



House of Commons  
Defence Committee

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# Obsolescent and outgunned: the British Army's armoured vehicle capability

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**Fifth Report of Session 2019–21**

*Report, together with formal minutes relating  
to the report*

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### Contacts

All correspondence should be addressed to the Clerk of the Defence Committee, House of Commons, London SW1A 0AA. The telephone number for general enquiries is 020 7219 3113; the Committee's email address is [defcom@parliament.uk](mailto:defcom@parliament.uk). Media inquiries should be addressed to Joe Williams on 020 7219 8878 | 075 4651 7626 or Toni McAndrew-Noon on 075 6243 5286.

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## Summary

The recent history of the British Army's armoured fighting vehicle (AFV) capability is deplorable. Since the end of the Cold War in the late 1980s, the Army's AFV fleets have been characterised by increasing obsolescence and decreasing numbers. In 1990 the UK had around 1,200 main battle tanks in its inventory, today has 227, and those that remain are in urgent need of modernisation.

The perceived loss of a challenging but known threat in the form of the armoured forces of the Soviet Union and the Warsaw Pact meant the British Army has struggled to re-define its role. Since at least the 1990s it has tried to move to more deployable, medium-weight armoured forces, suitable for expeditionary warfare against unforeseeable opponents. However, indecision around requirements, a desire to have the latest (immature) technology, operational experience and a lack of stable funding for its programmes mean the British Army's AFV fleet currently faces mass obsolescence and requires significant funding for modernisation. At the same time the UK is reviewing its future defence and security posture and what this means for traditional military capabilities. Therefore, the Army's AFV programmes and capability is now vulnerable when weighed against the desire to fund other priorities such as 'cyber', information warfare and other capabilities.

We are astonished that between 1997 and late 2020 (with the exception of a small number of armoured engineering and Viking protected mobility vehicles) the Department has not delivered a single new armoured vehicle from the core procurement programme into operational service with the Army. It is clear that the Ministry of Defence's armoured vehicles programme requires independent scrutiny. We ask the National Audit Office to revisit this issue.

The delayed Integrated Security, Defence and Foreign Policy Review (at time of writing scheduled for publication in March 2021) is expected to make a number of significant decisions about the UK's defence posture and the capabilities it requires to meet this. These have been characterised as being about the need to reduce or remove 'sunset' (or industrial-era) capabilities and replace them with 'sunrise' (or information-era) alternatives. There has been much speculation about what this means for the Army's AFV capability, notably the Challenger 2 main battle tank and the Warrior infantry fighting vehicle. Both vehicles have been in service for decades without meaningful upgrades and are both awaiting decisions about modernisation programmes.

In 2015 the Ministry of Defence outlined the requirement for a warfighting division that by 2025 could be deployed to assist NATO in the event of conflict on its Eastern borders. The Russian invasion of Ukraine in 2014 highlighted that NATO (and the UK) still face a potential threat from a challenging peer adversary state that retained considerable armoured forces which were being modernised at pace. The UK division was to draw on a number of capabilities but its core would have been two armoured infantry brigades and a new strike brigade, alongside 16 Air Assault brigade.

If the Integrated Review concludes that the Ministry of Defence and the British Army are to retain a heavy armoured capability it is clear that they must learn the hard lessons from recent history, and these are spelled out in the rest of this report. Furthermore,

to support this capability the UK requires an industrial base. The current procurement and upgrade programmes have led to new investment in skills and production facilities. To sustain this regrowth in what was a decaying sector, the Ministry of Defence (and wider government) must provide greater certainty about future requirements and possible contracts. The proposal to develop a Land Industrial Strategy is a welcome step in this direction.

In the course of this inquiry, it emerged that the Army will be unable to field its warfighting division as planned, reducing it by one Armoured Infantry brigade. This was apparently due to a lack of resources. In addition, the Army is deficient in important capabilities such as artillery and air defence. We heard evidence from witnesses that, despite assurances from the Ministry of Defence, it is possible that such a reduced UK division could be 'overmatched' (i.e. defeated) by its Russian armoured counterpart. This assessment was based on the assumption that current in-service vehicles would be upgraded or replaced, which as this report shows, is a matter of some uncertainty. It appears that the UK's armoured forces are at very serious risk of being both quantitatively and qualitatively outmatched by potential peer adversaries.

This report reveals a woeful story of bureaucratic procrastination, military indecision, financial mismanagement and general ineptitude, which have continually bedevilled attempts to properly re-equip the British Army over the last two decades. Even on the MoD's own current plans, (but subject to the Integrated Review) we are still some four years away from even being able to field a "warfighting division", which, itself, would now be hopelessly under-equipped and denuded of even a third combat brigade.

As a result, were the British Army to have to fight a peer adversary - a euphemism for Russia - in Eastern Europe in the next few years, whilst our soldiers would undoubtedly remain amongst the finest in the world, they would, disgracefully, be forced to go into battle in a combination of obsolescent or even obsolete armoured vehicles, most of them at least 30 years old or more, with poor mechanical reliability, very heavily outgunned by more modern missile and artillery systems and chronically lacking in adequate air defence. They would have only a handful of long-delayed, new generation vehicles, gradually trickling into the inventory, to replace them.

# 1 Context of the inquiry

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## Introduction

1. The British Armed Forces have a long history of operating armoured vehicles, beginning with the use of armoured cars at the beginning of the First World War and the subsequent development and first operational use of the tank in 1916 at the Battle of the Somme. Armoured vehicles were subsequently employed in a range of conflicts and theatres, including the Second World War, Korea, Northern Ireland, the Falklands and the 1991 Gulf War. The British Army most recently employed Challenger 2 tanks in anger in 2003, during the Second Gulf War. These vehicles, alongside other heavily armoured and tracked vehicles, are currently deployed in Estonia as part of NATO's Enhanced Forward Presence mission, with the purpose of deterring Russian aggression.

2. Since the end of the Cold War, the continued relevance of the tank has been the subject of considerable debate.<sup>1</sup> The demise of the Soviet Union and its eastern European satellite regimes were felt to have lifted the forty-year threat posed by the massive armoured and mechanised forces that had been held in readiness east of the Iron Curtain. With the lifting of this threat, Western military thinkers moved from the requirement to maintain large, static and very expensive heavy armoured forces to light and medium weight forces which could be deployed at relatively short notice to potential conflict zones, and were more affordable in the new era of leaner military budgets. This change of direction has met with mixed results; for example, the US Army developed and fielded its Stryker brigades in Iraq but found them not fully up to the task of protecting its troops from an evolving threat from insurgent Improvised Explosive Devices. The UK has fared even less well, stopping and starting a series of programmes aimed to deliver the medium-weight vision.

3. The British Army has struggled to define its role in the post-Cold War World, consumed for a decade fighting intractable and unpopular counterinsurgency campaigns in Iraq and Afghanistan. Today, its armoured vehicle capability has reached a point of batch obsolescence, having fallen behind that of our allies and potential adversaries. Programmes to introduce new vehicles or upgrade existing ones have encountered serious difficulties, resulting in delays, increased costs and cancellations. Partly as a consequence of the failure of these programmes, the Army now finds itself in a vulnerable position.

4. The government's Integrated Review of security, defence and foreign policy promises a radical rethink of the UK's defence posture and therefore capabilities. The Chief of the Defence Staff has spoken of the need to move away (gradually) from industrial age to information age capabilities.<sup>2</sup> Media coverage has speculated that the Army's heavy armour programmes may be reduced to the point where they lack sufficient numbers to be credible or indeed retired altogether, in favour of lighter more deployable platforms that will be delivered through the development of yet to be realised technologies.<sup>3</sup>

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1 [What does the future hold for tanks?](#), Army Technology, 2 January 2017; Peck, M. '[Kings of the Battlefield No More: Are Tanks Obsolete?](#)', The National Interest, 18 August 2016; Snow, S. '[The Marines want to get rid of their tanks. Here's why.](#)' Marines Corp Times, 26 March 2020

2 [Chief of Defence Staff speech RUSI Annual lecture](#), Ministry of Defence, 17 December 2020

3 Fisher, L. 'Defence chiefs face battle over plan to scrap tanks', The Times, 25 August 2020; Korksi, D. 'Tech, not tanks, should be at the centre of our defence planning', The Times, 4 September 2020; Shipman, T & Ripley, T. 'We must sacrifice tanks and sell more arms to fund hi-tech warfare, warns defence secretary', The Times, 6 September 2020

## Our Inquiry

5. Predecessor Committees have addressed the issue of armoured vehicle capability on a number of occasions, both specifically and in the wider review of Ministry of Defence business.<sup>4</sup> The Public Accounts Committee also reported on this issue in 2011.<sup>5</sup> The delivery of any military capability depends upon the coordination and integration of a wide range of components (people, training, equipment, infrastructure *et cetera*). Undertaking a holistic assessment of all these aspects was beyond the scope and resources of this inquiry, and we have deliberately limited ourselves to examining the equipment aspects of the issue.

Our inquiry was launched in July 2020, with a request for written evidence which received 16 written submissions including those from the Ministry of Defence, expert commentators, academic and the defence industry. We heard oral evidence from witnesses across three sessions:

- 6 October 2020
  - Mr Francis Tusa, defence journalist and Editor of Defence Analysis
  - Mr Nicholas Drummond, Director of AURA Consulting and adviser to Krauss Maffei Wegmann.
- 24 October 2020
  - Mr Jeremy Quinn MP, Minister of State (Minister for Defence Procurement)
  - Air Marshal Richard Knighton CB, Deputy Chief of Defence Staff (Military Capability), Ministry of Defence
  - Lieutenant General Christopher Tickell CBE, Deputy Chief of the General Staff, British Army
  - Mr Chris Bushell, Director General Land, Defence Equipment and Support
- 3 November 2020
  - Brigadier (retired) Ben Barry, Senior Fellow for Land Warfare at the International Institute for Strategic Studies

6. As part of our work, the Committee visited the British Army's Armoured Trials and Development Unit and saw four of the vehicles being procured or earmarked for upgrade. We are grateful to Paul Hough, a Special Adviser on the inquiry.

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4 Defence Committee, [The Army's requirement for armoured vehicles: the FRES programme, Seventh Report of Session 2006–07](#), 6 February 2007 para 92; Defence Committee, Defence White Paper 2003, HC 465-I, Fifth Report of Session 2003–04, Volume 1, 23 June 2004, para 116

5 Committee of Public Accounts, [The cost-effective delivery of an armoured vehicle capability, HC1444, Fifty-ninth Report of Session 2010–12](#), 30 November 2011



7. In this report we examine:
  - The history and development of UK armoured capability since the 1990s (Chapter 2)
  - The current state of the UK's armoured capability (Chapter 3)
  - The future of the UK's armoured programmes (Chapter 4)

## 2 The development of UK armoured vehicle capability since the Cold War

8. The story of UK armoured vehicle acquisition since the end of the Cold War is not a happy one. The Ministry of Defence has squandered significant amounts of money, totalling nearly a third of a billion pounds,<sup>6</sup> on a series of overly ambitious requirements and technically complex programmes, resulting in these being abandoned and no planned new vehicles being introduced to service over a 20-year period.<sup>7</sup> For readers with strong stomachs, a detailed narrative can be found in the Annex to this Report.

### The impact of evolving defence strategy

9. For the four decades following the Second World War, the British Army was trained, equipped and funded to face a specific threat: the armed forces of the Soviet Union and the Warsaw Pact. Western forces could not match the quantity of men and materiel held by their potential adversaries, but sought to balance this through the pursuit of a qualitative advantage, gained via superior training and technology.

10. The early 1990s saw Western governments eager to realise a 'peace dividend' through a series of reductions in the costly standing forces that had been maintained for the preceding 40 years. The UK undertook a number of reviews of defence posture and expenditure, the first being the 1990 'Options for Change'.

11. Options for Change resulted in a significant redrawing of the structure of the UK's Armed Forces and was seen as the start of a shift from a threats-based to a capability-based force structure.<sup>8</sup> The Armed Forces as a whole were reduced by 56,000 (18%) by the mid-1990s, with the most significant cuts falling on the Army which was reduced from 160,000 to 120,000.<sup>9</sup> In 1994 the Defence Costs Study sought to realise a further peace dividend and reduced the Army's numbers a further 2,200 by the end of the decade.

12. In 1997, the newly elected Labour government undertook a wide-ranging review of the UK's defence posture, the Strategic Defence Review. The organisation of the Army's armoured forces was modified, with a reduction in the number of armoured regiments and the shift of two reconnaissance regiments to different roles.<sup>10</sup> Following the 9/11 attacks in the United States and the subsequent intervention in Afghanistan, a New Chapter to the SDR was published in 2002, increasing the focus on defending against threats from non-state actors and terrorism.

13. The 2010 Strategic Defence and Security Review had significant implications for the Ministry of Defence and the Armed Forces. Defence was required to make cuts in both personnel and equipment. The Army was to be reduced by 7,000 troops by 2015, and to a size of 82,000 regulars and 30,000 reservists by 2018; all British forces were to withdraw

6 The sum of all the separate wastes of money detailed in this report.

7 With the exception of a small number of armoured engineering vehicles (Trojan and Titan) and Viking protected mobility vehicles.

8 Taylor, C. A Brief Guide to Previous British Defence Reviews, House of Commons Library, SN/IA/5714, 19 October 2010, p9

9 Taylor, C. A Brief Guide to Previous British Defence Reviews, House of Commons Library, SN/IA/5714, 19 October 2010, p9

10 Select Committee on Defence Eighth Report, The Strategic Defence Review, HC 138, Session 1997–98, para 242

from Germany by 2020; the Challenger 2 main battle tank fleet was cut by around 40% to 227 vehicles and the number of AS-90 self-propelled artillery vehicles was reduced by 35%.<sup>11</sup>

14. These significant changes to the Army's force structures were revised further as a result of the 2015 Strategic Defence and Security Review, which led to the 'Army 2020 Refine'. This outlined a new set of structures and forces, including:

- The creation of two new 'Strike' brigades by converting an Armoured Infantry brigade and an infantry brigade. These were to be equipped with new Ajax tracked reconnaissance vehicles and Mechanised Infantry Vehicles;
- That, by 2025, UK 3rd Division would comprise two armoured infantry brigades, a Strike brigade and a Strike experimentation group. This division would be available to NATO under UK command; and
- Establishing the Specialised Infantry forces, created through the conversion of five infantry battalions.

