfer issues? We have already heard that major American companies like General Dynamics could be a principal bidder. How are we going to avoid any JSF type issues?
Sir Peter Spencer: That is a very good point to raise. As you will have seen in the addendum to the memorandum which we sent in which describes the Defence Industrial Strategy, IPR is central to this and operational sovereignty is central to this, so there will be preconditions as to access and use of technology and IPR and if those conditions are not met then somebody who wanted to bid would be ineligible. The intention is to ensure that we secure the necessary IPR to deliver operational sovereignty through-life.

Q170 John Smith: You mentioned through-life management and support which fits in with the Defence Industrial Strategy. During this assessment phase, have you reached any conclusion on how that will be delivered by the winning company, a joint effort with the MoD?
Sir Peter Spencer: We certainly expect from the outset to define what our requirements are going to be over and above just delivering the vehicles and the other capability to the Armed Forces. Looking at the models which have developed in the Defence Logistics Organisation we would anticipate to be contracting for availability and capability over life and to make the economies that have already been scored in existing programmes. It is also going to be important that we design into the vehicles from the outset those things which will give us economies and logistic support to make sure that we do get high reliability, to make sure we do get the right sort of instrumentation, do the right sort of instrumented upkeep and maintenance and to go for open systems architecture for the electronics so that we can be vendor independent and have "plug-and-play" in play as we go through life to respond to changing circumstances.

Q171 John Smith: You mentioned in response to an earlier question about not being held captive to a single line supplier. Is that also being addressed in terms of through-life logistical support and maintenance support?
Sir Peter Spencer: That is certainly a major component. It is particularly important in terms of upgrades. We will want to partner through-life with an industrial entity which will provide us with support. There will always be in any partnership exit criteria if it does not turn out well.

Q172 John Smith: Export potential: is this something that is also being considered in the assessment phase which you are now going through?
Sir Peter Spencer: Yes, it is. As the Acquisition Strategy makes clear, the first priority is to meet the needs of the Army and the second is to maximise export potential. The export potential of this type of capability is judged by the head of defence export sales and by various companies as being very promising.

Q173 Chairman: Talking of the Acquisition Strategy, could you possibly make available to us the letter from the Minister for Defence Procurement to industry which outlines the strategy?
Sir Peter Spencer: I will obviously have to ask him to agree that, yes.
Chairman: If you could I would be grateful.[6]
John Smith: On reflection, do you think FRES was the correct acronym—Future Rapid Effect System—in light of the evidence we have heard today about timetabling, in light of the vehicle changing from a 17 tonne highly mobile vehicle to a 30 tonne vehicle? I wonder whether there is a case for renaming this project.

Q174 Chairman: Do you wish to answer?
Sir Peter Spencer: I think the central part of the doctrine remains unchanged, which is that if you are dealing with heavy armour it does take much longer to deploy into theatre of operations. The "Rapid" here applies to deployment, not to the acquisition phase, which I think is the point you are making; a nice touch of irony. The fact of the matter is we would be able to deploy into theatre quite rapidly some very capable vehicles. In the business of preventing something from getting worse in terms of "fire fighting" the opportunity to do that still has a very high value in military thinking, but clearly that

[6] See Ev 27

would be the first phase potentially of something we would need to follow up. Even if you are deploying by sea, the logistic deployment of FRES vehicles will be very much less and easier to manage than the logistic footprint of Challenger 2, for example.

Q175 Mr Hancock: You were reluctant to give us the in-service date and I think at least half of the Committee is probably supportive of your reasons why, but can you give us the actual date when there was an agreement between you and your customer of what it was they actually wanted? That is the first question. I want to know the date when you agreed—
Sir Peter Spencer: Can I clarify that I understand the question. What they wanted in terms of capability or what they wanted in—

Q176 Mr Hancock: When there was agreement between both of you that you both understood exactly what you wanted and that you could deliver. It would be helpful if we could know that agreed date of when that process then started the clock ticking. My second question, if Dr Watson is trying to find that date for us, is there a general reluctance on the part of the Ministry of Defence and your agency to buy off-the-shelf solutions to significant problems as opposed to smaller issues which are readily acceptably coming off-the-shelf? Is there a pre-emption on your part that it is always better to develop rather than buy in?
Sir Peter Spencer: No, quite the reverse.

Q177 Mr Hancock: Is there evidence to support that approach?
Sir Peter Spencer: C-17 aircraft.

Q178 Mr Hancock: Nobody in the UK—
Sir Peter Spencer: Tomahawk missiles, Chinook aircraft. We do buy substantial platforms from other nations and avoid incurring the non-recurring expenditure where we can. I respond to the requirement. If the requirement is stated in a way that an existing capability does not meet it we then have to make a judgment as to whether or not we do a development programme nationally or enter into some co-operative arrangement with like-minded nations. There is no predisposition against it. In fact, from a narrow perspective of how we deliver procurement results we are much more likely to deliver on time and on cost with an off-the-shelf solution than we are with something which has a substantial amount of development in it.

Q179 Mr Hancock: Is part of the problem the length of time it takes for your customer to decide exactly what it is they want? Your predecessor told us that time and time again things were delayed because one or other of the Armed Forces continuously changed the parameters of the equipment they were seeking him to deliver for them. Is that part of the problem, that they are not clear enough?
Sir Peter Spencer: I have not detected that here. I think there has been a journey which we have gone on together over the last two and a half years where we discovered that the degree of protection needed was very much greater than originally anticipated and that challenged the fundamental concept of rapid deployment. In the case of the C-130, as was pointed out earlier, it meant that frankly it was something which was not achievable. Nonetheless, we have continued to test the extent to which this type of capability remains relevant, and all of the operational analysis demonstrates that it does, but it has taken us that time to define those parameters in greater clarity formed by ongoing operations in the Middle East.

Q180 Chairman: I will change the subject now on to the systems company. Dr Watson, do you have the answer?
Dr Watson: I have a number of stages in the answer. There was an agreed requirement at the point of the initial gate business case which was in 2003. We agreed a revised baseline in 2005 in the middle of the initial assessment phase, that is normal business. As we get to each collection of evidence then there will be a normal transaction between ourselves and General Figgures' people to revise that as the evidence becomes available to us. We will not firm this until we make the main investment decision. Part of the assessment aim is to make sure that we have a balance between how we are going to provide a solution and the requirement itself. We do have a baseline we are working against at any time and that baseline is revised as evidence becomes available. It is a practical test rather than a philosophical one.

Q181 Chairman: When do you expect to make the main investment decision, Dr Watson?
Dr Watson: When we have done enough assessment to be sure that we can make the main investment decision.
Mr Hancock: We will chase that one again, shall we? We will get some hounds in for that one.

Q182 Chairman: The "Systems House"—I will not go back into the main investment decision, we have been through that with Carriers—what was the purpose of appointing a "Systems House" and what does a "Systems House" actually do?
Dr Watson: The main purpose of that appointment was to provide us with a significant volume of expert help in order to undertake the detailed engineering and technical assessment that was necessary to define the solutions base for the FRES requirement. Their principal work has been in helping us with detailed system engineering and, indeed, with risk assessment of meeting the FRES requirement and, indeed, in managing the technical demonstrator programmes, of which there are many involved in this phase of FRES.

Q183 Chairman: Why Atkins as the "Systems House"?
Dr Watson: It was a competitive process. We undertook an evaluation of a significant number of bids. I think there were six at one stage and then three in the final stage. They were required to be

independent of the armoured vehicles supply chain so that we did get advice that was uncoloured by an interest in delivery.

Q184 Chairman: Uncoloured by experience as well?
Dr Watson: Not uncoloured by experience. Much of the engineering that we are looking for is generic and it is further advised by the application of subject matter experts that we draw from a variety of sources.

Q185 Chairman: What value has Atkins added to the programme, would you say?
Dr Watson: I think they have added a significant technical expertise. They have added some pretty hard questioning of timescales and technical judgments. They have also provided us with a more flexible resource pool than we would have been able to provide from Ministry sources. They have been valuable in giving us momentum and quality in study. Where they have been asked to help us in areas such as defining the acquisition process, frankly they have not been as strong.

Q186 Chairman: Would you go so far as to say that their lack of connection with the armoured fighting vehicles industry in some respects has been a positive benefit?
Dr Watson: That was one of the goals that we were looking to achieve. It has been healthy. Clearly there are opportunities for misunderstanding but those have been relatively small. Overall we are very pleased with the quality of subject matter expert they have brought to the piece.

Q187 Chairman: I think you said their role in procurement has not been as strong.
Dr Watson: No. This is a scale of programme which is influenced enormously by both an industrial political environment and, indeed, by experience which they have not got. We found them helpful but not incisive in helping us to define the most appropriate way to buy the FRES capability.

Q188 Chairman: After the initial assessment phase, what role will they have?
Dr Watson: We would see a continuing role for the "Systems House". What we need to do is to judge just how that fits with the other members of the Alliance and to a degree we need the Alliance construct in place before we can do that. Certainly they will help us in the evaluation of bids and they will also be conducting further assessment work on the later variants of FRES.

Q189 Chairman: The cost of FRES, would you expect that to be around £14 billion?
Sir Peter Spencer: That is the current rough estimate based on the sorts of numbers of vehicles that are currently estimated by the Army to be what they need.

Q190 Chairman: Giving us that current rough estimate, does that not give us a football to play with in this place that if the cost goes up we then kick you around?
Sir Peter Spencer: No, because we have not set the main gate decisions yet and you have asked for an indication of the sort of scale of the programme.

Q191 Chairman: Why is there a difference in principle between giving us the rough cost and giving us the rough in-service date?
Sir Peter Spencer: Because that rough cost is of no particular merit as the requirement will undoubtedly change over time, whereas—
Chairman: But that is what you could say about the in-service date, is it not?

Q192 Mr Hancock: That is what he did say.
Dr Watson: Sorry, I would not see that £14 billion as being significantly different from early in the next decade, which is the sort of verbiage we are prepared to talk about on ISD.

Q193 Chairman: So early in the next decade pinpoints the genuine discrepancy between you and industry because if Atkins is saying 2017 and you saying early in the next decade there is obviously a difference.
Dr Watson: No, there is a wide range of potential dates at which we might deliver a capability. The key issue is which capability we stretch for and how we might therefore seek to develop it. To take Mr Hancock's point, we might take a vehicle off-the-shelf, for example, and put it forward in its native mode, as it were. That would be a capability which I do not think would be acceptable to the customer but it might offer us the fastest possible route. We might, however, decide that the best thing to do in terms of the development programme is to reach for a much higher capability and we would then have a much longer timescale. We need to understand the truth of the technical solutions that are being postulated by industry, that is partly by measurement, partly by examination of their documentation, as I have said, and we then need to decide what it is that is most appropriate to meet the initial capability. That will give us a programme and that will give us a cost and we can then go to the main gate decision and we can then confirm figures.

Q194 Chairman: In comparison with that uncertainty you do have the idea that you have got 14 billion to spend on this.
Sir Peter Spencer: No, we have not. That is not a budget, that is a broad-brush order of magnitude which sets the parameters against which we think is the scale of the programme. That assumes that all three phases go through over quite a prolonged period of time and it assumes a whole lot of things which if we look back in the past could well change. In terms of what the Ministry of Defence is held accountable to in terms of the measurement of performance, that is the specific parameters we set for specific projects at the main gate. As we said earlier, this will be a phased programme so that very

rough figure is based on assumptions about the scale of the three different families of vehicles. It also makes assumptions about the scale of technology upgrade over life that you might imagine and then we fill into that the whole-life costs of ownership in addition. Those are the sort of broad parameters that we need to take into account just in terms of how we scale the long-term programme over three decades. It helps to inform us to the amount of effort and care we need to put into the assessment phase.