## Shifting requirements and the impact of counter-insurgency operations

15. Since the end of the Cold War, the Army's attempts to replace and modernise its Armoured Fighting Vehicle fleet have not resulted in a significant refresh of its capabilities: the majority of its primary vehicles now in-service were procured before the 1990s, and some as early as the 1960s.

16. As early as 1985 the Army began the Future Family of Light Armoured Vehicles (FFLAV)<sup>12</sup> study with the aim of developing a series of lighter armoured vehicles to replace the already obsolescent FV430 and CVR(T) (Combat Vehicle Reconnaissance (Tracked)) vehicle families. This led to the development of two new programmes: TRACER (Tactical Reconnaissance Armoured Combat Equipment Requirement) and MRAV (Multi Role Armoured Vehicle).<sup>13</sup>

17. The TRACER programme aimed to replace the already aging CVR(T) which had been found to be inadequate during the 1991 Gulf War "in the areas of sensors, stealth, survivability, mobility and lethality".<sup>14</sup> In 1992 the Department began a joint programme with the US to develop TRACER, which envisaged the procurement of some 335 vehicles. The NAO noted in 2011 that the delivery of this programme would require the rapid development of some very advanced technologies, some of which are only now at the stage where they can be incorporated on armoured vehicles.<sup>15</sup> Subsequently the US abandoned the TRACER programme and in 2001 the UK halted its development, with £131m in sunk costs.

11 HM Government, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review*, Cm7948, 2010, p25, para 2.A.8

12 Flach, P. *Lessons from the Procurement of Armoured Fighting Vehicles*, RUSI Defence Systems, June 2010

13 Written evidence, para 3; Flach, P. [Lessons from the Procurement of Armoured Fighting Vehicles](#), RUSI Defence Systems, June 2010.

14 Report by the Comptroller and Auditor General: 'Ministry of Defence The cost-effective delivery of an armoured vehicle capability', HC 1029, Session 2010–12, 20 May 2011, para 2.5

15 Report by the Comptroller and Auditor General: 'Ministry of Defence The cost-effective delivery of an armoured vehicle capability', HC 1029, Session 2010–12, 20 May 2011, para 2.4

18. The MRV programme was intended to replace the obsolete FV430 and Saxon series of vehicles, and in the mid-1990s the UK joined a multinational programme with Germany and France to develop a new eight-wheeled armoured vehicle which could be fitted with interchangeable mission modules. Deliveries of the vehicle were scheduled to begin in 2006.<sup>16</sup> The first operational use of Boxer was by Germany in 2011. However, in July 2003, the Ministry of Defence decided to withdraw from the MRV programme, primarily on the grounds that it was too heavy to be transported on a C-130 Hercules transport aircraft (Boxer weighs up to 36 tonnes).<sup>17</sup> At the point of cancellation the Department had sunk £57m into the programme. Sixteen years later, the Ministry of Defence signed a £2.8 billion contract to procure over 500 of these vehicles (now known as Boxer) to meet the Army's Mechanised Infantry Vehicle requirement. **Even in the sorry recent history of the Army's attempts to procure Armoured Fighting Vehicles, MRV—now Boxer—stands out as a stark example of how shifting priorities and indecision about requirements lead to increased costs and failure to deliver new capabilities.**

19. The Ministry of Defence's next solution for this requirement was to be the Future Rapid Effects System (FRES). The programme had been in Concept phase since 2001, and moved into Assessment in 2004, with an initial In-Service Date of 2009.<sup>18,19</sup> This was a highly ambitious programme aimed at replacing the Saxon, FV430 and CVR(T) fleets with over 3,000 vehicles in Heavy, Utility and Reconnaissance families that would meet 16 different battlefield roles.<sup>20</sup> In 2007 our predecessors concluded that "nine years after the 1997 Strategic Defence Review, the Army's requirement for a medium-weight vehicles remains unmet"<sup>21</sup> and,

"This is a sorry story of indecision, constantly changing requirements and delay. [...] It is high time the MoD decided where its priorities lay".<sup>22</sup>

20. The In-Service Date for the first variant (FRES Utility Vehicle) slipped repeatedly from 2008 to 2012 and finally to 2015. The combination of difficulties faced by the programme increased the overall risk level to unacceptable levels, and the FRES programme was cancelled in 2008, with £133 million having been spent.<sup>23</sup> In 2009 our predecessors concluded that the programme had been a fiasco.<sup>24</sup>

21. While the FRES programme stalled and ultimately unravelled, the British Army had become fully engaged in the campaigns in Iraq (from 2003) and Afghanistan (from 2006 in Helmand province). In the main war fighting phase of the Iraq campaign (in Spring 2003) the UK's armoured forces employed their heaviest vehicles (Challenger 2, Warrior, and others), where they performed well. However, in the subsequent occupation phase, and operations in Helmand province in Afghanistan, these heavily armoured vehicles

16 Report by the Comptroller and Auditor General, Ministry of Defence: Major Projects Report 2002, pp111–112

17 Flach, P. Lessons from the Procurement of Armoured Fighting Vehicles, RUSI Defence Systems, June 2010.

18 Concept and Assessment are the early stages in the Ministry of Defence's CADMID acquisition lifecycle. See [www.asems.mod.uk/guidance/manual/acquisition-lifecycle](http://www.asems.mod.uk/guidance/manual/acquisition-lifecycle)

19 Defence Committee, The Army's requirement for armoured vehicles: the FRES programme, Seventh Report of Session 2006–07, 6 February 2007, p3

20 Report by the Comptroller and Auditor General, Ministry of Defence: Major Projects Report 2006, p162

21 Defence Committee, The Army's requirement for armoured vehicles: the FRES programme, Seventh Report of Session 2006–07, 6 February 2007 para 92

22 Defence Committee, The Army's requirement for armoured vehicles: the FRES programme, Seventh Report of Session 2006–07, 6 February 2007 para 92

23 Report by the Comptroller and Auditor General: 'Ministry of Defence The cost-effective delivery of an armoured vehicle capability', HC 1029, Session 2010–12, 20 May 2011, para 2.19

24 Defence Committee - Third Report, Defence Equipment 2009, Session 2008–09, 10 February 2009, para 95

were not appropriate for stabilisation operations. In lieu of having a medium-weight class of vehicles, British forces had to fall back on the use of much lighter vehicles such as lightly armoured Landrovers (for example the Snatch vehicles, which had previously been used in a public order role in Northern Ireland).

## Lessons from recent experience

22. The above summary of the past two decades of UK armoured vehicle procurement leads us to highlight a number of significant lessons for the future, many of which have been identified previously. These include requirements setting, programme funding and programme management.

23. **The Ministry of Defence and the Army embarked on a series of overly-ambitious procurement programmes which were too reliant on the development of nascent technologies in order to deliver viable capabilities; within these programmes; and, there was a reluctance to trade off capability requirements (such as vehicle weight) leading to programme cancellations and vacillation around decision-making. This was compounded by the desire to adapt requirements to concurrent operational experience. Too often the Ministry of Defence has aimed to deliver the 100 per cent solution tomorrow, rather than the 80 per cent solution today.**

24. A lack of coherence in programme funding repeatedly destabilised projects; between 2005 and 2011, the Department removed £5.6 billion in savings measures from its armoured vehicle programmes, resulting in delays to new vehicles being introduced.<sup>25</sup> **Procurement practices and skills were frequently found wanting; in 2011 the NAO concluded that the failure to introduce any new vehicles since 1997 indicated that, “the Department’s standard acquisition processes for armoured vehicles was not working”.**<sup>26</sup> **Subsequently the Committee of Public Accounts concluded that “there [was] poor accountability for long-term equipment projects”.**<sup>27</sup> **This process is, self-evidently, still not working a decade later.** Frequent changes in personnel within project teams and a lack of ingrained technical knowledge and understanding of armoured vehicle development have also been cited as contributing factors to the failure to deliver new vehicles to the Army.<sup>28</sup>

25. In evidence to this inquiry, Lockheed Martin UK noted that that where the Ministry of Defence acts as a systems integrator or provides assets or resources to the contractor (known as Government Furnished assets or resources - GFX) that “it is important for it to have the necessary resources, capacity, and focus to perform that role, including continuity in technical staff”.<sup>29</sup> **We are concerned that the Ministry of Defence, and in particular Defence Equipment and Support may not have sufficient technically qualified staff and capacity to manage effectively the multiple armoured vehicle procurement and upgrade programmes that are currently underway. Given both the large amounts of taxpayer’s money at stake and the importance of such programmes for our war**

25 Report by the Comptroller and Auditor General: ‘Ministry of Defence The cost-effective delivery of an armoured vehicle capability’, HC 1029, Session 2010–12, 20 May 2011, paras 3.11–3.12

26 Report by the Comptroller and Auditor General: ‘Ministry of Defence The cost-effective delivery of an armoured vehicle capability’, HC 1029, Session 2010–12, 20 May 2011, para 4

27 Committee of Public Accounts, ‘The cost-effective delivery of an armoured vehicle capability’, HC 1444, Fifty-ninth Report of Session 2010–12, 9 December 2011, para 6

28 Flach, P. Lessons from the Procurement of Armoured Fighting Vehicles, RUSI Defence Systems, June 2010.

29 Written Evidence submitted by Lockheed Martin UK, para 20

**fighting capability should deterrence fail, this appalling situation has now become completely unacceptable and must be rapidly reformed, including, if necessary, by senior management changes at DE & S Headquarters at Abbey Wood.**

26. The following chapters of this report will outline the ongoing consequences of the failures to deliver the new types of armoured vehicles required by the Army, the current condition of the UK's armoured forces and prospects for their future.

### 3 The UK's armoured forces today



















27. The preceding Chapter's summary of the development of UK armoured capability since the end of the Cold War makes for depressing reading. It is clear that the Ministry of Defence and the British Army repeatedly failed to procure the range of new armoured vehicles required by our Armed Forces. This resulted in the spending of at least £321m on programmes that were subsequently cancelled and a further £2.8 billion on filling an urgent capability gap. **We are astonished that between 1997 and late 2020 (with the exception of a small number of armoured engineering and Viking protected mobility vehicles) the Department had not delivered a single new armoured vehicle from the core procurement programme into operational service with the Army. It is clear that the Ministry of Defence's armoured vehicle programmes requires independent scrutiny. We ask the National Audit Office to revisit this issue to establish the costs incurred since its 2011 report, progress in delivering current programmes, current armoured capability gaps and the coherency and delivery realism of the Army's current portfolio of armoured vehicle programmes, particularly in the context of the forthcoming Integrated Review.**

28. Partly as a consequence of this failure, British Army personnel were inadequately protected on operations in Iraq and Afghanistan, and some of those currently on deployment in Estonia are equipped with lightly armoured (for example the open-topped Jackal) or obsolescent (FV430 series) vehicles in the face of a significant potential peer threat from Russian forces.

29. Since the Cold War, the British Army's armoured forces have contracted significantly. The assumed removal of the Soviet threat and the requirement to reduce public spending on Defence have led to the Army moving from maintaining three warfighting divisions in the 1980s to struggling to meet a requirement to deliver a single division by 2025.

30. While the scale of the Army's tasks and resources have changed dramatically since the 1990s, a good deal of its armoured equipment capability has remained static. This currently comprises a mix of vehicles introduced to service between the 1960s and the 1990s, alongside some of the Protected Patrol Vehicles procured for the conflicts in Iraq and Afghanistan. For comparison, the Table below shows when the four current primary armoured vehicle types were introduced.

What was happening when the Army's vehicles first came into service

Year	AFV introduced to service	Latest RAF fast jet in-service	Latest Royal Navy warship commissioned	Most popular selling car	Christmas No 1
1962	 FV430 series	 English Electric Lightning (1959-1988)	 Leander Class Frigate (1963-1994)	 Morris 1100	 Elvis Presley - Return to Sender
1970	 CVR(T)	 Hawker Siddeley Harrier (1969 - 2010)	 Type 21 frigate (1971-1994)	 Ford Cortina	 Dave Edmunds - I hear you knocking
1984	 Warrior IFV	 Pavina Tornado (1979-2019)	 Invincible-class aircraft carrier (1980-2005)	 Ford Escort	 Band Aid - Do they know its Christmas?
1998	 Challenger 2		 Type 23 frigate (1987 - current)	 Ford Fiesta	 The Spice Girls - Goodbye

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31. The Ministry of Defence and the British Army have been aware for decades that some of the Army's current vehicles require replacement. For example, in evidence to this inquiry Francis Tusa noted that: "In 1991 (the first Gulf War), one absolutely critical lesson had been learned: Warrior needed a stabilised cannon. The other one was the recce vehicles. They were listed as being close to lethal".<sup>30</sup> Programmes such as FFLAV, TRACER, MRAV and FRES (see paragraphs 16–20) were intended to replace the FV430 and CVR(T) vehicle families. The failure of these programmes means some of the current vehicles are either already obsolete or increasingly obsolescent, having been retained in service for much longer than planned. This obsolescence impacts on the overall capability and combat power of the Army, particularly in the face of a potential peer adversary such as Russia. Furthermore, the Department and the Army now find themselves in a position where a wide array of critical equipment need replacement or upgrade. As Nicholas Drummond told us: "in terms of modernisation, successive governments have kicked the can down the road to the point where the Army is now facing block obsolescence across a broad array of capabilities. This includes armoured vehicles, but also artillery and communications systems".<sup>31</sup>

30 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q1](#)

31 Drummond, N. Written Evidence to Support HCDC Inquiry: "[Progress in Delivering the British Army's Armoured Vehicle Capability](#)", para 1



32. We have not undertaken an in-depth review of the capability shortfalls across the full range of the Army's current vehicles; however, a summary of the key issues may be helpful.

### **Main Battle Tanks**

33. Main Battle Tanks (MBTs) are the heaviest, best protected vehicles, equipped with a large calibre gun designed to destroy a range of targets including other MBTs via direct engagement on the battlefield. Modern MBTs are highly mobile, well armoured and equipped with advanced fire control, sensors and increasingly, active protection systems which can defeat anti-tank missiles.