Q195 Chairman: I understand that. You seem though to be prepared within that field of broad assumptions to say, "On those broad assumptions roughly the sort of cost we are looking at is about £14 billion", but you do not seem prepared to say that the soldiers need these vehicles within this broad assumptions timetable.
Sir Peter Spencer: I am very clear that soldiers need these vehicles as soon as we can produce them but we have to produce something that is going to be acceptable to the Army and we will be in a much better position to know that at the end of 2007 when we have done the work which we have set out.

Q196 Chairman: So if we asked you these questions at the end of 2007 do you think we would get a more precise answer?
Sir Peter Spencer: You will get a more precise answer when the main gate submission takes place.
Mr Hancock: Is it possible to ask whether there is a codebook available that we can have that allows us to work out what these answers really do mean.
Chairman: You do not need to answer that question.

Q197 Mr Hancock: I am afraid that some of them really are contradictory and difficult to fathom. It must be some sort of code that you are speaking in.
Sir Peter Spencer: I do not see that they are contradictory at all. When the main gate capital investment decision is made we will set out the parameters by which we will be judged.

Q198 Mr Jones: This is perhaps not worth it, I will not get an answer, but can you not see the concern that the Committee has got. You cannot tell us an in-service date, you cannot tell us what these vehicles actually will be and now you are telling me, which must strike absolute horror in the Treasury, that this figure of £14 billion is not an actual £14 billion but a possible £14 billion. It could be double that, could it not?
Sir Peter Spencer: No, I think it is highly unlikely it would be double that.

Q199 Mr Jones: How can you say that if you do not know what you are going to produce?
Sir Peter Spencer: Because if it were double you would be making an assumption about an extremely large increase in the size of the Army and at the moment we can only go on the basis of the defence planning assumptions we are given.

Q200 Mr Hancock: You might as well pick any figure out of thin air.
Sir Peter Spencer: No. Planning long-range is an iterative process. You have rather demonstrated the conundrum any department finds itself in: you press and press for an answer and when you get an answer you then start beating people around the head with it. Why would we want to commit to anything until we understand the problem? We do not yet understand the problem. The problem in terms of procurement will be a series of capital investment decisions which are taken in a better understanding of what it is we are going to do and of the timescales properly risk-adjusted so we can set the parameters we are going to meet.

Q201 Chairman: I think the worry we have is that there are so many variables flying around in this programme that the people who are suffering in the long run are the Armed Forces while these decisions and trade-offs are being made. I think that will continue to be a real concern until some of these variables can be nailed down. It would be helpful if you could help us in that process to nail down the variables.
Sir Peter Spencer: I can assure you that we are about to select the process next year. We have been in the assessment phase for two and a half years. The intention is to drive it very hard and not to accept at face value the date that you have been quoted by the "Systems House". A very challenging target will be set but we will not go public and commit to it until we better understand the reality of the situation and whether or not there are products out there that can genuinely be further developed to meet it. We will be in possession of that information in a year's time and then the lead-in to the main gate will give the opportunity for that to be announced.

Q202 Mr Jenkin: Having listened very carefully, the conclusion I have come to in my own mind is that there is a trade-off between having a very broad and perhaps rather idealised concept for some future programme, which like the hunting of the Snark, you can never really define because it does not exist and everybody is attaching their own ideas and aspirations to it, alongside what actually happens on the frontline which is you suddenly have to produce a vehicle now to deal with the protection of the Armed Forces. Does it not beg the question, given this started out as TRACER and has been going for a number of years, we are looking at an assessment and acquisition phase that stretches over nearly two decades and this has only got to be something that you can bolt other things on to? It seems that the process that we have got bogged down in is so complicated and so divorced from the relatively simple things that these vehicles are going to need to do, this may be the wrong way of going about it. It does lead to an enormous amount of frustration from frontline officers and soldiers who complain that the Defence Procurement Agency and the way we go about procuring things is just so divorced from reality it is never going to deliver what the soldiers actually want.

Sir Peter Spencer: It is fine to keep on using the Defence Procurement Agency as the whipping boy and, as I said to General Jackson, "If you know the shop that sells what you want, I will go and buy it tomorrow as long as you write the requirement like that". That did not happen. What we have seen over the last three years is an outbreak of reality. We are now getting more real about the art of the possible. We are narrowing that down rapidly and we will continue that acceleration through 2007. We have set out what the Acquisition Strategy is, why do you not judge us by our ability to deliver during the next 12–18 months.

Chairman: Gentlemen, thank you. We have kept you long enough. We have given you a fairly hard time, we are grateful for your answers. Thank you.

Written evidence

Memorandum from the Ministry of Defence

Introduction

1. The MoD has outlined a two track approach to meeting its armoured fighting vehicle requirement. In the short term it has an urgent need to respond to the pressing need on current operations and is upgrading the current fleet of its medium weight armoured vehicles. In the longer term it needs to equip UK Armed Forces with new medium weight armoured vehicles that will be effective across the full spectrum of operations including rapid intervention, enduring Peacekeeping and Peace Enforcement and supporting high intensity, major combat operations. The FRES programme is the response to this longer term requirement.

2. FRES will deliver a fleet of wheeled and tracked armoured vehicles capable of meeting these needs, of operating across the spectrum of operations and protected against the most likely threats. They will be designed to operate more freely than heavy armour forces in theatres with poor infrastructure and to be able to exploit the opportunities offered by the UK's developing Network Enabled Capability.[1] FRES will deliver increased capability with higher levels of strategic deployability, survivability and lethality than our existing lighter armoured vehicles, with the potential to further enhance its capability as new technology becomes available. The combined effect of maximising commonality at sub-system level and increased reliability through a programme of reliability growth trials will contribute both to a coherent operational capability, and to minimising logistic and training requirements.

Requirement

3. The Army currently consists of heavy[2] and light forces. Heavy forces are optimised for major combat operations against a technologically mature opponent, although they have utility across the spectrum of operations. They are a potent force, but are relatively slow to deploy and their sustainment imposes a heavy logistic burden. Light forces, typically equipped only with soft skin vehicles, offer rapid deployment and flexibility, and are particularly well suited to operating in complex environments (such as built up areas, jungles and mountains), but they have limited protection and endurance. Within the heavy force there are a number of lighter armoured vehicles[3] which have historically provided an acceptable level of capability, either by avoiding direct confrontation with the enemy, acting in conjunction with heavy forces and suppressive indirect fire, or by limiting their deployments to the relatively benign environments of Peace Support Operations.[4]

4. The Balanced Force concept seeks to create medium forces—offering better protection and firepower than light forces but without the deployment, logistic and mobility penalties associated with heavy forces—in order to support expeditionary operations in a wide range of theatres. FRES will provide over 75% of the armoured vehicles to this medium force and provide the basis of a Small Scale airportable Focused Intervention capability. It will also constitute some 55% of the heavy force, replacing Saxon, Combat Vehicles Reconnaissance (Tracked) and elements of the FV430 series.

5. In the future, some medium weight vehicles will have the firepower to defeat enemy armour. Other FRES vehicles will rely on emerging technologies such as Defensive Aid Suites and reduced probability of detection via signature management in order to survive in the direct fire zone.[5] Current experience has shown that the proliferation of more capable weapons, optimised for short range attacks and for use in complex environments, will make it unlikely that medium weight vehicles will be able to avoid encounters with the enemy. They will therefore need appropriate levels of protection, although the concept of "medium weight" will continue to preclude the highest levels of protection.

6. This is a complex and challenging set of requirements and a careful balance is required to achieve the quickest possible timescale for an acceptable capability. Rapid deployment is required and a portion of the vehicles need to be air-deployable by A400M and C17 aircraft, which places limits on vehicle weight and levels of armour protection.

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[1] Including enhanced Situational Awareness and the ability to exploit enabling capabilities outside the FRES force.

[2] Including current armoured and mechanised brigades which, although differing in detail, are both characterised by Challenger 2 and Warrior AFVs.

[3] Saxon GWR, CVR(T) and FV 430.

[4] The assumption that all Peace Support Operations take place in benign environments is no longer valid.

[5] Reconnaissance vehicles trade protection for small size, reduced vehicle signature and the ability to access the most marginal of terrains, all of which enhance their survivability and effectiveness.

Numbers, Roles and Families

7. The programme is planning on delivering over 3,000 vehicles in up to 16 battlefield roles. The total capability is expected to comprise three families of vehicles; Utility, Reconnaissance and Heavy. An incremental approach to capability delivery is envisaged and the current planning assumption is that the Initial Operating Capability (IOC) will equip a Mechanised Infantry Battalion with the first elements of the Utility fleet. There will be a phased approach to delivering the full capability thereafter.

8. On present plans, the IOC is expected to comprise the first deliveries of the Protected Mobility, Command and Control, Light Armoured Support, Medical, Repair and Recovery and Driver Training variants. Other elements of the Utility fleet, to be delivered in later planned increments include specialist communications, electronic warfare and sensors vehicles.

9. The requirement describes a range of Reconnaissance roles including Scout (for Formation and Close Reconnaissance, Ground Based Surveillance, Indirect Fire Control and Formation Reconnaissance capability, as well as Medical and Equipment Support vehicles.

10. The Heavy family covers Fires and Manoeuvre Support roles. Included in the Fires will be the Direct Fire and Indirect Fire Support roles; Manoeuvre Support covers the earth moving, obstacle breaching and bridge laying roles. As with the Utility and Reconnaissance families, the heavy family vehicles will have its own repair and recovery capability and a driver training vehicle.

The Initial Assessment Phase

11. The initial Assessment Phase (iAP) was approved in April 2004. The iAP focuses primarily on the Utility roles whilst ensuring that any decisions regarding the Utility Vehicle Fleet are taken within the broader context of the full capability and take full account of commonality and coherence across the fleet.

12. The objectives for this phase are to define the requirement and identify options for meeting it, to understand and where necessary mitigate technical risk and to recommend an optimum acquisition strategy. The work is being done under the strategic direction of the Integrated Project Team who are leading a team that includes Atkins Defence, an independent Systems House (SH), who provide much of the technical effort and Defence Science and Technology Laboratories, who are leading the programme of supporting analysis.

13. Progress has been maintained against all three of the objectives of this phase.

- To date all decision milestones on the development of requirements and assessment of options to meet it have been met.
- An acquisition strategy is being developed to incorporate the Defence Industrial Strategy (DIS) and take account of the views of industry.
- Technical risk reduction work (the Technology Demonstrator Programmes) has been launched and is making good progress.

14. The iAP was originally scheduled to complete in November 2006. This has since been extended and it will now run until July 2007 to take full account of the outputs from the Technology Demonstration Programme (TDP) contracts which were awarded later than originally planned, due to a variety of cost, technical and intellectual property issues, now satisfactorily resolved; and also to conduct some further risk reduction work into issues that have emerged in the earlier stages of the iAP.

15. These TDPs address the risks associated with the key characteristics of armoured vehicle design including Physical and Electronic architectures and Survivability. Also included in this first tranche of nine TDPs is the development of a new gap crossing capability. This technical risk reduction work will serve as a means of assessing and, where necessary, accelerating the maturity of candidate technologies in order to determine if they are applicable to FRES. The TDPs are proceeding well and are due to deliver their outputs on time against the contract schedules. A list of the individual TDPs being conducted during the initial Assessment Phase is at Annex A.

Assessment Phase

16. The approval cost of the initial Assessment Phase is £113 million. The current estimate to complete the Assessment Phase for the Utility roles is £120 million, following the decision to extend this phase. The preliminary scoping and planning work for the Assessment Phases for the Reconnaissance and Heavy roles

has begun but substantial work is subject to further Departmental approval. The assessment phase spend for the Reconnaissance and Heavy roles has yet to be decided but is expected to be several hundreds of million pounds.