34. The Challenger 2 is the British Army's sole Main Battle Tank. Introduced in the late 1990s, it may have represented the peak of evolution of UK tank design and production since 1945. Its predecessor (Challenger 1) performed well in the 1991 First Gulf War and, with some environmental modifications. Challenger 2 repeated this during the 2003 invasion of Iraq. However, since its introduction in 1998 the vehicle has not undergone any significant capability upgrades. In the wake of Russian intervention in Ukraine in 2014, and its development of a new generation of main battle tank (the T-14 'Armata'), along with improved armour for in service Russian tanks, concerns emerged about the ability of the Challenger 2 to meet this new threat.<sup>32</sup> The lack of upgrades mean the tank is also less capable than its NATO counterparts such as the German Leopard II and the American Abrams. The Ministry of Defence is clearly aware that our armoured capability is falling behind that of our allies and potential adversaries. In a speech in 2019 the then Defence Secretary said:

“ ... .we must be competitive. We have not been. Challenger 2 has been in service without a major upgrade since 1998. During this time the United States, Germany and Denmark have completed two major upgrades, whilst Russia has fielded five new variants with a sixth pending ... Warrior, is even more obsolete, and is twenty years older than those operated by our key allies. Since Warrior's introduction in 1988 the United States and Germany have conducted four major upgrades and Russia has invested in three new variants”.<sup>33</sup>

35. To address this widening capability gap, the Ministry of Defence has proposed the Challenger 2 Life Extension Project (LEP) to address specific obsolete features of the tank. The original scope excluded a new 120mm L30 Rifled Main Armament, but it did include a provision for the Assessment Phase contractors to undertake a Lethality Study. It has been widely reported that the scope of the LEP has been expanded such that the Demonstration and Manufacture Phases will include a new 120mm smoothbore gun (similar to that used by Germany on the Leopard 2A7).<sup>34</sup> As a consequence of this broadened scope the LEP's estimated whole life cost is £1.3bn.<sup>35</sup> If approved, the upgrade of the tank will be carried out in the UK by Rheinmetall-BAE Systems Limited (RBSL). A decision on whether to proceed with the upgrade project was due to be taken in late 2020, but it appears this has

32 Flannigan, W. '[Has the T14 Armata changed the game?](#)', The Wavell Room, 11 December 2018, accessed 2 February 2021

33 [Defence Secretary keynote speech at the Land Warfare Conference 2019](#), Ministry of Defence, 4 June 2019

34 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 11

35 [Armour MBT 2025](#), MoD Government Major Projects Portfolio data, 2020

been postponed as a result of the delay to the publication on the Integrated Review, now expected in Q1 2021.<sup>36</sup> It is not clear how many of the current 227 Challenger 2 vehicles would be upgraded as part of this project, but media reporting has suggested it may be as few as 148, with the remainder being placed in storage.<sup>37</sup>

36. Our inquiry heard arguments both for and against the Challenger 2 LEP. In its written evidence, the contractor RBSL stated that “[t]he Challenger 2 Life Extension Project ... will create the most capable Main Battle Tank ... in NATO” and that it was wrong to suggest newer vehicles are available from NATO allies, rather that platforms such as Leopard II had benefited from years of incremental upgrades.<sup>38</sup> The Ministry of Defence concurred with this view, noting that:

“once in service [Challenger 2] will be comparable—and in certain areas superior—to the latest version of Leopard 2 and Abrams. It will have the same level of lethality, better survivability, similar levels of mobility and more capable surveillance and target acquisition systems”.<sup>39</sup>

37. In contrast, Nicholas Drummond (a consultant for RBSL competitor Krauss-Maffei-Wegmann) suggested that given armoured vehicle programmes typically take 10 years to implement, by the time the Challenger 2 LEP was completed the vehicle would be close to its projected end of service life (2035–2040), and therefore would not represent value for money. Mr Drummond offered the alternative view that the UK would be better to purchase off-the-shelf the latest variants of Leopard II or Abrams as a bridge to the development of a next-generation main battle tank in the 2040s.<sup>40</sup>

38. We do not propose to recommend which course the Ministry of Defence should take (on the assumption that the Integrated Review concludes that the UK should retain heavy armour). **We note that the Department’s recent experience of upgrading older vehicles with new weapons and turrets has been difficult, resulting in additional costs and delays in delivering the required capability. The Challenger 2 LEP calls for the integration of a new digitised turret and main gun, along with other upgrades, within an existing hull. When making the decision on whether to proceed with the programme, the Department must ensure that it has reduced such risks as far as possible and fully weighed the options between upgrade and an off-the-shelf replacement. The Department should also provide us with a timetable for the programme and explain what alternatives have been considered. We also believe that the Department should examine the possibility of fitting Challenger with an automatic loader.**

39. **We do not want to see the Army forced to ensure a lengthy capability gap as a consequence of emergent technical and integration issues. The Department should confirm to us that the UK’s main battle tank capability is currently fit for purpose and will remain so until Challenger 2 LEP reaches Full Operating Capability (assuming this project is approved later in 2021).**

36 Ripley, T. ‘[UK delays programme decisions on armoured vehicles](#)’, Janes Defence News, 12 January 2021

37 Cranny-Evans, S. ‘[UK to reduce operational Challenger 2 tank fleet](#)’, Janes Defence News, 23 April 2019

38 Written evidence submitted by Rheinmetall BAE Systems Land (RBSL), [AVF0013](#), paras 15–16

39 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 11.

40 Nicholas Drummond Written Evidence, para 11

## Armoured Infantry Fighting Vehicles

40. Armoured Infantry Fighting Vehicles (AIFVs) are heavily armoured vehicles designed to carry infantry sections into close combat with enemy forces and are typically equipped with light guns and a canon that can fire missiles to support the infantry and protect themselves from enemy vehicles, as well as to support tanks.

41. The Warrior Infantry Fighting Vehicle (IFV) was introduced to service in the late 1980s, designed to carry, protect and support infantry into close combat within the context of a high-intensity conflict in Western Europe. Built by GKN Defence (subsequently acquired by Alvis and later BAE Systems - now RBSL), 759 Warrior variants were manufactured. It performed well in the Balkans and Iraq, but was less suited to operations in Afghanistan, proving vulnerable to large, buried improvised explosive devices. A key vulnerability for the vehicle is its inability to fire while moving (it lacks a stabilised gun), and the vehicle has not received any significant upgrades for decades.

42. In 2009 the Army began the Warrior Capability Sustainment Programme (WCSP) to upgrade the weapon and turret of the vehicle, as well as enhancing armour protection and the vehicle's electronic systems. The contract for WCSP was awarded to Lockheed Martin UK in 2011. **Despite having spent around 50% of the allocated budget (£800 million), the programme has yet to place a manufacturing contract. The programme has a current in-service date of 2024 (originally planned for 2017) and is some £227 million over budget.**<sup>41</sup> After a decade of effort, this abject failure to deliver against both cost, (with an overrun now totalling over a quarter of a billion pounds of public money) and timescale (ISD seven years late) is clearly totally unacceptable. Nevertheless, it is symptomatic of the extremely weak management of Army equipment programmes, by both DE & S and the Army Board itself, in recent years.

43. The Warrior CSP has experienced significant technical problems, notably around the integration of the new turret and a 40mm Case Telescope Weapon that was mandated by the Department into the existing hulls, in part driven by Ministry of Defence specifications and delays in providing components to the contractor.<sup>42</sup>

44. In addition to multiple previous problems with the integration of the new turret and cannon, there have been suggestions that the associated 'caseless' ammunition is extremely expensive. *The Ministry, which mandated this weapons system, should therefore now be fully transparent about the cost of this new, highly specialised ammunition and its implications for the full life-cycle costs of the vehicle (and indeed for Ajax, which utilises the same weapon system).*

45. As part of this inquiry, we specifically asked whether, in light of its challenges, it made sense to continue with the Warrior CSP particularly in the context of anticipated changes arising from the Integrated Review. The Ministry of Defence told us that the case for the programme had "recently been reviewed and confirmed as the recommended best value for money route to enduring competitive advantage out to 2040" and that the upgraded vehicle "will provide a genuine close combat advantage against current and future adversaries, especially when teamed alongside [the upgraded] Challenger [2]".<sup>43</sup>

41 [Armoured Infantry 2026 - Warrior Capability Sustainment Project Accounting Officer Assessment](#), 29 January 2019

42 Written Evidence submitted by Lockheed Martin UK, [AVF008](#), para 11

43 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 7

Further to this, Lockheed Martin UK stated that: “[a]rmoured infantry fighting vehicles support all mission types, including high intensity warfighting, peacekeeping, peace enforcement, counter insurgency, conventional deterrence, and the deterrence of sub-threshold activities”.<sup>44</sup>

46. Nicholas Drummond made the point that if the Warrior upgrade was to be cancelled (effectively retiring the vehicle from Army service), this “would not change the need. The Army still needs an infantry fighting vehicle. It will be 380 vehicles short if it does not get Warrior. If you do not have that vehicle, that means you have to send troops into combat without protected mobility and that will put lives at risks”.<sup>45</sup>

47. **We note the significant delay and expenditure on the continuation of the Warrior CSP and that, after nine years and over £400 million in sunk costs, the Department has still to decide on the placement of a production contract. We would expect the Department to assess carefully the merits of continuing with the programme against both the potential for further technical challenges and whether the upgraded vehicle is still the best option for the Army in light of the Integrated Review. The Department should set out what steps it is taking to ensure there is no capability gap.**

### **Armoured reconnaissance vehicles**

48. Armoured reconnaissance vehicles are typically lighter armoured vehicles, either tracked or wheeled, equipped with a range of optical devices and sensors which enable them to locate, track and report on enemy forces and positions.

49. The Combat Vehicle Reconnaissance (Tracked) (CVR(T)) is a family of light armoured vehicles which entered service in the 1970s. The series includes reconnaissance vehicles (Scorpion and Scimitar), armoured personnel carriers (Spartan), command vehicles (Sultan), ambulances (Samaritan), anti-tank missile launchers (Striker) and armoured recovery vehicles (Samson). Scorpion and Striker have been withdrawn from service, but the remaining variants still play an important role in the Army's mechanised forces.

50. The Ministry of Defence's chosen replacement for CVR(T) is the Scout/Ajax programme (at a value of £4.6 billion),<sup>46</sup> designed to replace the Army's armoured reconnaissance vehicles. Ajax is a family of six variants and represents some of the technology investment resulting from the Army's failed Future Rapid Effects System (FRES) programme. The Army expects to procure some 549 variants of these vehicles by the mid-2020s, being manufactured in Wales by General Dynamics Land Systems UK (GDLSUK). **The first vehicles were originally due to be delivered to the British Army in April 2017, however this was delayed.<sup>47</sup> In May 2020 it emerged that the delivery of the first batch of Ajax vehicles was to be delayed further as they were found not to be ready to be accepted into service. It is not exactly clear what caused this delay but, in its evidence to the inquiry GDLSUK stated that delays had occurred in agreeing requirements and challenges with the integration of the 40mm weapon system mandated by the Ministry**

44 Written Evidence submitted by Lockheed Martin UK, [AVF008](#), Executive Summary

45 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q8](#)

46 Outside of the Defence nuclear enterprise, Ajax is currently the single largest procurement contract by value within the Defence Equipment Plan.

47 Armoured Fighting Vehicles, Question for Ministry of Defence, [UIN 52582](#), tabled on 11 November 2016

**of Defence - similar to the issue on the Warrior programme.**<sup>48</sup> The first six Ares (non-turreted variant) vehicles were subsequently delivered to the Army in July 2020.<sup>49</sup> In November 2020 the Secretary of State for Defence told us: “[f]or Ajax, there is currently a slight pause in the area around the turret. We are trying to sort out some issues with the turret. That has caused a delay”.<sup>50</sup>

**51. The Ajax programme, which is now also seriously delayed, is yet another example of chronic mismanagement by the Ministry of Defence and its shaky procurement apparatus. This is particularly worrying, as Ajax is fundamental to the establishment and deployment of the Army's new Strike Brigades, which are intended to be a key part of its future order of battle. As the Ministry materially contributed to delays to both Warrior and Ajax—by insisting on a complex, new generation 40mm cannon, when other tried and tested alternatives were available—they should now publicly justify why this decision was taken and by whom in Main Building, on the Army Board or at DE & S and what urgent action is now being taken, to mitigate its obviously deleterious effect.**

52. In their submission to the Committee, GDLSUK stated that Ajax would be “the British Army's most sophisticated armoured vehicle, a transformational reconnaissance platform and the first of a new generation of Digital Platforms, able to respond rapidly to changes in threat and new technologies”.<sup>51</sup> This was supported by the Ministry of Defence, which stated Ajax would contribute to the “creation of highly advanced, digitised, sensor enabled systems connected to an operational picture via secure fast networks” and that “in the longer term upgraded, digitised and networked AFVs will be a critical link to the ‘autonomous’ future of armoured capability through human and machine teaming. They will transform the way we operate and fight”.<sup>52</sup>

53. Some commentators have raised doubts about the suitability of the Ajax vehicle in a reconnaissance role, specifically regarding its weight and size and ability to deploy rapidly.<sup>53</sup> Nicholas Drummond echoed some of these concerns in his evidence to the inquiry; he noted that with the proliferation of increasingly sophisticated sensors deployed on aircraft and unmanned drones, there was doubt that a dedicated reconnaissance vehicle was necessary, and that at 43 tonnes Ajax was “anything but stealthy and agile”.<sup>54</sup> (In fact, Ajax, which is essentially a reconnaissance vehicle, is now heavier than most variants of the Sherman battle tank, used extensively by both the U.K. and US armies in World War Two, over 70 years ago, and much heavier and less air-transportable than the 7.8 tonne Scimitar it is intended to replace.) He also pointed out that the Army's intent to use Ajax

48 Written evidence submitted by General Dynamics Land Systems UK, AFV0011,

49 [First Ares Armoured Vehicles Delivered to the Army](#), British Army, 27 July 2020

50 Defence Committee Oral evidence: Defence contribution to the UK's pandemic response, HC 357, Tuesday 24 November 2020, [Q131](#); the Infrastructure and Projects Authority has reported that there were some safety operating clearance issues with Ajax's turret, requiring remedial engineering, resulting in a delay; it also noted that General Dynamics Land Systems UK had been late in producing safety cases, also resulting in delays to delivering vehicles to the Army (Source: [MoD Government Major Project Portfolio data](#), September 2019)

51 Written evidence submitted by General Dynamics Land Systems UK, AVF0011, Executive Summary

52 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 1

53 Hookham M & Collinridge, J. 'Tanks too heavy to fly in one piece', *The Sunday Times*, 5 February 2017; Richardson, H. '[Equipping the UK STRIKE Brigades](#)', *European Security and Defence*, 25 June 2020, accessed 4 February 2021.

54 Written evidence, Nicholas Drummond, para 2c

in its planned Strike brigades was problematic as these tracked vehicles would struggle to keep with the wheeled Boxer mechanised infantry vehicles and would be difficult to deploy without increased investment in Heavy Equipment Transporter vehicles.<sup>55</sup>

54. We note that difficulties with the Ajax programme have again arisen in part as a consequence of the Army's desire to develop a bespoke vehicle capability (albeit one based on an existing but modified ASCOD 2 hull), with a plethora of complex requirements, and the need to integrate a novel weapon system technology. We welcome the assurances from General Dynamics Land Systems UK that the challenges facing the Ajax programme have been largely resolved and look forward to these new advanced vehicles being delivered to frontline units as soon as possible. *The Ministry of Defence must ensure that there are no further delays to this expensive programme. We also note that there may be potential synergies between Ajax and a revised requirement for an armoured infantry fighting vehicle. In the event that the Warrior Capability Sustainment Programme does not proceed the Army should explain how that Infantry Fighting Vehicle role would be fulfilled and if a further AJAX variant may be a potential candidate, with the associated benefits of in-service support.*

### Armoured personnel carriers

55. Armoured personnel carriers (APCs), also referred to as mechanised infantry vehicles (MIVs), are more lightly armoured vehicles, designed to enable the movement of troops while providing a degree of protection from artillery fire and small arms. They are typically not intended to engage in direct combat with enemy armoured forces.

56. Currently the British Army's primary mechanised infantry vehicle is the FV430 series. Some 2,500 of these vehicles were introduced to service from 1962, the most common variant being the FV432 armoured personnel carrier. This vehicle family has been the workhorse of the British Army's mechanised units for 60 years, and repeated failures (see paragraphs 18 to 20) in procuring replacement vehicles have required their retention for much longer than originally envisaged. In 2006 the Army signed an £85 million contract to update at least 500 of the FV430 vehicles to a modernised version (the Mk3 or 'Bulldog' variant, including improved armour, a new engine and upgrades to other automotive components) and these upgraded versions saw operational service in both Iraq and Afghanistan. During our inquiry we challenged the Ministry of Defence on the continued use of these obsolete vehicles. Lieutenant General Tickell told us that:

"We need to replace Bulldog, no question. There is a programme called the Armoured Support Vehicle that will replace Bulldog. That will come online at the back end of this decade. In an ideal world, if I had a magic wand, would we do it sooner? Yes, but, frankly, there is continued need to prioritise. Actually, the Bulldog is very cheap to run and delivers people to the right place at the right time, and it is therefore right that we prioritise programmes such as Challenger, Warrior, Ajax and Boxer, but we absolutely recognise that we need to get after Bulldog sooner rather than later".<sup>56</sup>

55 Written evidence, Nicholas Drummond, para 2c

56 Defence Committee Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, 20 October 2020, [Q108](#)

57. When we asked if the FV430 series was suitable for contemporary warfighting operations, Lt Gen. Tickell responded “its key limitation is the fact that it will not be able to link into the digital spine as our new platforms are able to do. That is why we want to replace it”.<sup>57</sup> **We recognise that the Army must prioritise its equipment spending to specific areas of capability, but consider it unacceptable that the replacement of the FV430 series may not be in service until the 2030s, meaning that this vehicle will have been in service for some 70 years. We urge the Department to seek options to bring a replacement for the FV430 series earlier than currently planned. The Army should update us on the status of the programmes that will provide the ‘digital spine’ referred to by Lt. General Tickell.**

58. The Boxer Mechanised Infantry Vehicle will form the backbone of the British Army's long awaited medium-weight capability. As previously noted (see paragraph 18), the UK was originally a member of the joint venture to develop this vehicle (MRAV) but withdrew in 2003 as the Army decided the vehicle was too heavy. In 2007 it was a competitor in the ultimately abandoned FRES Utility Vehicle programme, in which the General Dynamics Piranha V was named as the preferred bidder.<sup>58</sup> Boxer will be used to equip the mechanised infantry battalions in Strike brigades, alongside Ajax-equipped reconnaissance regiments. In 2019 the Ministry of Defence signed a £2.8 billion contract with OCCAR<sup>59</sup> to procure 508 of these vehicles from ARTEC,<sup>60</sup> comprising personnel carrier, ambulance, command and specialist carrier variants. These are scheduled to begin delivery to the Army in 2023<sup>61</sup> and will span nine years, with only one vehicle being delivered per week. When challenged on this Air Marshal Richard Knighton, Deputy Chief of the Defence Staff for Military Capability, told us:

“The programme of delivery will be determined partly by the capacity and capability in the facility at Telford, and there's really very little opportunity for us to accelerate that, over the next few years. But we are considering, through our planning as part of the spending review and integrated review, what the options and opportunities might be to accelerate the production rate and delivery ... One is that that will help the British Army to make the transition to use of Boxer, which we think is going to be really important for the kind of operations that the Chair talked about earlier”.<sup>62</sup>

59. A clear benefit offered by the Boxer family of vehicles is the sharing of single chassis type, offering commonality of components and spare parts, simplifying logistic support and vehicle maintenance, although the benefit for in-service support has not been publicly quantified by the Army. Rationalisation of the large number of different vehicle types used by the Army would bring similar benefits. As the Department's written evidence to this inquiry put it:

57 Defence Committee Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, 20 October 2020, [Q110](#)

58 [Future Rapid Effects System](#) (FRES)

59 Organisation Conjointe de Coopération en matière d'ARmement, or the Organisation for Joint Armament Cooperation is a European intergovernmental organisation that manages collaborative armament programmes through their lifecycle between the nations of Belgium, France, Germany, Italy, Spain, and the United Kingdom.

60 ARTEC a Joint Venture between Rheinmetall MAN Military Vehicles and Krauss Maffei Wegmann (KMW).

61 '[BOXER for the British Army](#)', British Army, 5 November 2019, accessed 5 February 2021

62 We understand production will also take place at WFEL in Stockport. Defence Committee Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, 20 October 2020, [Q128](#).

“We need to look at a number of other variants of vehicles across the piece in order to reduce the range of vehicle types that we have, thereby gaining the efficiencies of the investment that we have made so far in programmes such as Boxer. That is an area that defence will be looking at going forward into the future. Another course would bring benefits in terms of savings to defence, if we can rationalise down to a lesser number of basic platforms”.<sup>63</sup>

60. We welcome the decision to procure the Boxer armoured vehicle for the British Army, albeit more than ten years later than would have been the case had the UK stayed in the original multi-national consortium. *As part of the Integrated Review and associated funding decisions, the Department should seek to accelerate the procurement of Boxer to ensure the Army receives this new capability as soon as possible. In particular we are astonished that the current contract only provides for production of one vehicle a week. In parallel, the British Army, while exploring the range of options Boxer may offer, should learn the lessons of previous failures and avoid adding additional requirements while it is being delivered. Once the vehicle is in-service options to incrementally add upgrades or extra capability may be pursued.*

61. We believe that commonality of platforms and modularity of capability such as sensors and weapon systems will be an essential element in maintaining an effective and capable Army. *The Department should ensure that future decisions around procuring new vehicles give greater weight to the undoubted benefits offered by both commonality of vehicle hulls and the modularity of equipment and weapons systems. It should be a matter of course that weapon systems and, for example, refrigeration units for vaccines, can be moved easily between platforms, even if produced by different manufacturers.*

## Overmatching the threat

62. In its written and oral evidence to this inquiry, the Ministry of Defence told us that British Army armoured forces, and in particular the deployable warfighting division (which the 2015 Strategic Defence and Security Review stated should be available by 2025)<sup>64</sup> would be able to ‘overmatch’ the threat posed by potential peer adversaries, however the Department’s evidence did not make clear if this was currently the case:

“The MOD would always seek to ‘over-match’ threats, rather than match them, (both physical and virtual) by seeking asymmetric advantage, potentially via novel offset strategies and by the development and co-ordination of a whole range of capabilities”.<sup>65</sup>

63. In its written evidence the Ministry of Defence disclosed for the first time that the Army would be unable to deploy the full warfighting division as set out in 2015:

63 Defence Committee Oral evidence: Progress in delivering the British Army’s armoured vehicle capability, HC 659, 20 October 2020, [Q134](#)

64 SDSR 2015 called for a warfighting division which could call on two armoured infantry brigades and two new Strike brigades to form a division of three brigades. HM Government, ‘[National Security Strategy and Strategic Defence and Security Review 2015 A Secure and Prosperous United Kingdom](#)’, Cm 9161, 2015 Para 4.48

65 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 6



“By 2025, the Army will be able to field a war-fighting division... consisting of a single Manoeuvre Brigade (Armoured Infantry) and an interim Manoeuvre Support Brigade (from Strike and Light Infantry)”.<sup>66</sup>

64. The figure on page 45 shows the difference between the 2015 and the new division, together with the size of a Russian division. The Department explained this shortfall of a full armoured infantry brigade thus:

“The 2015 SDSR, and subsequent planning round decisions, did not fully resource the Army to achieve this output within this timeframe. In the face of ongoing departmental financial challenges, subsequent programming decisions have kept the modernisation programme alive but placed it under increasing pressure and resulted in an inability to fully meet the 2015 SDSR ambition”.<sup>67</sup>

**65. We are alarmed by the revelation to this inquiry that a core aspect of the plans set out in the 2015 SDSR will not be met. In its response to this Report the Ministry of Defence should provide a detailed explanation of the specific shortfalls (equipment, logistic support, personnel et cetera) that have led to this situation, setting out when these were first identified, and what plans exist to rectify this in a given timescale.**

66. We asked the Minister for Defence Procurement, Jeremy Quinn MP, about the ability of UK armoured forces to meet a peer adversary threat:

**Derek Twigg:** “Minister, in 2025, will a British warfighting division be capable of overmatching the forces of a peer opponent such as Russia?”

**Jeremy Quin:** “Absolutely. Our objective is to ensure we have a high-end and extremely capable warfighting division, and that comes from a layered approach. We are learning the whole time about what is going on in other theatres, such as in Syria, in Ukraine and, sadly, right now in Armenia and Azerbaijan. We need to understand how to ensure that we have the very top capabilities. ...As the General was saying, it comes from investment in ISTAR and deep strike. Absolutely, we will ensure we are in a position, alongside our NATO allies, take on adversaries wherever the threat should come. However, we are asking far more of the Army than that ... The answer to your question is yes.”<sup>68</sup>

We note that the Minister stated that our forces will be capable of overmatching a peer adversary such as a Russian armoured force by 2025.

67. Brigadier (retired) Ben Barry, Senior Fellow for Land Warfare at the International Institute for Strategic Studies, cast doubt on the Ministry of Defence’s assertions on the ability to overmatch peer adversaries, both now and by 2025:

“Since the Russian threat to NATO’s eastern states is heavy in armour, NATO requires a credible land armoured warfare capability to deter and if necessary, defeat Russian armoured forces. Evidence suggests that the

66 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 2

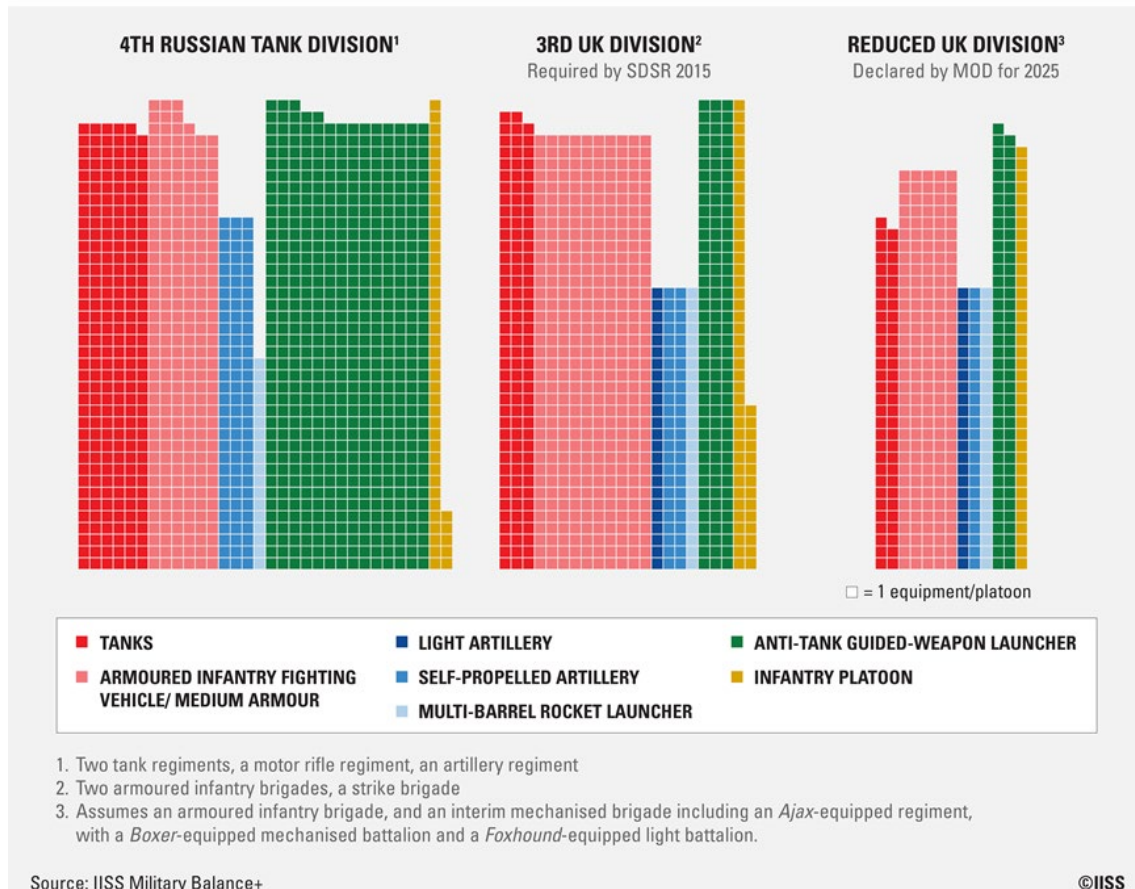
67 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 2

68 Defence Committee Oral evidence: Progress in delivering the British Army’s armoured vehicle capability, HC 659, 20 October 2020, [Q99](#)

British Army expects to play a major role in any such war ... The most challenging peer adversary for the 3rd Divisions' capability is Russia. To match Russian tank or motor rifle formations, in 2025, the division will need to exploit its strengths, but find ways of overcoming its weaknesses".<sup>69</sup>

Brigadier Barry's analysis of the reduced warfighting division the Department now expects to be able to deliver by 2025 suggests that it will not be able to overmatch a modern Russian armoured division, and rather it would find itself overmatched.<sup>70</sup> The figure below illustrates this analysis, highlighting a severe imbalance in terms of armoured forces and anti-armour capability with the posited reduced UK division versus a Russian counterpart.