In Service Date

17. As the Committee has recognised the ISD will not be set until the Main Gate business case is approved. Assessment Phase work does include exploring innovative ways of accelerating the programme to achieve the earliest practicable date for entry into service without compromising acceptable programme risk or long term change capability.

25 September 2006

Annex A

FRES INITIAL ASSESSMENT PHASE TECHNOLOGY DEMONSTRATOR PROGRAMMES (TDPS)

Aim

1. Analysis of the technologies, capabilities and issues associated with Key User Requirements identified critical technologies and risks that must be mitigated in order to deliver the overall FRES capability. The main aims of the FRES TDP programme are to:

- Inform the development and analysis of the FRES programme options and to inform future design and investment decisions. This will include, but not be limited to, benchmarking for potential vehicle/system designs and informing the capability/engineering trade-offs.
- Identify and mitigate timescale, cost and performance risks. The data captured will build our understanding of the key performance and systems integration risks associated with the candidate technologies, and enable appropriate mitigation plans to be developed.
- Provide tangible evidence that a technology or system performs to the criteria specified (including aspects of safety, reliability, maintainability, durability etc).
- Provide early resolution of risks to key Enablers and Technologies that are time drivers for IOC and/or key to subsequent incremental growth.
- Develop technology strategies that maximise coherence across the full FRES Fleet.

2. The iAP TDPs are:

Serial	*Title*	*Contractor*	*Status*
1	Stowage and Capacity	Dstl	Contract placed February 2005 Completed in May 2006
2	Hard Kill Defensive Aid System	Akers Krutbruk	Contract placed May 2005 Completion due December 2006
3	Chassis Concept TDP (AHED)	General Dynamics	Contract placed August 2005 Completion due February 2007
4	Chassis Concept TDP2 (SEP)	BAES	Contract placed December 2005 Completion due September 2007
5	Electronic Architecture TDP 1	Lockheed Martin	Contract placed August 2005 Completion due March 2007
6	Electronic Architecture TDP 2	Thales	Contract placed August 2005 Completion due March 2007
7	Electric Armour	Lockheed Martin/ Insys	Contract placed December 2005 Completion due June 2007
8	Integrated Survivability	Thales	Contract placed December 2005 Completion due November 2006
9	Gap Crossing	BAES	Contract placed December 2005 Completion due October 2007

Second memorandum from the Ministry of Defence

The Procurement Challenge

The FRES fleet of vehicles will be significantly more complex than previous generations of armoured fighting vehicles as they will need to be fitted with the following types of equipment:

- passive and active armour and other vehicle protection technologies;
- Bowman and other advanced digital communication systems (both data and voice) to allow full integration of the vehicles into the wider military network; and
- various weapons and sensor systems depending upon the vehicle type.

In effect each FRES vehicle will have on-board systems of similar complexity to a small aircraft. The high likelihood of continuous developments in such systems requires that the FRES fleet is designed to be upgraded easily in future. It therefore requires a vendor independent "open" design for its system architecture to allow a "plug-in and go" facility for future capability upgrades.

The weight of the vehicles has a direct bearing on the ease with which they may be transported by air; a key requirement.

The ease with which the FRES vehicles may be maintained and upgraded to meet future threats and tasks over their expected service life will have a major impact on their through-life costs and hence overall affordability and value for money. These features must be designed in at the start.

The harsh operational environment within which the vehicles will operate, given their system complexity, will present a significant engineering challenge.

The age of the current fleet of armoured fighting vehicles requires that the FRES vehicles be delivered as quickly as possible.

Meeting the above requirements presents a very significant challenge to the MoD and defence industry procurement community and has been a key reason for the time it has taken to determine an effective acquisition strategy.

Key Principles for FRES Acquisition

The Acquisition Strategy will be a key factor in successfully delivering FRES and will form the foundation of our future relationship with the Armoured Fighting Vehicle sector of the defence industry over many decades.

The MoD has established certain key principles for the FRES Acquisition Strategy to meet the procurement challenge.

The FRES Acquisition Strategy will be consistent with the framework provided by the Defence Industrial Strategy.

The FRES vehicles will be a key factor in the future effectiveness of the British Army and their flexibility and characteristics will have an impact on future tactics and techniques on operations. It is essential therefore that the intellectual property underpinning the "operating systems knowhow" of the FRES fleet is understood and controlled by the MoD to ensure that the system architecture remains open throughout the FRES fleet life and does not come under the effective control of another party. MoD will acquire the necessary knowhow through the acquisition process.

The FRES vehicles will be procured on a "through-life" basis to deliver optimum capability at best value for money through the full operating life of the vehicles from design through acquisition, multiple upgrade cycles and eventual disposal.

The first of the FRES vehicles to be procured will be the Utility variant. To reduce development cost and risk the utility variant will be based upon a vehicle chassis that is either already in production or is at a sufficiently late stage of development that it can enter vehicle proving trials to be undertaken by the British Army in 2007. The winning vehicle from these trials will be then fitted with the necessary systems and vehicle modifications required to meet the UK need.

Effective evolution of the vehicles through-life to meet the currently unknown levels of future threat will require an "open" architecture to the systems design and absolute clarity on Intellectual Property and technology transfer issues from the outset. Hence agreement to deliver "UK residence" of all intellectual property and design authorities will be a pre-requisite for companies to enter into the FRES procurement process.

Industry and the MoD FRES procurement team will be incentivised to meet the target date for the delivery of the first vehicles (utility variants) to the British Army in the early part of the next decade. By then we plan to have established an acceptable level of performance and number of vehicles to deliver an Initial Operating Capability. We will also have continued the parallel assessment work on the specialist variants with a view to delivering the full capability in planned increments thereafter.

In-service dates and costs for the Initial Operating Capability will be set at the Main Gate main investment decision point.

Early vehicles may be manufactured ex-UK on an existing production line if needed to meet the target delivery date for the first vehicles, but production (and all necessary IP and design authorities) will be transferred to the UK for subsequent vehicle manufacture to deliver UK operational sovereignty through life.

The first priority in choosing the capabilities of the FRES vehicles during the assessment phase will be the key user requirements of the British Army. A second priority will be to maximise opportunities for export sales in the design where this is consistent with these KURs.

FRES Alliance

The complexity and scale of the FRES fleet will require a team of suppliers from several parts of the defence industry (armoured vehicle suppliers, system integrators, digital communications, weapons systems etc) to work together and with the MoD in an efficient manner.

Given the recent positive experience on the Aircraft Carrier project the MoD has therefore decided to establish an alliance arrangement, to be led by the MoD as client, supported by an industrial player acting in the role of System of Systems Integrator (SOSI). The SOSI will be selected by competition. Alliance membership will expand as competitive selections are made. This approach will enable us to construct an industry team capable of meeting the unique challenges inherent in the programme. The programme will rely on having access to an appropriate blend of skills and resources and be based on a commercial relationship that is inherently flexible and capable of responding to the developing requirement.

With a whole life cost estimated in region of £50 billion it is vital to ensure that the alliance chosen to deliver through-life capability is made up of the best possible partners in each of the major areas of this programme. We will therefore use competition to select "the best team" and have concluded that there are four key roles in the delivery of the FRES Utility Vehicle family. We would expect these roles to be reflected in the other complex and heavy vehicle families, although the potential competitive field may be smaller. The four roles are:

System of Systems Integrator

Will aid the MoD led Alliance by undertaking system engineering, capability level integration, programme management and design services. The SOSI will ensure that coherent system solutions, integration approaches, design techniques, support and documentation are in place across all FRES variants. And that the vehicles will be interoperable with all other force elements in the UK ORBAT for both national and coalition operations. The SOSI will be UK based. The SOSI will be responsible for the development of the MoD's knowhow and control of the FRES operating systems architecture.

Vehicle Designer

This will be the designer of the vehicle that wins the proving trial. The vehicle will already be in production or late-stage development and the winning vehicle designer will implement the vehicle modifications required to meet the UK need. A precondition for entering this competition will be that regardless of the country of origin of the design, exploitation rights and Intellectual Property Right will be available to the UK government led alliance and will facilitate transfer to UK manufacture.

Vehicle Integrator

Will integrate the complex systems into the vehicle chassis. This will include integration of communications, command and control functions, plus the vectronics, sensors, weapons and Defensive Aid System . The Vehicle Integrator will be UK based with all the IP either created in the UK or made freely available for exploitation in the UK.

Vehicle manufacturer

Will manufacture the FRES utility vehicle. In principle this will be in the UK, but early production might use an existing production line ex UK before transfer to the UK. High efficiency and production quality will be essential. The vehicle designer may also be the vehicle manufacturer or the manufacturer may licence the rights to manufacture from the vehicle designer.

The above structure is needed to compartmentalise the various elements of the procurement process to deliver clear lines of responsibility and accountability within a teamed alliance approach.

Having agreed the strategy the FRES programme now has a clear path to deliver to the Army its essential future medium weight capability.

7 December 2006

Supplementary memorandum from the Ministry of Defence

Question 1. *What work was carried out by Alvis Vickers (AV) on FRES between 2002–03. The note should provide detail on the nature of the work undertaken by AV; MoD expenditure on this work; how the output from this work fed into the current FRES programme and clarification on when the FRES programme started*

In house concept studies began in April 2001 (a correction to the statement made during the evidence session that the Concept Phase had started in the previous Financial Year). The FRES project team began to form up in July 2002 and a contract was awarded to AV in October 2002 to carry out background planning work in preparation for the submission of the Initial Gate Business Case (IGBC) and subsequent launch of the Assessment. Key outputs of the AV work were the development of initial cost estimates and a programme schedule, which formed the baseline for planning future activities with a particular focus on the Assessment Phase. The AV contract was completed in July 2003 at a cost of £4 million.

The IGBC was approved in April 2004 and this was formally the start point of FRES as a programme (which corrects the statement made during the evidence session that this point was reached in 2003).

Question 2. *Provide detail of the MoD's expenditure on the TRACER and MRAV armoured vehicle programmes and explain why the MoD terminated its involvement in these projects*

TRACER was originally intended to form the land-based reconnaissance component of the Information, Surveillance, Target Acquisition and Reconnaissance (ISTAR) capability required to meet the land commander's critical information requirements. The decision to terminate the TRACER programme was a joint UK/US decision. The US decided to meet their requirement from the Future Combat System programme. The UK decision was taken in the light of the emerging wider requirement for deployable, rapid effect forces and the potential cost of the TRACER solution. UK expenditure on TRACER was £131 million (Official Record 19 September 2002: Column 329W refers). The requirement will now be met by the FRES programme.

The MRAV programme was originally intended to provide the principal platform for the mechanised infantry, and the command, signals and ambulance platform for a large component of the Field Army's armoured and mechanised force. These roles are currently provided for by Saxon, the Combat Vehicle Reconnaissance (Tracked) (CVR(T)) and the 430 series of vehicles. In 2002, the MRAV programme was reviewed in the light of the Army's evolving requirements for mechanised infantry vehicles against the background of the emerging FRES requirement. Ministers agreed that the revised capability would be better met by the FRES programme because it was judged that MRAV would not be ideally suited to the type of operations envisaged under the Strategic Defence Review New Chapter and other developing policy work. This, coupled with operational experience demonstrated the need for rapid deployability in expeditionary operations. MRAV was not considered able to meet this capability requirement. Consequently, Min (AF) announced the UK's withdrawal from the MRAV programme on 17 July 2003 (Official Record 17 July 2003 Column 70 W refers). UK expenditure on MRAV was £57 million as reported in the DPA Report and Accounts for 2003.

One of the major benefits of subsuming the TRACER and MRAV requirements into the wider FRES programme was considered to be the reduction in the deployed logistic footprint and in through life costs of ownership.