### Combat equipment and units in Russian and British divisions



68. Brigadier Barry explained the implications of this imbalance:

“The reduced UK division basically has half the anti-armour capability, only 30% of the tanks of a Russian tank division, two-thirds of the armoured infantry fighting vehicles, 20% of the anti-tank guided weapons and 15% of the self-propelled artillery. It would be very difficult for that reduced division to stop a Russian tank division. A Russian tank division would seriously overmatch the reduced Third Division. “Overmatched” is a very polite, clinical way of saying “could be defeated”.<sup>71</sup>

69 Written evidence submitted by Brigadier (Retired) Ben W. Barry OBE Senior Fellow Land Warfare International Institute for Strategic Studies (IISS), [AVF005](#)

70 Barry, B. ‘[British Army heavy division comes up light](#)’, Military Balance Blog, IISS, 8 January 2021

71 Defence Committee Oral evidence: Defence contribution to the UK's pandemic response, HC 357, Tuesday 24 November 2020, [Q161](#)

69. The Russian armed forces have undertaken a wide-ranging programme of modernisation, particularly with regards to its land forces. IISS analysis has highlighted the investment Russia has made in improving its land forces' capability:

“Russia’s Ground Forces are today smaller and more capable than they were in the mid-1990s. Elements of these forces are held at a high state of readiness and have had recent combat experience... The inventory of the Ground Forces, certainly the manoeuvre formations, will in the immediate future consist of some wholly new equipment types, as well as a large number of modernised platforms, such as the T-72B3. [T]here has been particular progress in improving artillery and missile capabilities ... These hold the potential, when combined with new command-and-control systems and unmanned aerial vehicles, to improve the ability of Russia’s forces to find, fix and strike adversary formations at greater range than before”.<sup>72</sup>

70. These observations appear to be supported by other analysis. The RAND Corporation has noted that while Russia’s ground forces have received a relatively small amount of funding, they:

“draw heavily on adapted Soviet-era platforms, such as the T-72, BMP-2, and BTR-80/82. These platforms can be made almost as effective as new platforms with the addition of new components, such as fire control or active protection systems at a fraction of the cost. Since 2013, the proportion of tank forces has grown within the Ground Forces, and the size and capability of [manoeuvre] ground forces in Western Russia has expanded ... These developments have significantly increased the capabilities of Russian Ground Forces, for example around the Ukrainian border”.<sup>73</sup>

RAND’s analysis makes it clear that while Russia is modernising its ground forces, it cannot afford wholesale replacement of its legacy vehicle fleets. However, it has allocated a good deal of resources into ground combat system research and development and, through upgrade programmes has “closed some of the quality gap with the United States and NATO with relatively small investments because most countries have been minimizing expenditures on expensive heavy [armour]”.<sup>74</sup> Ben Barry noted in his written evidence that an important element in Russia’s modernisation efforts has been the ‘disruptive’ development of active protection systems, designed to defeat anti-tank guided missiles, which would reduce the effectiveness of NATO missile-based anti-armour capabilities, increasing the importance of tanks in this role.<sup>75</sup>

71. As we have noted earlier in this chapter, efforts to address the obsolescence of the Army’s primary armoured fighting vehicles have met with repeated delay, indecision and technical obstacles. It appears that the UK’s current armoured capability may find itself both quantitatively and perhaps qualitatively overmatched by a peer adversary. The current

72 ‘An introduction to Russia’s military modernisation’, IISS, 30 September 2020

73 Radin, A, *et al*, [The Future of the Russian Military: Russia’s Ground Combat Capabilities and Implications for U.S.-Russia Competition](#). Santa Monica, CA: RAND Corporation, 2019, p52

74 Radin, A, *et al*, [The Future of the Russian Military: Russia’s Ground Combat Capabilities and Implications for U.S.-Russia Competition](#). Santa Monica, CA: RAND Corporation, 2019, Appendix E, p85

75 Written evidence submitted by Brigadier (Retired) Ben W. Barry OBE Senior Fellow Land Warfare International Institute for Strategic Studies (IISS), [AVF005](#). See also Dr Karber, P. ‘[RUS-UKR War Lessons Learned](#)’, Potomac Institute, Conference Paper, July 2015

Enhanced Forward Presence battlegroup is equipped with non-upgraded Challenger 2s, Warriors, obsolete FV430s and lightly protected, open-topped Jackal vehicles. As Francis Tusa noted in his evidence:

“The Russian threat ... is the one that represents a serious threat to this country today ... You could, for the sake of argument, send people in Jackals and Land Rovers to counter the Russian threat, but not if you want them to come back ... I wonder whether sometimes people try to overplay the fact that we can use [Jackal] in peer-on-peer warfare. Lack of overhead protection strikes me as a significant problem.”<sup>76</sup>

**72. While we welcome the ongoing efforts to modernise the fleet, new vehicles will only trickle into service over the next four years, and it seems unlikely that they will do so in sufficient numbers to make a material difference by 2025. For example, the Ministry of Defence does not expect to contract for the upgrade of Challenger 2 until later this year (assuming the Integrated Review concludes that heavy armour should be retained). Given the recent history of UK armoured vehicle programmes, it seems unlikely that enough upgraded vehicles will have been completed, tested and brought into service within four years.**

### Addressing other capability gaps

73. As the Ministry of Defence noted in its evidence, the capability of the warfighting division will be developed through the layering of multiple assets and resources, not just its armoured vehicles. The Department's evidence acknowledged that there are a number of other capability gaps relating to its armoured forces:

“The current assessment of armoured vehicle capability gaps includes the requirement for a Mobile Fires Platform, a Future All-Terrain Vehicle (a multinational collaboration alongside the German, Dutch and Swedish armies), a mortar variant and a repair (crane) variant of Boxer and an Armoured Support Vehicle (to replace a number of platforms including Bulldog which has been in service since the 1960s)”.<sup>77</sup>

Other witnesses to the inquiry support this view and noted other gaps that needed to be filled. Nicholas Drummond told us:

“That speaks to the missing capabilities that the Army needs to invest in ... The first is artillery. It needs to do a wholesale renewal of its artillery systems ... it needs to have the ability to fire anti-tank missiles from under armour. It does not have that ability. It urgently needs that. The third missing capability is air defence. We are woefully short, and we would get absolutely spanked if we went to war without investing there”.<sup>78</sup>

76 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q20](#)

77 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 12

78 Defence Committee Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, 20 October 2020, [Q33](#)

Ben Barry concurred:

“Another firepower differential is the capability to fire ATGW from underneath armour. In the Cold War, the British FV 438 and Striker AFVs could fire Swingfire ATGW from under armour... Between 1991 and 2005 these capabilities were all abandoned... So, when British [armoured forces] are attempting to manoeuvre against the enemy, the only way of rapidly firing Javelin ATGW will be for crews to stand in open vehicle hatches. This will be slower than if the British had ATGW equipped turrets and the operators will be much more vulnerable to enemy fire ... With its aviation brigade due to receive 50 new AH64E Apache helicopters, the British Army will have a powerful rotary wing ATGW capability... But the aviation brigade's effectiveness will be limited by two “inconvenient truths”. The first is that the Russian Army has a much greater air defence capability than the British army. Secondly, enemy AFVs fitted with active protection will be much less vulnerable to Hellfire missiles ... Russian indirect fire is likely to outgun, outrange and outnumber indirect fire available to UK and NATO formations ... This will place their opponents at a considerable disadvantage, increasing the chance of artillery fire damaging AFVs, and destroying light armoured vehicles. This increases the importance of replacing the remaining FV432 and CVR(T) vehicles in the Army. It also increases the importance of modernising the Army's artillery, an enhancement that does not appear to be funded.”<sup>79</sup>

74. We note that a key lesson that has emerged from the Russian intervention in Ukraine since 2014 (and more recent conflicts in Iraq, Syria and Nagorno Karabakh) is its use of artillery combined with surveillance capabilities such as unmanned drones, allowing its forces to strike targets within minutes of spotting them.<sup>80</sup>

75. Russian military doctrine has traditionally placed great emphasis on the value of artillery, as the “God of War.” Modern Russian missile and rocket artillery systems, such as the “Smerch” 300mm rocket artillery system, are designed to rapidly obliterate enemy formations unless they are adequately protected, including protection under armour. During the Russian incursion into Eastern Ukraine in 2014, some Ukrainian military formations, once located and then very rapidly subjected to intense, highly-concentrated, Russian artillery and rocket bombardment, simply ceased to exist within a matter of minutes.

76. In response to this very potent threat, the British Army has now retired most of its Multiple Launch Rocket System (MLRS) regiments from front-line service. Instead, it now relies mainly on a limited number of AS-90 self-propelled howitzers which, as well as being some 30 years old, and mechanically unreliable as a result, are now both outranged and outgunned by their Russian equivalents. **An “artillery duel” between a modern British and Russian division would now only be likely to end one way—and not necessarily to the British Army's advantage.**

79 Written evidence submitted by Brigadier (Retired) Ben W. Barry OBE Senior Fellow Land Warfare International Institute for Strategic Studies (IISS), [AVF005](#).

80 Angevine, R et al, [Learning Lessons from the Ukraine Conflict, Institute for Defense Analyses](#), May 2019 p9

77. The AS-90 self-propelled howitzer is the British Army's only large calibre (155mm) tubed artillery piece. This vehicle was built in the early 1990s from Vickers Shipbuilding and Engineering (now RBSL), with some 179 being procured. It has not received any significant upgrades during its life and by 2017 the number of vehicles in service had been reduced to 110. The AS-90 is out-ranged by many potential adversaries and its of ammunition suite has not been refreshed since it entered service. The AS-90 is currently scheduled to leave service in 2030, with work underway to identify a replacement (the Mobile Fires Platform requirement). **We share our witnesses' concern that, considering recent experience in Ukraine and elsewhere, UK armoured forces may find themselves at a serious disadvantage in terms of artillery capability and air defence when facing a peer adversary. The Ministry of Defence must urgently pursue options to address shortfalls in artillery, air defence and anti-drone capabilities.**

78. **It is alarming that for at least the next several years UK armoured forces may find themselves overmatched by their most challenging peer adversary. During the Cold War, the British Army and its NATO counterparts sought to offset the numerical advantage held by the Warsaw Pact through the superior quality of its equipment, training, and people. While we do not believe Army personnel have diminished in their capability and motivation, it does appear that our heavy armoured equipment has fallen behind in terms of both quantity and quality.**

## 4 The future of UK armoured capability

79. The UK's armoured forces are at a pivotal point regarding their future size, nature and role. The Integrated Review and the associated Integrated Operating Concept are intended to provide a new strategic vision for the Armed Forces and how they will operate. This may entail the requirement to maintain heavy armour heading into the sunset, to be replaced in due course by lighter, more agile forces which draw their combat power from 'sunrise' capabilities such as being increasingly 'networked' and equipped with superior technology suitable for the information age. However, critics of this approach point out that our most-likely peer adversaries (Russia and China) still retain significant armoured forces and have been modernising them, highlighting the need to retain the UK's equivalent or rely on allies. The UK faces a series of decisions about its continued readiness for high intensity land warfare and how this may evolve over the coming decades.

### The Integrated Review and the Integrated Operating Concept

80. Following the 2019 General Election, the government announced the launch of an Integrated Security, Defence and Foreign Policy Review ('the Review'), which was heralded as "the most radical reassessment of [the UK's] place in the world since the Cold War".<sup>8182</sup> The emergence of the coronavirus pandemic in early 2020 led, understandably, to a delay in completing the review and at time of writing the latest estimate for its publication is March 2021.<sup>83</sup>

81. In common with previous reviews of the UK's defence posture, the behind- closed-doors nature of the review has been punctuated with media briefings and speculation about possible outcomes and the types of capabilities that may be enhanced or cut back as a result. This has been particularly true with regard to the future of the UK's armoured capability.<sup>84</sup> In binary terms, the two sides of the debate can be summarised as

- a) those who see heavy armour as a Cold War anachronism which absorbs funding that could be better spent on new and emerging technologies such as 'cyber' (however this might be defined) and unmanned drones; and,
- b) proponents of the view that heavy armour is and will remain an important capability, reinforced by recent conflicts in Ukraine and the Middle East.

82. The former argument was crystallised in an opinion piece by the Defence Secretary, in which he wrote:

... I recognise we desperately need to reform and modernise our armed forces if we are to meet emerging threats. For too long we have had a sentimental attachment to a static, armoured centric force structure

81 [Queen's Speech December 2019](#), 19 December 2019

82 For a detailed consideration of the Review see: Defence Committee, '[In Search of Strategy—The 2020 Integrated Review](#)', HC 165, First Report of Session 2019–21, 28 July 2020

83 Public Accounts Committee Oral evidence: Defence Equipment Plan 2020–2030, HC 693, Thursday 4 February 2021, [Q99](#)

84 Fisher, L. 'Defence chiefs face battle over plan to scrap tanks', *The Times*, 25 August 2020; Korksi, D. 'Tech, not tanks, should be at the centre of our defence planning', *The Times*, 4 September 2020; Shipman, T & Ripley, T. 'We must sacrifice tanks and sell more arms to fund hi-tech warfare, warns defence secretary', *The Times*, 6 September 2020

anchored in Europe, while our competition has spread out across the globe. If we are to truly play our role as “Global Britain”, we must be more capable in new domains, enabling us to be active in more theatres”.<sup>85</sup>

This line of thinking was also highlighted in a speech by General Sir Nick Carter, Chief of the Defence Staff (CDS), in which he said:

“This direction of travel means that some industrial age capabilities will have to meet their ‘sunset’ to create the space for capabilities needed for ‘sunrise’. This will be an incremental process, recognising that in the emerging operating environment some sunset capabilities will be useful in a mix of ‘high-low’ systems but will increasingly become vulnerable in a war fighting context”.<sup>86</sup>

83. The Ministry of Defence’s recently published Integrated Operating Concept, which makes the ambitious claim that it “represents the most significant change in UK military thought in several generations [which] will lead to a fundamental transformation in the military instrument and the way it is used”.<sup>87</sup> The IOC envisages the future of warfighting operations as an increasingly “intense competition between hiding and fighting”, which will require future UK forces to adapt a range of new characteristics: these are reproduced in the figure below.

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85 Wallace, B. ‘From Arab headdresses to the aerospace industry, the thread of history links us to the Middle East’, *The Sunday Times*, 6 September 2020.

86 [Chief of Defence Staff speech RUSI Annual lecture](#), Ministry of Defence, 17 December 2020

87 [Introducing the Integrated Operating Concept](#), Ministry of Defence, 30 September 2020, p1



**Characteristics of modernised forces beyond 2030**

- Have smaller and faster capabilities to avoid detection
- Trade reduced physical protection for increased mobility
- Rely more heavily on low-observable and stealth technologies
- Depend increasingly on electronic warfare and passive deception measures to gain and maintain information advantage
- Include a mix of crewed, uncrewed and autonomous platforms
- Be integrated into ever more sophisticated networks of systems through a combat cloud that makes best use of data
- Have an open systems architecture that enables the rapid incorporation of new capability
- Be markedly less dependent on fossil fuels
- Employ non-line-of-sight fires to exploit the advantages we gain from information advantage
- Emphasise the non-lethal disabling of enemy capabilities, thereby increasing the range of political and strategic options

Source: Introducing the Integrated Operating Concept, Ministry of Defence

The IOC further asserts that:

Expensive, crewed platforms that we cannot replace and can ill afford to lose will be increasingly vulnerable to swarms of self-coordinating smart munitions ... designed to swamp defences already weakened by pre-emptive cyber-attack. The economics of warfare are changing the balance between platforms and weapons, and between crewed and uncrewed systems”.<sup>88</sup>

84. While the language of the IOC may be somewhat impenetrable, it does appear to indicate a direction of travel away from heavy, relatively slow armoured platforms to smaller, lighter, faster and perhaps cheaper platforms that may or may not be crewed and where speed and situational awareness are the key features of survivability. However the CDS has also said: “When you’re up against a determined opponent on the battlefield you have to go close and personal with your enemy–I’m afraid it’s too early to plot the demise of the tank”.<sup>89</sup> This suggests the arguments for armoured forces being a ‘sunset’ capability may be more nuanced than they at first appear.

88 [Introducing the Integrated Operating Concept](#), Ministry of Defence, 30 September 2020, p6  
 89 [Chief of Defence Staff speech RUSI Annual lecture](#), Ministry of Defence, 17 December 2020

85. That the British Army is currently investing (albeit belatedly) in revitalising its armoured forces through the proposed upgrades to Challenger 2 and Warrior suggests it too believes that these capabilities are still relevant. In its written evidence to this inquiry the Ministry of Defence stated:

“Armoured Fighting Vehicles are at the heart of the British Army’s contribution to high intensity warfighting and therefore integral to deterrence and a vital part of an integrated defence system... The Army’s modernisation programme seeks to ensure that we retain the appropriate capabilities to meet and deter the threat”.

### The case for retaining heavy armour

86. In evidence to this inquiry, several witnesses have stated that the tank, and other heavily armoured vehicles, will retain utility on the future battlefield. Ben Barry wrote that recent operations in the Middle East have seen extensive use of armoured forces in urban fighting (specifically Iraq and Syria) where their firepower and protection significantly reduced casualties among the armies employing them.<sup>90</sup> He told us:

“Armoured warfare is still a capability of great relevance. What is really important is that tank heavy armour, or, for that matter, medium and light armour, is part of a 21st-century combined arms battle. That 21st-century combined arms battle clearly includes drones and counter-drones. It includes both old fashioned dumb artillery and precision artillery. To make manoeuvre warfare on land work, it needs to be inherently joint and air-land. There is no better exposition of that than the US advance from Kuwait towards Baghdad”.<sup>91</sup>

87. Francis Tusa and Nicholas Drummond concurred with this view:

“Personally, I still think the tank has value. We had a very strong feeling from the Army in the late 2000s that the tank was irrelevant, as was anything heavy armour. The great phrase of General Richards was, “We are at a ‘cavalry or tank’ moment”. His belief was pretty obviously that he thought the tank was redundant. We then saw British forces in Afghanistan ... relying on Danish Leopard 2s to provide vital support on the ground”;<sup>92</sup>

and,

“To Francis’s point, [heavy armour] is not a sunset capability. We still need it. Recent conflicts in Ukraine in particular, where we have seen heavy armour used, and more recently between Azerbaijan and Armenia, show that heavy armour is extremely important”.<sup>93</sup>

90 Written evidence submitted by Brigadier (Retired) Ben W. Barry OBE Senior Fellow Land Warfare International Institute for Strategic Studies (IISS), [AVF005](#)

91 Defence Committee Oral evidence: Defence contribution to the UK’s pandemic response, HC 357, Tuesday 24 November 2020, [Q172](#)

92 Defence Committee Oral evidence: Progress in delivering the British Army’s armoured vehicle capability, HC 659, 6 October 2020, [Q2](#)

93 Defence Committee Oral evidence: Progress in delivering the British Army’s armoured vehicle capability, HC 659, 6 October 2020, [Q3](#)

These three witnesses also noted that where other countries such as Canada and the Netherlands had previously given up their heavy armoured capability, operational experience (for example in Afghanistan) had led to heavy armour being re-acquired rapidly. Ben Barry also made the point that as the armoured forces of potential adversaries continue to be modernised (for example through the wider proliferation of Active Protection Systems and electronic warfare capabilities) the ability of anti-tank guided missiles to defeat enemy armour would be reduced, resulting in greater reliance on the main gun armaments of main battle tanks to defeat other tanks. In these circumstances, reducing the number of tanks available leads to a commensurate loss in combat power.<sup>94</sup> Recent press reporting suggests that the Army is planning to retain 150 Challenger tanks, enough to equip two regiments, using the remainder for spares.<sup>95</sup>

88. In addition to the potential loss of combat power, we heard how the elimination or further reduction in heavy armoured capability would be perceived by our allies. In the context of Russia's 2014 intervention in Ukraine, the US and Germany have invested in modernising their armoured forces;<sup>96</sup> other NATO members are also looking to upgrade and enhance their armoured capabilities.<sup>97</sup> When asked if the UK could abandon heavy armour and remain a credible member of NATO, Ben Barry told us:

‘Such a course of action would reduce the UK’s contribution to NATO’s deterrence and military credibility. It would probably be welcomed by the Kremlin. We need to turn our minds back to the NATO summits of 2016 and 2018, which saw commitments made by the alliance and the UK to improve NATO’s ability to deter and reinforce. This included a greatly increased emphasis on armoured forces in both roles ... It would be quite difficult to explain to the NATO military structure and key UK allies, including the US, France, Germany and our eastern European allies like Poland and Estonia. It would also be difficult to explain to smaller allies that retain tanks: Australia, Canada, the Netherlands and Norway’.<sup>98</sup>

The Ministry of Defence acknowledged the importance of the perception of retaining armoured capabilities:

“Beyond the ability to conduct complex combined arms, armoured manoeuvre also underpins our credibility as a ‘reference’ Army on the global stage ... AFVs influence target audiences, particularly when combined with effective information activity. This can be through the highly visible sign of the UK’s commitment to deterrence of an adversary, but also by reassuring a host nation and allies, as well as the UK population’.<sup>99</sup>

**89. We share Brigadier Barry’s concern about the message that any reductions in the Army’s ability to conduct high-intensity warfighting in defence of NATO may send to both our allies and adversaries. Whatever the specific conclusions that emerge from**

94 Written evidence submitted by Brigadier (Retired) Ben W. Barry OBE Senior Fellow Land Warfare International Institute for Strategic Studies (IISS), [AVF005](#)

95 ‘Dozens of tanks to be scrapped in ‘redesign’ for army of the future’, The Times, 24 February 2021

96 ‘Ritchie, N. ‘German parliament approves funding for Leopard 2 upgrades’, Defence Today, 26 March 2019; Kuper S, ‘General Dynamics secures US\$714m Abrams modernisation deal’, Defence Connect, 11 January 2019

97 Adamowski, J. ‘Poland’s search for new European tanks is contagious’, Defense News, 27 August 2019

98 Defence Committee Oral evidence: Defence contribution to the UK’s pandemic response, HC 357, Tuesday 24 November 2020, [Q172](#)

99 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 12

the Integrated Review, the Army must retain (or perhaps regain) its credibility. From the evidence provided we doubt whether, currently, the Army has sufficient armoured capability to make an effective contribution to NATO deterrence. *We have agreed this report before publication of the Integrated Review: in its response, the Department should set out what effect any reduction in the Army's headcount as a result of the Review will have on delivery of armoured vehicles and on the Army's ability to deploy them.*

90. In addition to the question surrounding the utility or otherwise of armoured vehicles, evidence from our expert witnesses repeatedly highlighted the fact that “armoured warfare has to be a holistic, combined arms capability”.<sup>100</sup> It is clear from recent conflicts in Iraq, Ukraine and Nagorno-Karabakh that the UK's future armoured capabilities must be augmented by a range of other assets and resources. **The lack of a credible short-range air defence system for our land forces, especially in light of the rapidly increasing threat from unmanned aerial vehicles, is of particular concern.** We have already noted in Chapter 3 that the Army is also overmatched in terms the artillery firepower available to our likeliest peer adversary and lacks the ability to fire anti-tank missiles from under armour. *The Ministry of Defence must ensure that these capability gaps are filled as a matter of urgency.*

91. The following table sets out the options if the main battle tanks are retained:

1	Retain (and upgrade) 150 Warrior
2	Upgrade 150 of Boxer fleet to include a turret
3	Upgrade 150 Ajax to carry infantry
4	Rely on NATO allies to provide AFV support.

A more radical option would be to remove the battle tank completely and opt for a light, mobile and agile day one capability.

## Equipping future UK forces

92. A crucial aspect in the future of the British Army's armoured capability is that of technological development and the rapid introduction of new equipment into service. We have seen in Chapter 2 that the recent history of UK armoured vehicle development and procurement has been tortuously slow and wasteful of scarce financial resources.

93. The Integrated Operating Concept clearly places great store in the potential for emerging technologies to enable our forces to adapt to the future battlefield:

“This modernisation will require us to embrace combinations of information-centric technologies to achieve the disruptive effect we need. Predicting these combinations will be challenging. We will have to take risk, accept some failure and place emphasis on experimentation by allocating resources,

100 Defence Committee Oral evidence: Defence contribution to the UK's pandemic response, HC 357, Tuesday 24 November 2020, [Q170](#)

force structure, training and exercise activity to stimulate innovation in all lines of development, with a responsive commercial function at the leading edge. This will enable adaptive exploitation as opportunities become clear”.<sup>101</sup>

94. In 2011 the National Audit Office sounded a note of caution about the reliance on novel technology, concluding that Ministry of Defence and the British Army had:

“frequently depended on integrating advanced, but immature, technologies from the design stage. Where there is no clear and compelling requirement for these technologies to be integrated during vehicle design, the Department should have a default position of purchasing off-the-shelf equipment which can be incrementally upgraded in the future, if necessary”.<sup>102</sup>

Francis Tusa pointed out:

“Having read the comments by the Chief of the Defence Staff and various others, from the chief of the General Staff, I then, apropos of this hearing, looked back to the FRES programme, the future rapid effect system. It kicked off in the late 90s. The language between then and what we have just heard with the new operating concept is very close to identical. The concept was fundamentally flawed when it was FRES and I do not see any difference now”.<sup>103</sup>

95. Our predecessor Committees have also commented on this issue. In 2004, the Defence Committee stated that: “We are surprised that the Army is prepared to do away with, as yet unspecified quantities of heavy armoured forces when their replacement [FRES] remains a concept which has not even left the assessment phase”<sup>104</sup> and concluded that:

“We remain concerned that the decision to give up heavy-weight forces in favour of lighter capabilities is being implemented long in advance of their medium-weight replacements becoming available. The FRES family of vehicles for example remains a distant prospect, not a specific programme with predictable delivery dates”.<sup>105</sup>

**96. We share the concerns of our witnesses and our predecessors. It appears that, as part of the Integrated Review, there is a risk that the Army's current armoured capabilities (albeit in need of modernisation) are at risk of being denuded on the basis of promises of technically advanced ‘jam tomorrow’. Experience has shown that these technologies have a long gestation period and may not be realised within useful timescales (for example the ‘electric armour’ concepts proposed in the late 1990s). It would be unacceptable for the Army to give up its heavy armoured forces only to be faced with a repeat of the FRES fiasco, followed by the need to urgently procure a new batch of vehicles to meet a sudden crisis. *The Department should not place its faith in***

101 [Introducing the Integrated Operating Concept](#), Ministry of Defence, 30 September 2020, p16

102 Report by the Comptroller and Auditor General: Ministry of Defence The cost-effective delivery of an armoured vehicle capability, HC 1029, Session 2010–12, 20 May 2011

103 Defence Committee Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, 6 October 2020, [Q1](#)

104 House of Commons Defence Committee, [Defence White Paper 2003](#), HC 465-I, Fifth Report of Session 2003–04, Volume 1, 23 June 2004, para 116

105 House of Commons Defence Committee, [Defence White Paper 2003](#), HC 465-I, Fifth Report of Session 2003–04, Volume 1, 23 June 2004, para 159

*a 'big bang' type development of its armoured capabilities, but rather should focus on the incremental development and experimentation approach aligned with our NATO allies.*

### LE TacCIS

97. The Department and the Army have told us that the next-generation of Armoured Fighting Vehicles will be:

“highly advanced, digitised, sensor enabled systems connected to an operational picture via secure fast networks. They will gather and share vital information to ensure Defence has an accurate land, air and littoral picture. They will provide 24/7 intelligence and effect in all weathers and can operate indefinitely in the most hostile environments and, when needed, can deliver overwhelming precision lethality, from a protected position using verified data and operator information to avoid collateral damage. In the longer term upgraded, digitised and networked AFVs will be a critical link to the ‘autonomous’ future of armoured capability through human and machine teaming. They will transform the way we operate and fight”.<sup>106</sup>

An important aspect of enabling these ‘networked’ armoured vehicles is LE TacCIS (Tactical Communication and Information Systems - also known as Project Morpheus),<sup>107</sup> a £3.2 billion programme to upgrade UK land forces’ communications systems.<sup>108</sup> The Department told us that:

“LE TacCIS is key ... in order to be able to fully exploit Mission System Integration and enable the seamless passage of information on and off [armoured] platforms. The key is influencing new capabilities at the design stage to avoid costly contract amendments, ensuring platforms are an integral part of the network and for in-service capabilities when interventions [can] be made”.