Question 3. *The indication given by the MoD to industry of its required FRES In-Service Date*

Question 4. *A note on the Army's planning assumption for FRES entering service*

Industry has been challenged to develop proposals with aggressive timelines that will deliver, as early as possible, an initial operational capability that can be incrementally upgraded over time to meet longer term operational requirements. As stated by CDP in his evidence to the committee on 12 December 2006 and later confirmed by Lord Drayson in his evidence on 19 December, the ISD will not be set until the main investment decision is taken.

Question 5. *A summary of the evaluation made by the MoD of the suitability of the current off-the-shelf armoured vehicles for meeting the FRES requirement*

The analysis of the options for delivering the FRES capability has been one of the key strands of work during the initial Assessment Phase. A range of programme options was developed as the basis for the analysis. Each programme option comprised a technical solution, programme schedule, acquisition and support strategies and an assessment of risk. The programme options fall into three distinct categories. These are:

— Off The Shelf (OTS)—an armoured vehicle currently or recently in production that is considered for FRES without the need for further modification.

— Current Development (CD)—an armoured vehicle design for which Demonstration/Prototype vehicles exist and are currently or recently under development, but requires some evolution to achieve desired level of capability.

— New Start (NS)—development of a completely new vehicle.

***[6]

The Systems Engineering analysis that has lead to these conclusions is supported by independent Operational Analysis conducted by the Defence Science and Technology Laboratories. In operational scenarios, none of the off the shelf vehicles was able to provide the required level of protection against known threats. This shortfall in protection would mean that the vehicles would not be operationally effective. These conclusions have been reinforced by operational experience in Iraq and Afghanistan.

***

New start options are unnecessary to meet the requirement and are unduly costly and time consuming. New start options have therefore been discounted.

In shaping the FRES programme, it is critical that we strike an appropriate balance between early delivery and ensuring we deliver to the Army a capability that will be operationally effective through life. This balance is best achieved through a CD vehicle and this is in line with the general trend in the AFV industry that has seen nations defining requirements for heavier, better protected armoured vehicles. A number of the CD vehicles are being evolved to increase their weight carrying capabilities to meet the needs of their international customers.

The potential of CD vehicles to meet the FRES requirement will be further examined in detail in 2007.

Question 6. *Provide a copy of the letter outlining the MoD's FRES Acquisition Strategy from the Minister for Defence Procurement to the companies involved in the FRES programme*

The letter is being withheld as it is considered release could be prejudicial to the effective conduct of Public Affairs. It is MoD policy not to disclose information that could undermine the ability of the Department to consider all options and make free and unprejudiced decisions. Premature disclosure of information can lead to pressure to conclude studies in unrealistic timescales resulting in decisions on future investment being taken on inadequate or incomplete information.[7]

18 January 2007

Memorandum from Atkins

Introduction

1. Atkins is pleased to provide this evidence in response to the invitation extended by the Defence Committee. It is structured as follows:

— Atkins and its Role.

— Programme and Achievements.

— Technology Demonstrator Programmes (TDPs).

— Industry Engagement.

— Summary.

— The Future.

Atkins and its Role

2. **Atkins is performing the role of independent Systems House** in the FRES Initial Assessment Phase (iAP). In 2004 MoD decided to conduct the iAP with a Systems House, independent of product or manufacturing capability, selected for its programme management, risk management and systems engineering capabilities. Using a large independent engineering and management consultancy for assessment work on a project of this scale is a new step for MoD, where more usually a prime manufacturer would undertake such work. In this role Atkins adds significant expertise and resource to the MoD, providing technical, programme and commercial advice and services which are entirely independent of downstream manufacturing interest since Atkins has no direct or parent ownership interests in the potential FRES supply chain. Atkins is able

[6] Asterisks in the memorandum denote that part of the document has not been reported, at the request of the MoD and with the agreement of the Committee.

[7] Letter subsequently made available to the Committee in confidence. Not printed.

therefore to offer completely impartial advice to the MoD and, with wide experience gained both within and outside the defence market place, this advice should ensure that MoD's subsequent procurement plans are both realistic and consistent with industrial best practice.

3. **Atkins is a FTSE250 company** with a turnover of £1 billion and 15,000 staff and is the UK's largest engineering consultancy, operating across a diverse range of markets. Atkins plans, designs and enables all aspects of major capital programmes, undertaking feasibility studies and impact analysis covering technical, logistical, legal, environmental and financial considerations. Atkins is a top 40 supplier to MoD with annual sales of £50 million.

4. Following a competition, Atkins won a two year firm price contract in November 2004 to manage the FRES Initial Assessment Phase. Atkins has deployed a flexible and skilled engineering and management team of around 70, including many with a background in the Army, Armoured Fighting Vehicle industry or MoD, as well as those with a non-defence background in programme management and systems engineering to bring best-practice and to provide balance and experience. Based in Bristol, Atkins is able to work closely with the MoD in a spirit of partnering.

5. Our role is threefold:

(a) To define the FRES "system requirement"—derived from the user requirement, taking into account technical feasibility, cost, programme and risk.

(b) To support the MoD in developing optimum through life acquisition and support strategies.

(c) To manage technology risk to acceptable levels.

6. As part of this, Atkins is managing a series of Technology Demonstrator Programmes (TDPs) on behalf of MoD which are de-risking crucial aspects of the potential FRES design. These are run over two years and are described at para 13 below.

7. Owing to their initial unaffordability, protracted negotiations and approvals, the TDPs commenced later than originally envisaged and so the MoD has proposed extending the original Atkins contract to July 2007 to cover their completion. Also, Atkins has been tasked to undertake planning work for the contracting process for the first FRES family—the utility vehicles—and to scope the second assessment phase (covering the recce, fires and manoeuvre support variants).

Programme and Achievements

8. Atkins' work has encompassed requirements definition, trade studies and the creation of "reference concepts", relating to performance, cost, timescale, risk, acquisition strategy and support solutions. **The key achievement has been to provide a robust evidence-based independent view of the performance, cost, time and risk implications of the possible overall solutions, and of the key requirements that drive cost and/or time.** In particular, and in line with MoD's Acquisition Values, realism has been introduced to the time it will take to field a coherent and reliable capability to the Army—based on past AFV programmes' performance and the views of Industry.

9. This will allow the MoD to proceed quickly to issue invitations to tender for the FRES utility variant, framed so that only realistic bids should be received and the necessary understanding will be in place to evaluate the bids robustly.

10. The iAP has been characterised by a series of major reviews, attended by a wide range of Army and MoD stakeholders, which have supported senior decision making. As part of a "One Team" with MoD and Dstl, Atkins has played a leading role in these reviews which have covered technical, programme, risk and commercial aspects. A brief summary of the key events, reviews and associated achievements follows.

(a) **Project Launch**—November 2004.

(b) **Fleet Workshop**—April 2005. Atkins reviewed all possible approaches to FRES and down-selected 12 fleet options to focus further study work.

(c) **Preliminary Fleet Review**—July 2005. Atkins narrowed the fleet options to six.

(d) **Fleet Review**—December 2005. Atkins rejected all existing "off the shelf" vehicles and new design approaches, reducing the options to evolutions of vehicles currently being developed. Atkins concluded that a single vehicle family was unlikely to meet the requirement and noted that the aspiration to achieve an initial operating capability in 2012 was unlikely based on current evidence. For the utility vehicles, Atkins recommended running parallel prototype contracts between two competing consortia during the demonstration phase, and moving the main investment approval, Main Gate, from its planned point at the end of the assessment phase to the end of the demonstration phase—so that it could be based on the evidence of proven prototypes when a much better view of performance, cost, time and risk would be available. Stakeholder feedback has commented that this objective, evidence-based approach adopted by the Systems House is a considerable improvement to the usual assessment phase process.

(e) **System and Programme Review 1**—June 2006. Atkins recommended ways to accelerate the programme schedule. Atkins launched scoping work for the second stage of assessment study for the "specialist vehicles", and for the utility vehicle competition.

(f) **Draft System Requirement Document** (SRD) released to Industry for comment—July 2006.

(g) **System and Programme Review 2**—Due to report in late November 2006. The primary objective is to set a realistic performance, cost, time and risk target to form the basis of the Invitation To Tender (ITT) for the utility competition. It is Atkins and the MoD's view that the FRES requirement can be met within the planned budget in a 2017–18 timeframe, and whilst it would clearly be desirable to achieve the required performance at the earlier date of 2012, there is currently little evidence to support this view and the Systems House analysis has had to be careful to ensure that the MoD is not lured into a conspiracy of optimism for which it has been so often criticised in the past. The proposed contracting approach retains the possibility of a 2012 date if Industry can provide credible supporting evidence through the bidding process planned in 2007. Overall, SPR2 puts the MoD in a position to launch the utility family competition with confidence in 2007. As part of the "One Team" approach with MoD and Dstl, Atkins has provided a realistic programme with a controllable degree of risk.

11. Atkins fully understands the importance of this project to MoD and has delivered 100% of their required input to support FRES, on time and to the Project's satisfaction.

12. As part of the "One Team" concept and through our provision of robust evidence-based independent advice, feedback from stakeholders close to the programme indicates that Atkins is adding real value to the programme.

Technology Demonstrator Programmes (TDPs)

13. Atkins is managing a series of TDPs in order to de-risk potential technologies for FRES, and to feed the development of the SRD. Atkins has provided robust contract management of the TDPs on behalf of MoD. They are listed below, in order of start date.

(a) **Chassis—General Dynamics.** Contract let—August 2005. Planned completion—February 2007.

(b) **Electronic Architecture—Lockheed Martin.** Contract let—August 2005. Planned completion—March 2007.

(c) **Electronic Architecture—Thales.** Contract let—September 2005. Planned completion—March 2007.

(d) **Electric Armour—Lockheed Martin Insys.** Contract let—December 2005. Planned completion—June 2007.

(e) **Chassis—BAE Systems.** Contract let—December 2005. Planned completion—September 2007.

(f) **Integrated Survivability—Thales.** Contract let—December 2005. Planned completion—November 2006.

(g) **Gap Crossing—BAE Systems.** Contract let—December 2005. Planned completion—October 2007.

Industry Engagement

14. Atkins has sought to keep Industry in general abreast of the programme's development and of the opportunities for participation—through our web-site, an Industry day, strategic dialogues and attendance at defence conferences (eg RUSI).

15. A crucial aspect of the iAP has been to engage with Industry in order to assess their ability to manage and deliver in terms of technology, programme, cost, industrial capacity etc. This has occurred specifically through two mechanisms.

16. Firstly, "rainbow teams" of recognised experts have been asked to undertake specific tasks to inform our work. These have been openly advertised and have drawn from academia and individual consultants as well as from Industry—spanning the range from SMEs to the primes. (a) Some 75 companies are on contract and in excess of 130 tasks are in progress or have completed to date. (b) These have provided invaluable information in areas such as:

— Schedule timeline development.

— Sensors, fuel systems, vibration management, armour, mortars, turret design, counter-mine technology and computer training "embedded" in vehicles.

— Acquisition Strategy.

17. Secondly, as the options have been narrowed, Atkins has sought to understand the maturity of current development vehicles by engaging with potential FRES suppliers. To this end Atkins has issued 56 "requests for information" which have also yielded important information.

18. The TDPs have provided an important avenue of potential involvement at all levels of the supply chain, and Atkins has required the prime contractors to compete sub-contract opportunities and enable SME involvement.

19. Generally, Atkins has enjoyed good relations with Industry. However, our role as a robust independent consultant has on occasion caused discomfort to Industry.

(a) It is endemic to independent assessment work that Atkins must on occasions challenge the overly-optimistic claims of Industry—which may be based on incorrect assumptions or be driven by marketing considerations, for example in relation to capability or a realistic in-service date.