98. Clearly, coherent alignment and integration of LE TacCIS/Project Morpheus with ongoing and future armoured vehicle projects will be important. Historically the Ministry of Defence does not have a good track record of coordinating the delivery of government furnished equipment and resources as an input to dependent armoured vehicle programmes.<sup>109</sup> ***The Department must ensure that Project Morpheus is adequately resourced with technically qualified staff to facilitate coordination and integration with its current and planned armoured vehicle programmes. Based on the Department’s track record in the Land sector we are concerned that the programmes necessary to deliver the capability described above will not be delivered in a timely manner and, given the pace of technology development in this field, may be obsolete before it is delivered. In order to retain a shred of credibility the Army must set out the programmes***

106 Written evidence submitted by the Ministry of Defence, [AVFF0016](#)

107 Written evidence submitted by the Ministry of Defence, [AVFF0016](#)

108 [Morpheus Programme: next generation tactical communication information systems for defence](#), Ministry of Defence, 18 April 2018

109 For example, on the Warrior Capability Sustainment Project, Lockheed Martin UK stated that challenges caused by the provision of government furnished equipment contributed to programme delays and cost-overruns. [Written Evidence submitted by Lockheed Martin UK](#)

*that comprise the capability described above along with a statement on whether each will be delivered in time to provide the capability described and how obsolescence will be avoided.*

## Towards a land industrial strategy

99. Since the end of the Cold War there has been a reduced requirement to develop and produce new armoured vehicles. In addition, a number of the programmes started by the Ministry of Defence failed to deliver new vehicles or have been significantly delayed. As the National Audit Office concluded in 2011:

“The armoured vehicle sector is characterised by greater reliance on open-market competition than some other sectors. With the exception of some limited capabilities, Defence policy has not favoured the preservation of national industrial capacity in this sector. Furthermore, the repeated failures of the Department to deliver its acquisition strategies for a number of significant armoured vehicle procurements have led to there being relatively few large scale or long-term contractual obligations in this sector”.<sup>110</sup>

Francis Tusa explained that the lack of domestic investment in armoured vehicle programmes and upgrades resulted in the “design capability in the UK being run down” which had resulted in some of the technical problems seen on the Ajax and Warrior programmes.<sup>111</sup> This assertion was supported by evidence from GDLS UK, who told us that

“AJAX is the first major armoured vehicles programme to be delivered in the UK since Challenger 2 in the early 1990s and consequently it has taken time for both the MoD and industry to rebuild skills in armoured vehicles procurement, design, development and delivery”.<sup>112</sup>

100. As a consequence of this lack of investment and orders, the UK armoured vehicle industry experienced a period of contraction and consolidation. In the first decade of this century the market response to the Department's procurement approach was a consolidation of the manufacturers of the armoured vehicle fleet (Alvis, GKN Defence, Vickers) into a single company, BAE Systems Land Systems. In 2019, BAE Systems announced that it had sold a controlling stake in its UK vehicles business to Germany's Rheinmetall (a key supplier to the Boxer programme), creating Rheinmetall BAE Systems Land. At present the majority of the UK's active armoured vehicle programmes are being delivered by UK subsidiaries of overseas prime contractors, albeit those with sizeable UK presences. The current major industry suppliers in the UK market are:

- Rheinmetall BAE Systems Land (RBSL), recently formed as a joint venture as part of the Boxer bid for the Army's £2.8 billion Mechanised Infantry Vehicle contract. Around half of the 500-vehicle order will be manufactured at RBSL's facility at Telford. RBSL employs 450 staff across the UK;

110 Report by the Comptroller and Auditor General : Ministry of Defence The cost-effective delivery of an armoured vehicle capability, HC 1029, Session 2010–12, 20 May 2011 para 3.16

111 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q31](#)

112 Written evidence submitted by General Dynamics Land Systems UK, [AVF0011](#), Summary

- General Dynamics Land Systems UK (GDLSUK), formed in 1962 this is a British subsidiary of the US-based General Dynamics. It has eight sites across the UK, and its primary UK contract (£4.6 billion) is for the delivery of 589 Ajax reconnaissance vehicles to the Army, being manufactured at two facilities in south Wales which employ 850 staff. GDUK also works in the global tactical systems and avionics sectors.
- Lockheed Martin UK (LMUK), created in 1999 as a British subsidiary of the US-based Lockheed Martin. It undertakes a wide range of activities within the UK defence and security sector (including the nuclear deterrent). Within the armoured vehicle sector it produces the turret for the Ajax and Warrior vehicles and is responsible for the Warrior Capability Sustainment Programme. LMUK employs around 2,000 staff across the UK.
- Krauss-Maffei Wegmann (KMW) is part of the Franco-German defence group KNDS (which also contains Nexter Defence Systems). KMW is a leading manufacturer of armoured vehicles, including the Leopard family of main battle tanks. KMW along with Rheinmetall is part of the ARTEC consortium which produces Boxer. It is planning to undertake work on the UK MIV programme at its UK subsidiary WFEL.
- Babcock International is a UK-based defence and engineering company, which is represented in multiple areas of MoD activity, including support of Royal Navy ships and submarines. It is also responsible for the management and upkeep of the majority of the Army's armoured vehicle fleet, a result of its 2015 acquisition of the Defence Support Group.
- Supacat, based in Devon, produces a range of highly mobile tactical vehicles (for example the UK Jackal and Coyote protected mobility vehicles).
- Thales, which supplied the Bushmaster vehicle to the UK, and is a competitor for the Multi role Vehicle Protected (MRVP) Package 2 programme, where GDLSUK is the other competitor

101. In its evidence to this inquiry, the Ministry of Defence told us that, as part of the ongoing work to develop a Defence, Security and Industrial Strategy<sup>113</sup> it was considering a 'Land Industrial Strategy'.<sup>114</sup> The Department claimed its analysis to date suggested that:

“the UK could derive greater value from its procurement activity by adopting a national industrial strategy for future land capabilities. In addition to creating and maintaining competitive capabilities for the Army, the most obvious gains are operational advantage (in terms of technology) and freedom of action (in terms of security of supply), but there are also fiscal, national prosperity and foreign policy benefits to be gained ... “<sup>115</sup>

102. Our industry witnesses, unsurprisingly, supported a Land Industrial Strategy (LIS). LMUK, GDLS UK and RBSL had all made substantial investments in new design and

113 [‘Review into the UK’s defence and security industrial strategy’](#), Ministry of Defence, 13 March 2020

114 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), Executive Summary

115 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 9



production facilities for the Warrior CSP, Ajax and Boxer programmes respectively. These investments had helped to rebuild UK 'on-shore' capability in the design and construction of armoured fighting vehicles and their associated systems. Lee Fellows of LMUK told us:

“I am strongly in favour of a land industrial strategy. It was something that was identified in the NAO report in 2011. From a Lockheed Martin perspective, my corporation has invested £12 million in the Amptill capability, which makes us a unique and world-class turret manufacture and design organisation. We have had some tough lessons to become that. If we do not have a land strategy, my concern is that that will erode”.<sup>116</sup>

103. Experience suggests that if this re-established capability is not sustained beyond the current portfolio of projects, it is likely it would again wither and be lost, resulting in further costs and the need to redevelop the necessary skills at a later point.<sup>117</sup> The development of a Land Industrial Strategy would help avoid this by providing industry with a clear roadmap for the coming decades and incentivising further investment in skills, technology and infrastructure. **We support the Ministry of Defence's initiative to develop a Land Industrial Strategy. The LIS should place the land sector on an equal footing with the Air and Maritime sectors, providing industry with certainty for the coming decades and ensuring the Army has access to the technical and manufacturing base that will facilitate the development of new technologies as armoured warfare capabilities evolve. The Strategy should also make clear sustaining capability relies on co-operation with allies.**

104. The maintenance of a UK armoured vehicle industrial base would also have the benefit of enabling the vehicles currently being produced to be upgraded more often. As noted previously, one reason the Army's current vehicles are obsolescent is due to their not being modernised on an ongoing basis in contrast to those of our allies and potential adversaries. In evidence to the inquiry, LMUK highlighted the importance of this:

“Sustaining the industrial base will be vital for enabling the through-life capability management of what will be “digital fighting vehicles”. Upgraded (and new) software-enabled vehicles will require more frequent spiral upgrades, rather than the traditional approach of major hardware recapitalisations once a generation. A live industrial base will be required to deliver rolling capability enhancements, including by giving industry the certainty to invest in disruptive technologies that will further enhance the operational utility of land vehicles and other platforms, such as artificial intelligence, machine learning, cyber, and electronic warfare”.<sup>118</sup>

116 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q61](#)

117 The consequences of allowing an industrial base to atrophy only to rebuild it when it is again required have been clearly shown in the MoD's nuclear enterprise and specifically the Astute submarine programme. Due to the gap between the completion of the Vanguard-class and the commencement of the Astute-class submarines skills and infrastructure at the Barrow shipyard and the Ministry of Defence were lost and allowed to degrade, resulting in costly technical delays and overruns. See: Schank, J.F. et al, [Learning from Experience: Volume III: Lessons from the United Kingdom's Astute Submarine Program](#). Santa Monica, CA: RAND Corporation, 2011.

118 Written Evidence submitted by Lockheed Martin UK, [AVF0008](#), para 23

This point was reinforced by GDLS UK, which told us that the absence of a LIS and concomitant investment would mean there would “be no UK core capability to evolve the digital armoured vehicles capabilities through their full-life or to develop the next generation of armoured vehicles”.<sup>119</sup>

105. A further potential benefit from the sustainment of a UK land systems industrial base is that it establishes the foundation for future collaboration with our allies. As Nicholas Drummond told us:

“Armoured vehicles have become so expensive. They are like combat aircraft almost because they are so sophisticated in the electronics and weapons that they carry. Any future armoured vehicle, like the next-generation tank, will be an international collaboration ... The next-generation main ground combat system being developed by France and Germany at the moment will be an international collaboration. That is the only way that we can procure armoured vehicles in the future. It is only when you have the economies of scale, of several armies using several thousand vehicles, that they become affordable for you”.<sup>120</sup>

As Nicholas Drummond noted, it seems likely that, should the UK decide to retain a heavy armour capability beyond the life of the current or upgraded Challenger 2, it will need to procure this new capability collaboratively. In April 2020 the French and German governments signed agreements launching the Main Combat Ground System (MCGS programme) which aims to begin the replacement of their respective Leclerc and Leopard 2 tanks by 2035.<sup>121</sup> It has been reported that the UK is in discussions to gain access as an observer to the project.<sup>122</sup> Peter Hardisty of RBSL told us that

“we need to look at international partners to take forward major projects, such as main ground combat system ... It would be central to any strategy for the British to decide whether it is a European or an American engagement that they would pursue. There is one thing quite clear: we cannot sit on the fence. We must make a decision, we must invest and we must have the capabilities inside the UK if we wish to be part of a collaboration ... If you do not have the capability to contribute to the development of the platform, you are merely a customer. You will be building to print”.<sup>123</sup>

This view was reinforced by Carew Wilks of GDLS UK:

“To be an effective collaborator, we have to be credible, such that we can both influence and ensure that the requirements that the UK has can be embedded, and be part of the programme rather than, as Peter mentioned,

119 Written evidence submitted by General Dynamics Land Systems UK. [AVF0011](#), para 9

120 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q30](#)

121 'Germany, France Sign Agreements to Kick-off Ground Combat System Project', DefenseWorld.Net, 29 April 2020

122 Chuter, A and Sprenger, S. 'British military looks to the 'Eurotank' as it weighs its hardware options', Defense News, 11 January 2021.

123 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q62](#)

just a recipient of that. For that to be the case, we need to retain the skills that we identify in the UK, and build on the existing facilities, laboratories and so on that have been invested in so far”.<sup>124</sup>

**We agree that it is important the Ministry of Defence maximises the collaborative opportunities offered by the recent investments in the UK's armoured vehicles sector. The Department should ensure that it leverages these advantages by making a clear decision about its participation in the Main Ground Combat System. A repeat of the MRAV/Boxer debacle would be unacceptable.**

106. A final argument for the revitalisation and sustainment of the UK armoured vehicles sector via the implementation of a Land Industrial Strategy is that of the potential for exports and economic growth (known as the prosperity agenda). Again, evidenced to the inquiry highlighted the potential for such opportunities which could arise from the LIS. The Ministry of Defence stated:

“The UK could also derive wider benefits that would help attend to the Government's priorities. Revenue from increased export ... would contribute to national prosperity ... Land systems exports currently make up approximately 7% of total UK Defence exports and it is assessed that Army modernisation offers a considerable opportunity for growth. In addition, securing and generating jobs and STEM skills in the UK's devolved nations and regions supports the Union and assists with levelling up”.<sup>125</sup>

Evidence from RBSL also noted the potential economic benefits arising from a LIS:

“a strong and coherent domestic market, as the result of a LIS, will facilitate and support exports. Furthermore, defence exports can be leveraged to support diplomacy and broader government agendas, in addition to contributing to the balance of trade, jobs and prosperity. Only with a prosperous domestic sovereign defence capability can the UK continue to benefit from defence exports.”<sup>126</sup>

Carew Wilks of GDLS UK echoed this, telling us:

“The opportunity for a spin-off from these defence activities, not only within the UK but for exports at every level of the supply chain, will be tremendous if we can sustain some form of continuous capability and have a long-term plan in which industry can invest alongside other parts of the MoD”.<sup>127</sup>

Lee Fellows of LMUK concurred, saying:

“If we had a land strategy, we could make sure we focused on what mattered, both to us an industry and to HQ Army and, indeed, export, ... There have been good opportunities in export, but I would like to see genuine UK

124 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q64](#)

125 Written evidence submitted by the Ministry of Defence, [AVFF0016](#), para 9

126 Written evidence submitted by Rheinmetall BAE Systems Land (RBSL), [AVF0013](#), para 9

127 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q61](#)

capability sold internationally. I am proud of what we have achieved on Warrior. It has been a tough story. There are export opportunities out there. A land strategy would reinforce that".<sup>128</sup>

107. It is apparent that those leading the UK armoured vehicle sector believe there is greater potential for exports and economic benefit to the UK. However, it is not immediately apparent where these opportunities may lie. In recent history the UK has had limited success in exporting its domestically developed armoured vehicles (the Challenger 2 has only one export customer - Oman). ***We trust the creation of and adherence to the proposed Land Industrial Strategy will improve the UK's competitiveness in this sector. The Ministry of Defence, the British Army and their Industry counterparts must work together to map out the coming decades for the armoured vehicle sector.***

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128 Oral evidence: Progress in delivering the British Army's armoured vehicle capability, HC 659, Tuesday 6 October 2020, [Q61](#)

## 5 Conclusion

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108. This report reveals a woeful story of bureaucratic procrastination, military indecision, financial mismanagement and general ineptitude, which have continually bedevilled attempts to properly re-equip the British Army over the last two decades. Even on the MoD's own current plans (but subject to the Integrated Review), we are still some four years away from even being able to field a "warfighting division", which, itself, would now be hopelessly under-equipped and denuded of even a third combat brigade.