(b) As a Systems House, Atkins has undertaken work which might normally have gone to Industry which might be a cause for complaint with certain companies.

(c) It is also inevitable that Atkins has been unable to engage as much as some would have liked nor provide the desired degree of programme information, owing to the sensitive nature of some of the study work.

20. Nonetheless, Atkins has found Industry to be constructive and a vital part of our assessment process.

SUMMARY

21. Atkins has been a key part of MoD's team to define the Future Rapid Effect System, the Army's highest priority future procurement programme and one of the largest in Defence.

22. Our contract has been delivered to time and budget, with all contracted reviews and deliverables met to a high quality to MoD's satisfaction. Atkins has also provided support to the MoD in senior level reviews with the Army and the wider stakeholder community, providing a flexible and committed resource.

23. At all stages, Atkins has been careful to fully engage Industry through specific Industry Days, involvement in TDPs, information exchanges, conferences and their participation in rainbow teams.

24. Atkins believes that the Systems House role has made a real and significant positive difference to the FRES programme to date. Our contribution over the past two years has achieved the following:

(a) A broad shared understanding of the requirement and its implications for all stakeholders. FRES will comprise a number of families of vehicles, likely to include wheels and tracks, with sub-system commonality and derived from vehicles currently under-development.

(b) A narrowing of the potential solutions, now matched to the potential "points of departure" amongst candidate vehicle providers for the utility family.

(c) A robust evidence-based independent view of the performance, cost, time and risk implications of the possible overall solutions, and of the key requirements that drive cost or time. In particular, realism has been introduced to the time it will take to field a coherent and reliable capability to the Army—based on past AFV programmes and the views of Industry.

(d) A vital tool with which MoD should be able to proceed quickly to issue invitations to tender for the FRES utility variant, framed so that only realistic bids should be received and the necessary understanding will be in place to evaluate the bids robustly.

(e) Taken together, Atkins has been able to identify and reduce risk across the FRES programme. Atkins has put the MoD in a position to proceed with the Utility contracting process in 2007 with confidence based on a realistic specification, budget and programme.

THE FUTURE

25. Atkins expects that our current contract will be extended to July 2007 to match the end point of key TDPs.

26. In addition, we believe that Atkins can continue to add significant value to the MoD in providing truly independent support as the programme moves forward into:

(a) the second Assessment Phase for the "specialist vehicles".[8]

(b) the contracting process for the utility vehicles, and

(c) the contracting process for the System of Systems Integrator.

27. Atkins believes that the current contracting arrangements for a Systems House contract works well with a firm price and scope, and incentivisation metrics on delivery, quality and behaviour. Atkins would recommend that as the project matures there would be merit in co-locating the MoD team and its partners, including ourselves, in order to maximise coherence and efficiency.

24 November 2006

Memorandum from the European Defence Agency (EDA)

On the requirements of different European countries, I enclose a table setting out what we know of armoured fighting vehicles in use, and to be procured over the next 10 years, across a spread of European countries. (As you will see the data is not fully comprehensive and, being drawn from open sources, may

[8] Covering recce, direct fire and maneouvre support variants.

not be wholly accurate). That said, in broad terms, the Annex paints a picture of nations buying similar but differently configured vehicles and few true examples of cooperation. The only known ongoing cooperative development programme is the GE, NL BOXER Programme. The industry-to-industry cooperative ASCOD programme, which comprises the SP PIZARRO and the AU ULAN, is in production. The light-weight FENNEK cooperative development programme between NL and GE is also in production.

The armoured fighting vehicle market in Europe was one of the first subjects that the EDA's Ministerial Steering Board, aware of the fragmentation on both demand and supply sides, asked us to pursue. Whilst a number of Member States have now come together within the Agency to consider the possible development of a new whole-system collaboration, around 2020, our experience to date suggests that this objective may be best realised by a series of collaborations in sub-systems and components. Our Member States are evidently more interested in cooperative sub-system programmes, which would allow them to work together on upgrading and modifying existing platforms, or on innovative technologies for future vehicles. And more common components and technologies will lead, we hope, to a natural convergence of system design and therefore to a significantly reduced number of AFV platforms.

Specifically, within the general requirement for a modular, protected, multi-role family of AFV systems, five relevant technology areas have been identified by our Member States and industry as offering the first opportunities for co-operation:

- Network Enabled AFV.
- Active protection systems for air transportable AFV.
- Virtual prototypes.
- Unmanned Ground Vehicles.
- Beyond line-of-sight command and control.

In addition, common sub-system capability requirements have been identified in weapon packages, training systems and battlefield target identification devices.

The "Network Enabled AFV" and "Unmanned Ground Vehicles" projects are the most mature, with the scope of work broadly defined and the formal process of consultation with our interested Member States started that should lead to feasibility studies being conducted in these two areas, probably next year.

In sum, our work in the AFV sector has underlined for us the difficulty of catalysing collaborations within a time-frame covered by existing national plans and commitments—however strong the strategic arguments for doing so might be. So we are focussing on progressing collaborations on subsystems and components—in the hope that this may in due course lead to whole system collaborations for the next generation of vehicle.

Annex

AFV HOLDINGS AND PROCUREMENT INTENTIONS OF CERTAIN* EUROPEAN COUNTRIES

Country	Stock		Intended Procurement		Period of Procurement								
	Model	Quant	Model	Est. Quant	06	07	08	09	10	11	12	13	14	15
Austria	PANDUR 6x6 Light APC	68	8x8 Med APC	200		■	■	■	■	■				
	ULAN Heavy AFV		ULAN Heavy AFV											
Belgium	PANDUR 6x6 Light APC	50	8x8 AFV	242			■	■	■	■	■			
	YPR-765 Light Tracked APC	104	PIRANHA III 8x8 Light APC	32			■	■						
Bulgaria	BTR 60 8x8 Light APC	618												
	BMP-1/-2 Light/Med AFV													
Czech Republic	OT-64 8x8 Light APC	18	PANDUR II 8x8 Med APC	234		■	■	■	■	■	■			
	BMP-1/-2 Light/Med AFV	545	PANDUR II 8x8 Med APC	35			■	■	■					
Croatia			8x8	126+94		■	■	■	■	■	■	■	■	
	DARDO Heavy AFV	122	DARDO Heavy AFV		■	■	■	■	■					
Denmark	PIRANHA III 8x8 Light APC	22	8x8 Med APC	69		■	■							
			CV9035 Heavy AFV	45		■	■	■						
Estonia	BTR 80 8x8 Light APC	25	XA-180 6x6 Light APC	60	■	■								
Finland	XY-180 6x6 Light APC	655	AMV 8x8 Med AFV	100	■	■	■	■						
	BMP-1/-2 Light/Med AFV	263	CV9030 Heavy AFV	57	■									
France	VAB 4x4/6x6 Light APC	1	VBCI, VC 8x8 Med/Heavy AFV	700	■	■	■	■	■	■	■			
	AMX-10P Light/Med AFV	601	VBCI 8x8 Med/Heavy AFV	550			■	■	■	■	■	■		
Germany	FUCHS 1 6x6 Med APC	909	BOXER 8x8 Heavy APC	200+115			■	■	■	■	■	■	■	■
	MARDER Heavy AFV	2,122	Puma Heavy AFV	410				■	■	■	■	■	■	■
Greece	BMP-1 Light/Med AFV	501	MARDER Heavy AFV	415+30			■	■	■					
Hungary	BTR 80 8x8 Light APC	458												
	BTR 80A 8x8 Light APC	178												
Ireland	PIRANHA III 8x8 Light APC	40	Med 8x8 AFV	14		■								
			FRES?	140										

Country	**Stock**		**Intended Procurement**		**Period of Procurement**									
	Model	Quant	Model	Est. Quant	06	07	08	09	10	11	12	13	14	15
Italy	CENTAURO 8x8 Med AFV	378	VBC 8x8 Med AFV	200		■	■	■	■					
Latvia	M-80 Light/Med AFV	104	SKw 8x8	126+94										
Lithuania	BTR 60 8x8 Light APC	22												
The Netherlands	XA-188 6x6 Light APC	72	BOXER 8x8 Heavy APC	200+57				■	■	■	■	■		
Norway	XA-186 6x6 Light APC	80												
	YPR-765 Light APC	569	CV9035 Heavy AFV	184		■	■	■	■					
Poland	OT-64 RYS 8x8 Light APC	726	ROSOMAK 8x8 Med AFV	690	■	■	■	■	■	■	■	■		
	BMP-1 Light/Med AFV	1,248												
Portugal	V150/V200 4x4 Light APC	88	PANDUR II 8x8 Med APC	260		■	■	■						
Romania			PANDUR II 8x8 Med APF		■	■	■	■						
Slovakia	OT-64 8x8 Light APC	7	8x8 Med AFV	90						■	■	■		
	M-80 Light/Med AFV	26												
Slovenia	PANDUR 6x6 Light APC	34	AMV 8x8 Med AFV	150					■	■	■			
	CV9030 Heavy AFV	127	CV9030 Heavy AFV	186	■									
Spain	CENTAURO 8x8 Med AFV	22												
	BMR 6x6 Med APC	686												
	BMP-1/-2 Light/Med AFV	411	SKw 8x8							■	■	■	■	
	PIZARRO Med AFV	144	PIZARRO Med AFV	176	■	■	■	■	■					
Sweden	XA-180/203 6x6 Light APC	417	SEP Med AFV / 6x6 APC											
	MLI-84	177	Upgrade MLI-84	177	■	■	■	■	■					
Switzerland	PIRANHA 6x6 Light APC	515	PIRANHA IV 8x8 Med APC	105	■	■								
	CV9030 Med AFV	355	CV9030 Med AFV											
	PBV-501 Light APC	350												
Turkey			Tbd					■	■	■	■	■	■	
	AFV	650												

Key

APC – Armoured Personnel Carrier
AFV – Armoured Fighting Vehicle
The countries listed here all participate in the EDA except for Bulgaria and Romania (to join on 01 Jan 07), Denmark, Norway

24 November 2006

Memorandum from Thales UK

In this document Thales outlines its position in the UK Land domain, and its contribution to the development of the FRES Requirement and Acquisition Strategy and to the DIS

Thales UK

1. Thales is a key player in the land systems domain, both globally and in the UK, acting as both a systems integrator and a supplier of key technologies. The company has taken the prime contractor role on many complex vehicle programmes. Thales is committed to making a significant contribution to the debate and to the delivery of the FRES capability.

2. Thales is the largest military vehicle system integrator in Europe with experience on over 20,000 vehicles worldwide. The most recent example is the provision of a fleet wide electronic architecture to the new Piranha III Armoured Fight Vehicle (AFV) fleet being procured by the Belgian Army.

3. In the UK Thales, through its Belfast facility, is the prime contractor and system design authority for the Self Propelled High Velocity Missile (SP HVM) Weapon System, which integrates the Starstreak missile system with advanced sensors and command and control on the Stormer platform. As system design authority, Thales also delivered a major capability upgrade to this system, successfully achieving the in service date in October 2006. Thales is concluding negotiations with MoD to provide the SP HVM capability through-life.

4. Thales, through its Glasgow facility, is the prime contractor for the Battle Group Thermal Imager (BGTI) System, which was successfully delivered into service in 2005 and will be fielded on over 500 vehicles. Thales has total responsibility for the sub-system and vehicle integration of BGTI across all vehicle variants, sub-contracting the platform, design authority to BAE Systems. BGTI integrates a stabilised gunners sight, commander's crew station, three-axis inertial navigation system (INS), driver's display and the BOWMAN/ Combat battlefield management system (BMS). The BGTI commander's panel is the hub for all data flow and provides the commander with an intuitive man machine interface that enables him to have access to optical, video, map and navigation data. BGTI is also capable of planning routes and displaying target location data independent of BOWMAN. The architecture includes a combination of international open standard data transfer protocols to utilise proven "off the shelf" technology whilst optimising the interface to the BOWMAN system. Thales believes that BGTI represents the most complex AFV electronic system in service in the UK.

5. Thales has wide experience in the UK and overseas of acting as an independent system and system-of-systems integrator. Its roles in SP HVM, BGTI, CVF, Watchkeeper and Future Integrated Soldier Technology (FIST) testify to its capability, people and processes in this regard. In the land domain Thales has run competitions for complex sighting and sensing systems and has then successfully integrated these to deliver an AFV based capability to UK MoD.

Thales FRES Activity To Date

6. Through the FRES Integrated Project Team (IPT) and the Directorate of Equipment Capability (Ground Manoeuvre) Thales has contributed to the MoD's deliberations on acquisition strategy by way of presentations, papers and strategic discussions. Thales has developed programme, risk, supply chain management, business and financial models to illustrate alternative ways of working and to facilitate the identification of issues.

7. From other major programmes in which Thales is involved such as CVF, Watchkeeper, FIST and others, Thales also has much experience of alliancing, partnering and working with other substantial organisations.

8. Thales has also been supporting the FRES Systems House (SH), Atkins Defence, in the development of the system requirement document (SRD) that will deliver the operational requirement for FRES. Thales has been tasked by the SH to provide inputs on specific topics such as power management, embedded training, vehicle batteries, commonality and acquisition strategy. Thales has also initiated direct discussion with the SH and informed their development of the SRD.

9. Thales competed for and is leading the two key FRES Technology Demonstrator Programmes (TDP), the Electronic Architecture (EA) TDP and the Integrated Survivability (IS) TDP.

10. As part of the work on the EA TDP Thales sees the development of an open, scalable electronic architecture as key to ensuring the coherence of both the FRES fleet and legacy platforms and to providing a mechanism for growth and technology insertion. To meet these requirements Thales has brought in BAE Systems, QinetiQ and a number of SMEs including Ncode, IFS Defence, McLaren Electronic Systems, Eaton Aerospace, and Aerosystems International, as well as the University of Sussex, to ensure that the best of UK capability is harnessed and developed in a team environment to deliver an optimised architecture.

11. Thales believes Integrated Survivability to be a key enabler to delivering the FRES capability through life. As part of the Integrated Survivability TDP Thales has identified the major trade-offs that need to be made in terms of survivability characteristics and has proposed a number of optimised survivability concepts for FRES. Thales has contracted with The Boeing Company to ensure the pull through of the survivability lessons learnt in the US including those from the Future Combat Systems (FCS) programme.

FRES Acquisition Strategy

12. It is highly likely that FRES will consist of platforms from more than one supplier. FRES fleet coherence, commonality and hence value for money, are likely to be delivered only through a systematic approach, focussed on the capability required of the FRES fleet and individual variants, rather than a vehicle-centric approach. A key enabler in delivering that coherence is the effective management and control of the FRES system of systems architecture and in particular the fleet level segments of electronic architecture and integrated survivability. Thales is therefore pleased to confirm its support for the acquisition strategy outlined in the recent letter to its Chief Executive and looks forward to playing a leading role in working with the MoD to deliver the FRES capability effectively.

13. Thales looks forward to working with MoD to define further and refine the acquisition process. A key issue to be addressed by the acquisition strategy will be the mechanisms by which broad fleet coherence will be achieved by spiralling systems and technologies from the FRES programme into the legacy fleet.

FRES and DIS

14. The DIS clearly sets out MoD's intent that FRES should be delivered through a team lead by a systems integrator with the highest levels of systems engineering, skills, resources and capabilities based in the UK. The DIS also highlights the need for a system of systems perspective to manage the challenges not just of the physical integration of complex sub-systems into the various platforms but also the integration of these platforms into the wider military network to fully exploit the benefits of NEC. Thales has voiced its support for these objectives and its desire to work with the MoD to ensure that they are fulfilled.

15. With respect to legacy AFV platforms, Thales considers it important that the partnering agreement with BAE Systems should not restrict competition, especially with respect to major system integration activities. Thales believes that such partnering agreements should not become rigid monopolies and that they should be transparent to the supply chain. Thales considers that systems such as BGTI provide good examples of where the MoD has benefited from effective competition beyond the platform supplier.

Conclusion

16. Thales has a strong desire to be the System of Systems Integrator for the FRES programme acting in partnership with the MoD. Thales has all of the necessary resources and capability in the UK to lead a UK based team harnessing the best of UK and international companies for the benefit of the programme.

24 November 2006

Memorandum from BAE Systems plc

Introduction

BAE Systems is the premier transatlantic defence and aerospace company delivering a full range of products and services for air, land and naval forces, as well as advanced electronics, information technology solutions and customer support services. With 86,000 employees worldwide, BAE Systems' sales exceeded £15.4 billion in 2005.

BAE Systems Land Systems, created following the acquisition of Alvis Vickers Ltd (AVL), is part of the Land & Armaments Group within BAE Systems and has some 3,900 employees across three business streams: Land Systems UK, Land Systems South Africa, and Land Systems Munitions.

Land Systems UK designs, develops, manufactures and markets military weapon and vehicle systems. The company's primary products are indirect fire systems, direct fire systems, armoured engineer vehicles, tracked and wheeled military vehicles, military bridging, and logistic support. The head office is in Farnborough, with sites in Newcastle-upon-Tyne, Barrow-in-Furness, Hattiesburg (USA), Leeds, Leicester, Ridsdale, Telford and Wolverhampton.

Land Systems UK products include Challenger 2, CRARRV, Warrior, CVRT, FV430, Panther, TITAN, TROJAN, M777, TERRIER, Panther, bridging systems, Tactica, and 105mm Light Gun, with through life support services.

Early Phases of FRES

The FRES concept emerged during 2001 with small scale studies. BAE Systems responded with three inputs: one from each TRACER/FSCS consortium (LANCER & SIKA) and one from BAE Systems Future Systems. Alvis (including Hagglunds) and Vickers (as separate companies in 2001) also submitted bids based on new and existing products.

In July 2002, at the request of the FRES IPT Leader in DPA, BAE Systems formed a relationship with Alvis, whereby Alvis would contribute the AFV domain knowledge and skills and BAE Systems would manage the System Engineering. A non-competitive contract was let to Alvis in September 2002. The purpose of the contract was to determine plans for the Assessment Phase of a FRES programme with a target ISD of 2009. The industry team comprised 60 people and delivered several studies to MoD. GD (UK) joined the team in March 2003 specifically to help with the Bowman interface.

The contract was terminated in July 2003 by the DPA after the Procurement Strategy for a non competitive approach was not approved by the Investment Approvals Board.

Establishment of the Systems House

In August 2004, Atkins was confirmed as the chosen Systems House to lead a two year initial Assessment Phase (iAP), with the following broad aims:

- To further define the FRES capability required within the developing medium-force and network-enabled operational concepts and thus develop a series of affordable options for meeting the FRES requirement.
- To develop optimum procurement and support strategies for future phases in order to present a robust case at Main Gate.
- To manage technology and supplier risk to acceptable levels.

Atkins was also tasked to let competitive Technology Demonstrator Programme contracts to industry as part of a FRES Integrated Technology Acquisition Plan (ITAP).

BAE Systems established a dedicated FRES team in September 2004 to coordinate FRES activities across all interested BAE Systems Business Units.

In the same period the company strengthened its capability to deliver land systems solutions. First, by the acquisition of Alvis Vickers (by this time Alvis had acquired Vickers) in August 2004. This acquisition had the effect of strengthening its position for taking a leading role on the FRES programme. Second, by the acquisition of United Defence Industries (UDI) in June 2005. The integration of these companies with BAE Systems' existing land sector activities created one of the world's leading providers of design, manufacturing and support for land and armament systems.

Technology Demonstrator Programmes

In December 2004, ITTs were issued for a range of FRES Technology Demonstrator Programmes (TDPs) which were intended to inform the FRES requirements documentation.

BAE Systems bid for and won:

(a) Chassis Concept TDP—The ITT requested a proposal for up to two demonstrator vehicles to undertake mobility trials. At the DPA's request BAE Systems put in separate bids for Tracked and Wheeled Concepts. After a number of iterations, BAE Systems was contracted in December 2005 with the aim of evaluating the ability of the Swedish SEP vehicle electric drive system (designed for 17–22 tonne vehicle weight) to deal with vehicle weights up to 25–28 tonne. Phase 2 is under contractual negotiation and is forecast to complete in 2008.

(b) Gap Crossing TDP—The aim of this TDP is to evaluate gap crossing in three phases:

- The derivation of gap crossing design requirements;
- Generation of design concepts against the requirements; and
- More detailed design of the solutions encompassing both alloy and composite materials.

BAE Systems Land Systems was contracted in December 2005 and has completed Phase 1 of the TDP; Phase 2 is in train and will complete in October 2007.

(c) Electronic Architecture TDP—The aim of this TDP is to define a candidate Electronic Architecture for FRES and to carry out demonstrations to mature the Readiness Levels of the Architecture. BAE Systems chose to team with Thales in bidding for the EA TDP. The Thales team which won one of the two EA TDPs comprises Thales, BAE Systems Insyte and QinetiQ. The TDP will inform FRES electronic architecture requirements by design and demonstration of technology including; Vetronics, Power Management, CBM(Land) Command and Control, On-platform Command and Control, Integrated Image Handling (IIH), Local Situational Awareness, End-to-End Health and Usage Monitoring System (HUMS) and requirements for a System Integration Lab.

The TDP was contracted September 2005 and is currently exercising an example electronic architecture at BAE Systems' System Integration Facility in Leicester. The team is preparing to embody the architecture in an electric drive vehicle for testing. The TDP will conclude in March 2007.

BAE Systems bid for but did not win:

(a) Electric Armour TDP—BAE Systems Land Systems failed to win this against an Insys bid (teamed with SAIC and QinetiQ). The aim of this TDP was to evaluate the development and integration issues of electric armour onto AFVs.

(b) Integrated Survivability TDP—After evaluation of the ITT for this TDP, BAE Systems decided to support QinetiQ's bid since the scope was predominantly modelling. This TDP was won by Thales against competition from QinetiQ and Insys.

Defence Industrial Strategy Statements on FRES

The Defence Industrial Strategy (DIS) was published on 15 December 2005. Amongst the key aims of DIS was to provide greater transparency to the UK's future defence requirements and, for the first time, to set out those industrial capabilities for which the UK needs to maintain appropriate sovereignty. Significantly, it seeks to achieve the through-life management of Armoured Fighting Vehicles (AFV). Chapter B3 on Armoured Vehicles includes the following statements about FRES:

> *"The most likely solution (for FRES) will be a team in which national and international companies co-operate to deliver the FRES platforms, including the required sub-systems, led by a systems integrator with the highest level of systems engineering, skills, resources and capabilities based in the UK."*
>
> *"We expect to see a significant evolution of BAE Systems Land Systems both to deliver AFV availability and upgrades through life, and to bring advanced land systems' technologies, skills and processes into the UK. If successful in their evolution, BAE Systems will be well placed for the forthcoming FRES programme"*

The AFV Partnering Agreement was signed on the same day as the DIS by Lord Drayson (Min DP) and Mike Turner (BAE Systems CEO) and has the following key objectives:

— Deliver military capability for demonstrably better value for money.

— Improve the reliability, availability and effectiveness through-life of existing AFV fleets.

— Transform BAE Systems Land Systems to achieve better Through-life Capability Management for AFVs.

— Support the Sustained Armoured Vehicle Capability (SAVC) Pathfinder project.

— Scope any necessary industrial alliances.

— Ensure the UK has access to the relevant IPR involved in current and future AFV fleets.

The achievement of these objectives is measured through 22 Confidence Building Measures (CBMs), most of which have been completed.

Transformation

Under the AFV Partnering agreement BAE Systems Land Systems has committed to transform its business in four key areas to support MoD now and in the future:

— Through-Life Capability Management.

— Through-Life Systems Integration.

— Industrial Supply Chain Management.

— Technology Acquisition and Insertion.

The main focus of this transformation is to ensure effective Through Life Capability Management of the existing AFV fleet with a further aim of strengthening Land Systems capability to take a leading role in FRES.

BAE Systems Investment in Transformation and FRES

System Integration Laboratories (SILs)

As part of Land Systems transformation, BAE Systems initiated in January 2006 an investment project to create a System Engineering Facility at Leicester. The facility builds on the Leicester site heritage in electronic systems and vehicle integration (eg radar and naval weapon control system programmes, TRACER and TERRIER AFV programmes).

The initial phase, completed in September 2006, has consolidated synthetic environment rigs and tools in one place for use by engineers throughout the system engineering life cycle in the concepts, design, risk mitigation, demonstration and integration of AFVs.

The major elements of the facility draw on BAE Systems capabilities in UK and US and comprise:

— 3-Dimensional visualisation facility—to support rapid concept generation from CAD designs enabling requirement evolution with the customer leading to a rapid prototyping where required.

— Combat SIL—focussed on the fighting capability of the vehicle, in particular development of the crew tasks, human interfaces and effectiveness in battle simulations.

— Electronic SIL—focussed on the design of the electronic architecture and (through successive substitution of models for prototype hardware and software) the de-risking of the eventual vehicle system.

— Vehicle SIL—a facility to support the integration, testing and verification of complex electronic and software based systems into demonstrator, prototype or in service vehicles (eg for Urgent Operational Requirements—UORs).

The Systems Integration Facility is a unique UK capability to support the current and future fleet of AFVs.

Platform Development Centre

BAE Systems is planning a substantial investment to create a Platform Development Centre (PDC) at its Newcastle site.

Used in conjunction with the Systems Integration Facility at Leicester, the PDC will:

— Rapidly transform 3-D model concepts into experimental prototypes and pre-production demonstrators.

— Reduce programme cost, risk and timescale from inception to production commitment.

— Be exercised in rapid product development activities where opportunities arise in advance of FRES programme requirements.

The PDC rapid prototyping facilities will translate designs to hardware in the shortest possible timescales.

Both of these new facilities demonstrate BAE Systems' commitment to invest and prepare for participating in the FRES programme. They will fast track platform design and integration activities by combining the benefits of:

— Co-located integrated project team (IPT) resources, using the best available skills, tools and methods.

— A collaborative environment that serves to engage partners, strategic suppliers and customer representatives.

— Lean product development methods.

Wheeled Utility Vehicle

During 2005 it was becoming increasingly apparent that the most likely vehicle configuration for the Utility roles of FRES would be an 8x8 wheeled configuration capable of carrying a two-man crew plus eight-man infantry section. In Sweden the FMV/BAE Systems Hagglunds SEP programme had been developing a vehicle system comprising both 6x6 wheeled and tracked electric drive vehicles. BAE Systems decided in September 2005 to invest PV funding in the development of an 8x8 conventional drive version of SEP which will meet the FRES requirements. The 8x8 conventional drive demonstrator vehicle will commence trials in January 2007 initially in Sweden and then the UK. This project demonstrates BAE Systems' commitment to product development in advance of MoD funding and in anticipation of competition for the utility variant.

Capability Integration

BAE Systems has also presented MoD with a proposal for a Industrial Capability Integration Partnership, which would be led by the company in partnership with GD (UK), QinetiQ and other firms with a relevant capability, to support the introduction of Through Life Capability Management (including support, upgrade, technology insertion and overall fleet coherence) across the current and future fleets of AFVs, and to ensure the integration of FRES into the wider Land battlespace.

FRES Acquisition Strategy

In November 2006 MoD announced a three tier acquisition strategy for FRES, with a Systems of Systems Integrator, Platform Designer, and a Vehicle Integrator/Manufacturer. In accordance with the declared MoD approach, BAE Systems has intends to compete for all three levels of the structure and looks forward to taking a leading role in all aspects of the FRES programme.

24 November 2006

Memorandum from General Dynamics

Executive Summary

1. General Dynamics United Kingdom Limited welcomes the opportunity to give evidence to the Defence Committee's inquiry into the Future Rapid Effects System (FRES). The key imperatives of the FRES programme are, in the view of General Dynamics:

- Early delivery: the FRES protected mobility capability is needed urgently. This need stems from a long gap in procurement of new vehicles, together with changes in doctrine and the type of operations the UK Armed Forces have undertaken since the end of the Cold War.
- Reliability: proven reliability is a vital element of any AFV programme, and it is particularly relevant to the timing and delivery of capability.
- Cost effectiveness: at a time of competing pressures on Government budgets, the Ministry of Defence must be confident that it is providing maximum value to the taxpayer for the resources it allocates to major equipment programmes such as FRES, whose life expectancy for individual platforms is likely to be 40 years or more.
- Survivability: the experience of current operations has shown the critical importance of integrated force protection measures given the evolutionary nature of the threat environment in Iraq and Afghanistan.

2. The introduction explains the experience and background of General Dynamics as a systems integrator in the context of battle winning technology and Armoured Fighting Vehicles (AFV), including the leveraging of global technology into the UK without encumbrance of ITAR controls.

3. The evidence goes on to cover factual information on the FRES programme that may be of use to the Committee. It contains General Dynamics' view on how the Minister's challenge can be met and how the procurement process might be enhanced to meet the Army's need:

- It addresses the evolving FRES requirement, in particular the importance of survivability.
- It deals with the delivery of early capability, using the US Army's Stryker vehicle as an example to demonstrate that the keys to delivering early capability are identifying a reliable and proven solution, keeping the amount of development work to a minimum and close cooperation between the contractor and the client (MoD, Army etc). It uses the lessons learned from other successful AFV programmes such as Piranha in Europe and Canada.
- It contains recommendations on reliability growth, process, industrial strategy and culture, which are core to the programme's success.

Introduction—About General Dynamics

A British Prime Systems Integrator

4. A prime contractor and systems integrator, General Dynamics UK has been involved in complex systems integration for over 40 years and employs over 1,500 people at facilities in London, South Wales, East Sussex and Gloucestershire.

5. As a C4I system of systems integrator, General Dynamics UK delivers integrated end-to-end solutions from the Network Infrastructure, through tactical C4I systems, down to the individual soldier level.

6. General Dynamics UK is a committed advocate of the Defence Industrial Strategy, already working in partnership with the MoD to deliver the Bowman CIP tactical C4I system. We are actively involved in key integration activity for Global Information Infrastructure programmes, such as linking SkyNET, Cormorant and Bowman, and the integration of bespoke Battlefield Information System Applications (BISAs) into the deployed force command and control infrastructure.

7. The Company's proven track record in partnership is demonstrated in its work with the MoD on Bowman; the Joint Systems Integration and Joint Networks Integration Bodies, and the Defence and Information Fusion Defence Technology Centre, a research consortium developed with the MoD, led by General Dynamics UK and involving partners from industry and universities.

8. General Dynamics UK has a unique UK capability in the integration and assembly of AFVs at its specialist in-country facilities, with a rich and well-developed resource of system and vehicle design and engineering skills. We have designed and produced installations for a wide range of land platforms and are currently engaged in the successful digitisation, together with Installation Design and Certification, of over 14,000 vehicle platforms at these sites, primarily at Ashchurch and Pershore near Tewkesbury.

9. General Dynamics UK is currently delivering a key FRES Chassis Concept Demonstrator Programme with the innovative GD Advanced Electric Hybrid Drive (AHED) vehicle, and is integrating the electronic architecture (EA). This builds on extensive vectronics and C4I experience, including existing digital EAs.

Leveraging Global Technology

10. General Dynamics UK has a proven track record in levering global technology to benefit the UK industrial base and its principal customer, the British Armed Forces.

11. This history stretches back to the early 60's and Nimrod Sonar Buoy detection technology, through support to UK Aircraft and Rotorcraft projects. General Dynamics UK developed ground-breaking airborne reconnaissance technology which enabled Tornado and Jaguar aircraft to detect and destroy Scud missiles in the first Gulf War and is a long term participant, as the UK's second largest Avionics supplier, in the Typhoon aircraft programme. The Company has successfully exported UK technology to the US, Canada and Europe.

12. This in-country experience is enhanced by access to the capability and resources of its global parent corporation, General Dynamics, which is the world's leading supplier of Armoured Fighting Vehicles (AFVs), which has 81,000 employees and a turnover of $24 billion.

13. General Dynamics has a reputation for excellence in vehicle integration, with a vast body of experience and capability not currently available elsewhere in the world.

14. The global capability of General Dynamics includes experience of fabrication and assembly from its world-wide vehicle businesses. General Dynamics' Combat Systems division, with an annual turnover of $5.8 billion and eight active AFV production lines in North America and Europe, includes General Dynamics Land Systems (GDLS) and European Land Combat Systems (ELCS), both of which design and manufacture AFV families.

15. Currently a major player in the United States' Future Combat System (FCS) programme, General Dynamics Land Systems has produced over 57,000 AFVs, including the M1A2 SEP Main Battle Tank, the US Marine Corps Expeditionary Fighting Vehicle and the US Army's Stryker.

16. Further experience and resource is available to General Dynamics UK from GD's European Land Combat Systems, which comprises a number of major European AFV manufacturers: Mowag, Santa Barbara Sistemas and Steyr-Daimler-Puch.

17. Mowag, based in Kreuzlingen, Switzerland, is a leading exporter of wheeled AFVs. The Mowag Piranha family of vehicles, of which 9,200 are in service with 19 countries, is largely delivered to a business model under which the vehicles are built in the country of use. The Piranha design has evolved constantly with a through life growth path, enabling customers to evolve capability without changing the basic vehicle type. The design is of European/Canadian origin and therefore represents a potential solution for FRES with minimum intrusion of US ITAR controls, thereby facilitating UK sovereign control of through life capability. The latest evolution of the Piranha is a 26 tonne 8x8 wheeled AFV, with outstanding survivability and considerable growth potential. Mowag also produces the Eagle, an 8.5t 4x4, and the Duro, a well-protected highly mobile off-road tactical transport vehicle, which is in service with the British Army.

18. Santa Barbara Sistemas, based in Spain, designs and manufactures a range of armoured vehicles including the tracked Pizarro, the wheeled BMR-2, the 155/52 APU SBT howitzer and the Leopard 2 tank (built under licence).

19. Steyr-Daimler-Puch, based in Austria, designs and manufactures the Ulan, a 35 ton tracked AFV; and the Pandur which comes in two versions: a 15.5t 6x6 and a 22t 8x8. The latter has just been successful in competitions in the Czech Republic and Portugal.

Meeting the Minister's Challenge

The requirement

20. Recent operational experience in Iraq and Afghanistan has highlighted the critical importance of survivability to our armed forces and we would not expect to trade any significant survivability requirements. However, there will be options for trading off lower priority requirements, which can have major implications for cost and timescale, because of the need to conduct extensive reliability growth trialling and testing.

21. The Minister for Defence Procurement has stated that the aspiration for the FRES Utility Variant IOC is 2012, which means that there is insufficient time to start a new vehicle development programme (*ab initio*), and therefore it must be based on and developed from an existing off-the-shelf platform.

22. FRES is more than just a vehicle programme. It also involves potentially complex mission equipment even for the Utility variant. There must be an examination of the integration of Bowman, FIST, Falcon, DII, ESM, EW, APS, E-armour and ISTAR assets, to name a few, into a coherent Electronic Architecture within the vehicle and across the battlespace ie between vehicles and other agents. In this, Bowman will be a key enabler of information flows and must be at the heart of the integration.

Delivering early capability—a 2012 IOC

23. Lord Drayson has expressed his intention to move the FRES programme forward and to deliver the utility vehicle to the Army in 2012 through a MoD/industry Alliance. General Dynamics warmly welcomes this challenge: it is realistic, achievable and shows a solid commitment to meeting the needs of the Armed Forces.

24. For a 2012 IOC to be achieved, a Main Gate decision needs to be made by the end of 2008.

25. The key to delivering early capability is to identify a reliable and proven solution, with growth potential for technology insertion and platform evolution, meeting the critical survivability requirements and containing the necessary flexibility in design to satisfy the broad range of operations envisaged. Our advice would be to keep the amount of development work to an absolute minimum—this is a utility vehicle, not a highly complex weapons platform like, for example, Challenger II.

26. Group 1 Utility vehicles, capable of evolution to the FRES specification, are available now, as General Dynamics demonstrated when we showed the Piranha Evolution at the FRES Medium Weight Demonstration day at Warminster in September 2006.

27. General Dynamics has a mature platform in the Piranha and the 2012 IOC can be achieved based on this vehicle design. Already significantly exceeding the survivability of the current Warrior and FV340 Bulldog vehicles, the Piranha can be developed to meet the anticipated threshold requirements by 2012, with the growth potential to meet the majority of the objective requirements thereafter.

28. Whilst our offering for the FRES utility vehicle is Piranha, there is a great deal of corporate learning which can be leveraged from the experiences and practices developed on the US Stryker programme. Stryker is a derivative of an existing Piranha platform; initial delivery to theatre was accomplished in two years, eight out of the 10 variants were delivered in about three years, and the fleet is now experiencing operational readiness rates of 94.66% over 360 days. This is in the context of an operational deployment totalling over 7 million miles in Iraq and Afghanistan. The critical enablers of the Stryker Programme success are detailed in the next section "Ideas for Enhancing the Procurement Process."

Ideas for Enhancing the Procurement Process

Reliability Growth

29. The British Army's legacy AFVs have historically suffered from troubled development in abinitio programmes, with reliability growth proving a real, expensive and time consuming struggle. This is due to the lengthy development time that results from starting with a clean sheet of paper rather than using the experience gained through incremental, proven evolution. Typical experience is that reliability has not been achieved as quickly as expected. Indeed, a series of reliability growth studies and trials has often been needed to achieve the requirement. This has greatly extended the development time and the vehicles have been delivered late to the Army.

30. Buying "off-the-shelf", where possible, has advantages: for example, there is more likelihood of commonality with equipment and spares from other allied armies. In the modern operational environment, where coalition action involving a range of allies is the norm, this is a distinct advantage. Having identical or similar equipment enhances interoperability on operations, and means that users can all benefit from technology insertion. The advantages of the increased use of "off-the-shelf" are a reduction in programme risk and acquisition timescales, increased reliability, reduced costs, and simplified support because of the greater availability of parts and knowledge.

31. Another advantage of an off-the-shelf based solution is the increased potential for export, with the positive effect that this could have for the UK Defence Industrial Base.

32. Off-the-shelf technology can provide a basis for confidence on reliability. If only a small number of vehicles have been made, however, a customer is unlikely to see the benefits. If the vehicle marque has been produced in large numbers, then the benefits accrue, but the customer needs to be sure of not getting obsolete technology. However, if the marque has gone through many iterations, design varieties and evolutions, then the customer can be confident that the next variant will not only be as reliable as the last but will provide up to date capability. Even then, change may introduce risk, but this can be managed through the process developed through the previous evolutions. General Dynamics has developed a regime that accelerates the achievement of reliability growth targets, and has proved it on Piranha and Stryker.

33. General Dynamics has developed an Accelerated Reliability Growth Regime at its European test facility, which can greatly speed up delivery and improve the reliability of a platform. The test regime achieves an 8x compression of the demanding elements of a battlefield mission, representing "heavy

utilisation" in a test regime derived from user mission profiles. Already used successfully to evolve Piranha through a 30% weight envelope growth programme, this type of capability could be fully utilised in developing the FRES programme.

34. A key outcome of such an approach would be programme compression, and thus delivery for 2012. The fact that 9,200 vehicles are in this evolution cycle gives confidence that reliability predictions and availability targets will be met.

Process

35. General Dynamics UK welcomes the innovation of a MOD/Industry Alliance for FRES. A well-constructed Alliance will provide ample opportunity for the accelerated development of the FRES Vehicle programme and will allow the wide industrial involvement foreseen by the DIS.

36. Formation of the Alliance as early as practical will support achievement of a comprehensive FRES solution for a 2012 IOC.

37. Conducting concurrent procurement and commercial activity will minimise downtime in the decision making process, therefore avoiding delay.

38. The option of contracting for availability should be considered. The support should not be constrained by the limitations of the legacy fleet.

Industrial Strategy

39. General Dynamics UK fully endorses the Defence Industrial Strategy's commitment to retaining key skills, knowledge and expertise in Britain. This is a good strategy for enhancing the current base of knowledge and skill in the UK industrial base while enjoying the benefits of tried and tested technology from around the globe, where it can add value both to the outcome of this specific programme and the UK's wider industrial capability.

40. Lord Drayson has made it clear that the DIS should provide a level playing field for British companies whose shareholders do not reside in the UK, and we believe this is sensible.[9]

41. A complete and relevant supply chain is key to FRES delivery and sustainability, and current arrangements for the legacy fleet should not influence the decision on how the FRES programme is awarded. General Dynamics UK has a diverse and growing supply chain, with a commitment to developing the capabilities of small- and medium-sized suppliers. This is healthy, and should be a feature of the eventual FRES solution.

42. UK industrial capability in the AFV manufacturing sector should be fully utilised as a core element of the chosen FRES solution. This is entirely consistent with, for example, the proven track record of Piranha, where General Dynamics has transferred the technology necessary to manufacture and assemble vehicles in the customer's country, including the UK for some earlier versions of Piranha. General Dynamics would be willing to use existing in-country AFV facilities in addition to its own, delivering vehicles in the UK under a system of licences, with the key intellectual property, design authority and sovereign through-life capability residing in the UK. General Dynamics would be able to draw on extensive experience and expertise to provide a solution with minimal implications from the US ITAR controls.

Culture

43. A shared MoD-industry vision is needed to achieve a 2012 IOC. The vision needs to include a common view on risks, close integration of industry and MoD processes, and be based on trust, intimacy, shared visions and a mutual commitment to meeting the needs of the users.

44. Early involvement of the user in the procurement process is highly desirable. Full-time subject matter experts, seconded to industry, have been proven to speed up the procurement process and greatly improve the fightability and supportability of equipment. The Stryker experience demonstrated that close partnering between users in the US Army and the General Dynamics trials teams led to a vastly compressed process when, for example, production vehicles were used for testing. A similar experience of success based on partnering proved true when General Dynamics UK delivered the initial milestone in the Bowman C4I programme within just 30 months.

45. A key requisite is a full commitment by customer and company: properly funded with timely funding authorisation, together with assignment of the best people and physical resources.

[9] For example, see Lords *Hansard*, 17 October 2006: Column 759.

Glossary of abbreviations

APS	Active Protection System
Bowman CIP	The Bowman, ComBAT Infrastructure and Platform is the Armed Forces' Tactical Digital Communications and Data system
CORMORANT	Strategic theatre-wide area communications network
DII	Defence Information Infrastructure
E-armour	Electric Armour
ESM	Electronic Warfare Support Measure
EW	Electronic Warfare
FALCON	Formation Command Level Communications System (Wide Area Network)
FIST	Future Infantry Soldier Technology
ISTAR	Intelligence, Surveillance, Target Acquisition and Reconnaissance
SKYNET	UK Satellite Communications System
TIRRS	Tornado Infra-red Reconnaissance System

27 November 2006

Memorandum from Roy F Williams

THE SWEDISH SEP PROGRAMME (FAMILY OF ARMOURED FIGHTING VEHICLES (AFV))

BAE Systems Hägglunds have been working on the concept stage of the future family of AFVs under contract to the Swedish Defence Forces for around the last three years. The users requirements for SEP and FRES are very similar and there has been many exchange visits between the UK MoD and Sweden over that time. The concept stage which saw the building of two prototypes by BAE Systems has now been successfully completed and the contract ready to go to development stage.

A contract for initial SEP development was placed at BAE Systems Hägglunds AB 17 of July 2006. The aim is to start the development of the SEP system regarding the basic platforms (wheeled and tracked) and the roles for APC and LOGISTIC.

It has been stated that a contract must be placed spring 2008 for the development of additional SEP variants AMBULANCE, REPAIR, RECOVERY, COMMAND & CONTROL.

The Swedish Government has stated that development shall be done in co-operation with another nation/ other nations to save on costs. Not necessarily however, in the initial phases. A bilateral co-operation with UK has priority. If this is not possible, another partner shall be asked, firstly within EDA and secondly with other nations in Europe.

There was in 2003 an agreement established on information exchange between DPA and the Swedish Defence Materiel Administration regarding FRES and SEP. Work has been carried out regarding Harmonization of Requirement. It is believed that there are today very few differences in the Requirements.

The Swedish Government has decided to use BAE Systems Hägglunds as the prime contractor. Competition will be established on subsystems level to give value for money. This is the method of contracting that was carried out in the early 1990s when Sweden developed the CV 90 family. The CV 90 has been a great success and is today operational in six European nations including Sweden, Netherlands, Finland, Norway, Denmark and Switzerland. This is now regarded as the most effective AFV available in todays market.

A contract for series production of the SEP, including the series preparations, is planned to be in place 15 March 2009. This will allow a first serial delivery 30 November 2011 (APC and LOGISTIC). The second serial delivery is foreseen to be 31 July 2012 (the rest of the roles).

23 November 2006

Second memorandum from General Dynamics

At Tuesday's session of the Defence Committee when the DPA gave evidence there was some discussion of the various evolutions of the Piranha vehicle and I thought it would be helpful to clarify the detail of these variants for the Committee's information.

The Piranha III has been sold to Belgium, Canada, Denmark, Ireland, New Zealand, Spain, Sweden, Switzerland and, in a separately developed solution, as Stryker to the US. It has evolved from 18–22–25 tonnes since 1997. I explained to the Committee last week that General Dynamics is not suggesting the

Stryker ICV, currently at 19–22 tonnes, as a solution for the FRES utility variant. This view derives from our understanding of what the DEC believes is needed as a base FRES platform to ensure survivability and future growth.

The Piranha IV has been developed since 2004 for higher weight applications and was designed at 25 tonnes. It has been through three development cycles in that time and is in a high state of production readiness. Because survivability requirements have evolved very quickly in the last two years we have commenced the next evolution of the Piranha, known as Piranha V, starting from a baseline of 26 tonnes. We believe it is a strong candidate to be used as the basis of the FRES utility variant, using the proven development path and processes of the Piranha/Stryker family.

The interim Piranha Evolution, designed to demonstrate key elements of the Piranha V, took part in September's Medium Weight day in Warminster and will be offered by General Dynamics to the Trials of Truth next year.

So, to summarise, comments made during the DPA's evidence session that GD's current vehicles will not meet the FRES requirement are correct when the DEC's criteria are applied to those in volume production (Piranha III, Stryker) but do not apply to the latest evolution from Piranha IV to V. The latter will, in our opinion, meet the exacting FRES requirements set by the DEC. We look forward to proving that the Piranha V provides the lowest risk path to FRES in the trials to be held in 2007.

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