109. Were the British Army to have to fight a peer adversary—a euphemism for Russia—in Eastern Europe in the next few years, whilst our soldiers would undoubtedly remain amongst the finest in the world, they would, disgracefully, be forced to go into battle in a combination of obsolescent or even obsolete armoured vehicles, most of them at least 30 years old or more, with poor mechanical reliability, very heavily outgunned by more modern missile and artillery systems and chronically lacking in adequate air defence. They would have only a handful of long-delayed, new generation vehicles, gradually trickling into the inventory, to replace them.

## Annex: UK armoured vehicle capabilities and programmes since the Cold War

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1) The story of UK armoured vehicle acquisition since the end of the Cold War is deplorable. The Ministry of Defence has squandered significant amounts of money on a series of overly ambitious requirements and technically complex programmes, resulting in these being abandoned and no planned new vehicles being introduced to service over a 20-year period.<sup>129</sup> Partly as a result of these failures, the Armed Forces lacked modern, survivable vehicles for stabilisation operations in Iraq and Afghanistan, leading to avoidable casualties and the need to procure billions of pounds worth of off-the-shelf vehicles to fill the capability gap via the Urgent Operational Requirements process.

### The impact of evolving defence strategy

2) For the four decades following the Second World War, the British Army was trained, equipped and funded to face a specific threat: the armed forces of the Soviet Union and the Warsaw Pact. These forces represented arguably the apex of late 20th Century conventional armed forces, made up of large, heavily armoured combined arms groupings designed to penetrate and advance rapidly beyond the frontiers of Western Europe.

3) NATO and UK forces in Europe (primarily the British Army of the Rhine - BAOR) sought to deter and counter this threat through the development and maintenance of similar heavy armoured forces. Western forces could not match the quantity of men and materiel held by their potential adversaries, but sought to balance this through the pursuit of a qualitative advantage, gained via superior training and technology, which arguably came most to fruition in the early 1980s with the introduction of a new generation of main battle tanks such as the US Abrams, the German Leopard II and the British Challenger 1. The advanced optics, fire control systems and weaponry of these vehicles heralded a step-change in NATO armoured capabilities.

4) As the Cold War came to an end, so too did the certainty around the threats that the UK's Armed Forces, and particularly the British Army would be required to prepare for. The early 1990s saw Western governments eager to realise a 'peace dividend' through a series of reductions in the costly standing forces that had been maintained for the preceding 40 years. The UK undertook a number of reviews of defence posture and expenditure, the first being the 1990 'Options for Change'. The then Secretary of State for Defence told the House of Commons:

“In the options for change studies, we have sought to devise a structure for our regular forces appropriate to the new security situation and meeting our essential peacetime operational needs [...] Our proposals will bring savings and a reduction in the share of GDP taken by defence”.<sup>130</sup>

5) Options for Change resulted in a significant redrawing of the structure of the UK's Armed Forces and was seen as the start of a shift from a threats-based to a capability-based

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129 With the exception of a small number of armoured engineering vehicles (Trojan and Titan) and Viking protected mobility vehicles.

130 HC Deb 25 July 1990, c470-1

force structure.<sup>131</sup> With this change came significant reductions in personnel numbers: the Armed Forces as a whole was reduced by 56,000 (18%) by the mid-1990s, with the most significant cuts falling on the Army which was reduced from 160,000 to 120,000.<sup>132</sup> The BAOR was reduced from three to two divisions, one based in the UK. The subsequent 1994 Defence Costs Study sought to realise a further peace dividend and reduced the Army's numbers a further 2,200 by the end of the decade.

6) In 1997, the newly elected Labour government undertook a wide-ranging review of the UK's defence posture - the Strategic Defence Review. This set out in more explicit form the intent to move away from static, Cold War-type forces to more expeditionary, capability-focused structures. It also set out future technology and equipment requirements to meet this vision, including new aircraft carriers. The organisation of the Army's armoured forces was modified, with a reduction in the number of armoured regiments and the shift of two reconnaissance regiments to different roles.<sup>133</sup> Following the 9/11 attacks in the United States and the subsequent intervention in Afghanistan, a New Chapter to the SDR was published in 2002, increasing the focus on defending against threats from non-state actors and terrorism. From 2003 and 2006 respectively, the British Army was increasingly focused on maintaining Operations Telic (Iraq) and Herrick (Afghanistan) which consumed most of its resources and effort.

7) In the aftermath of the 2008 financial crisis and amid the need to make large-scale savings within the public sector, the 2010 Strategic Defence and Security Review had significant implications for the Ministry of Defence and the Armed Forces. Defence was required to make cuts in both personnel and equipment. The Army was to be reduced by 7,000 troops by 2015, and to a size of 82,000 regulars and 30,000 reservists by 2018; all British forces were to withdraw from Germany by 2020; the Challenger 2 main battle tank fleet was cut by around 40% to 227 vehicles and the number of AS-90 self-propelled artillery vehicles was reduced by 35%.<sup>134</sup> This review also saw a wholesale restructuring of the Army as set out in the 'Army 2020' vision.<sup>135</sup>

8) These significant changes to the Army's force structures were revised further as a result of the 2015 Strategic Defence and Security Review, which led to the 'Army 2020 Refine'. This outlined a new set of structures and forces, including:

- The creation of two new 'Strike' brigades by converting an Armoured Infantry brigade and an infantry brigade. These were to be equipped with new Ajax tracked reconnaissance vehicles and Mechanised Infantry Vehicles;

131 Taylor, C. A Brief Guide to Previous British Defence Reviews, House of Commons Library, SN/IA/5714, 19 October 2010, p9

132 Taylor, C. A Brief Guide to Previous British Defence Reviews, House of Commons Library, SN/IA/5714, 19 October 2010, p9

133 Select Committee on Defence Eighth Report, The Strategic Defence Review, HC 138, Session 1997-98, para 242

134 HM Government, Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review, Cm7948, 2010, p25, para 2.A.8

135 Army 2020 called for the restructuring of the British Army into three key elements: a high-readiness Reaction Force, the Adaptable Force made of up of regular and reserve forces available for combat operations; and, Force Troops, providing a range of regular and reserve units including engineer, artillery and medical support. It would maintain five multi-role brigades, with one kept at high readiness. See: [Transforming the British Army: An update](#), 2013

- That, by 2025, UK 3rd Division would comprise two armoured infantry brigades, a Strike brigade and a Strike experimentation group. This division would be available to NATO under UK command; and,
- Establishing the Specialised Infantry forces, created through the conversion of five infantry battalions.

9) It is apparent from the above summary that since the 1990s there have been several Defence reviews with significant implications for the Army's force structures, equipment requirements and capability goals. The vision of what the Army is required to do and where it may be needed to it has been revised repeatedly, from the Cold War to Iraq and Afghanistan and now the Integrated Review. These shifts in requirements inevitably flowed into planning for future capability and equipment procurement. The next section of this report will address the effects of this.

### Shifting requirements and the impact of counter-insurgency operations

10) Since the end of the Cold War, the British Army has made a number of attempts to replace and modernise its Armoured Fighting Vehicle fleet, but to date these have not resulted in a significant refresh of the Army's capabilities, with the majority of its primary vehicles now in-service having been procured before the 1990s, and some as early as the 1960s. As the National Audit Office (NAO) reported in 2011:

“The [Ministry of Defence] has initiated a number of projects since 1985 to replace its existing vehicles, and from the 1998 Strategic Defence Review ... Despite the expenditure of considerable resources over more than a decade, the Department has not met its objective of fielding a more mobile, flexible fleet”.<sup>136</sup>

As noted previously, during the Cold War the British Army's major procurement programmes were driven by the need to counter a relatively well-understood threat, which evolved gradually and incrementally (for example, through improvements to the capabilities of Soviet armoured vehicles). This engendered an approach to procurement that prioritised the meeting of exacting technical requirements to ensure the resulting vehicles could overmatch those of the posited threat. Consequently, there was little appetite for compromise or trading-off between performance and time, with delivery of new equipment expected to take one or even two decades.<sup>137</sup>

11) With the demise of the most likely threat in 1990 and as the likelihood of state-on-state conflict in Europe appeared to recede, NATO militaries began exploring the types of forces that might be required for operations in other theatres and contexts. Experiences in the First Gulf War in 1991 and the 1999 Kosovo intervention highlighted the logistical challenges associated with deploying armoured forces at scale beyond the North American and European continents. This direction was also influenced by the need for future forces to be less costly to procure and sustain than their Cold War predecessors. In the US, these factors led the US Army to begin a process of transformation with the aim of developing

136 Report by the Comptroller and Auditor General: 'Ministry of Defence The cost-effective delivery of an armoured vehicle capability', HC 1029, Session 2010–12, 20 May 2011, para 1.7

137 Report by the Comptroller and Auditor General: 'Ministry of Defence The cost-effective delivery of an armoured vehicle capability', HC 1029, Session 2010–12, 20 May 2011, para 2.3



'medium-weight' forces which were able to deploy rapidly to an emerging crisis with sufficient combat power to act as a deterrent. In 1999 the then US Army Chief of Staff, General Eric Shinseki, stated:

“Look at the condition of the army and our ability to move quickly to these hot spots. We need to have sufficient capability on the ground to deter and to hold crises where they are, with the intent of then returning to stability. That takes a kind of agility and flexibility and versatility that we need in the force ... So as we talk about transformation, we intend to get into the design of our units. It is about looking for a common chassis design. It is about looking for smaller [calibre] ammunition. It is about fuel efficiency. It is about micro-technology. As we reduce the size of our platforms, we also reduce the size of this rather significant logistical footprint, and that gives us the kind of agility that will put us in places that are least expected.”<sup>138</sup>

This led the US to develop a new range of modular, wheeled armoured vehicles to equip new Brigade Combat Teams which could be deployed at short-notice globally with a reduced logistical footprint.<sup>139</sup> These new vehicles were later named 'Stryker' and came in a number of variants, seeing operational deployment to Iraq in the mid-2000s where they generally performed well but required upgrades to their armour to protect from insurgent attacks.<sup>140</sup> We note that within four years of General Shinseki's speech Strykers were deployed on combat operations, a striking contrast with the UK's planned armoured vehicle programmes from the same period.<sup>141</sup>

12) In parallel to the US, the British Army also sought to develop new types of armoured vehicles. As early as 1985 it began the Future Family of Light Armoured Vehicles (FFLAV) study<sup>142</sup> with the aim of developing a series of lighter armoured vehicles to replace the already obsolescent FV430 and CVR(T) (Combat Vehicle Reconnaissance (Tracked)) vehicle families. This study led to the development of two new programmes: TRACER (Tactical Reconnaissance Armoured Combat Equipment Requirement) and MRAV (Multi Role Armoured Vehicle).<sup>143</sup>

13) The TRACER programme aimed to replace the already aging CVR(T) which had been found to be: “inadequate during the Gulf War (in 1991) in the areas of sensors, stealth, survivability, mobility and lethality”.<sup>144</sup> In 1992 the Department began a joint programme with the US to develop TRACER, which envisaged the procurement of some 335 vehicles. The NAO noted in 2011 that the delivery of this programme would require the rapid development of some very advanced technologies, some of which are only now

138 Shinseki, E. 'The Future of War: An Interview with General Eric K. Shinseki', PBS, accessed 20 January 2021

139 These vehicles were intended to be an interim solution until vehicles from the subsequently cancelled Future Ground Systems Manned Ground Vehicle programme could be delivered.

140 Bernton H & Fryer A. 'Combat proves Stryker's worth but also reveals its shortcomings', The Seattle Times, 27 December 2005, accessed 1 February 2021; M1126 Strykers in Combat: Experiences & Lessons, Defense Industry Daily, 11 October 2005, accessed 27 January 2021

141 However we acknowledge the success of the UK effort to procure Protected Patrol Vehicles for Iraq and Afghanistan via the Urgent Operational Requirements process.

142 Flach, P. Lessons from the Procurement of Armoured Fighting Vehicles, RUSI Defence Systems, June 2010

143 [Written evidence](#), para 3; Flach, P. Lessons from the Procurement of Armoured Fighting Vehicles, RUSI Defence Systems, June 2010.

144 Report by the Comptroller and Auditor General: 'Ministry of Defence The cost-effective delivery of an armoured vehicle capability', HC 1029, Session 2010–12, 20 May 2011, para 2.5

at the stage where they can be incorporated on armoured vehicles.<sup>145</sup> Subsequently the US abandoned the TRACER programme and in 2001 the UK halted its development, with £131m in sunk costs.

14) The MRV programme was intended to replace the obsolete FV430 and Saxon series of vehicles, and in the mid-1990s the UK joined a multinational programme with Germany and France to develop a new eight-wheeled armoured vehicle which could be fitted with interchangeable mission modules. Deliveries of the vehicle were scheduled to begin in 2006.<sup>146</sup> The first operational use of Boxer was by Germany in 2011. However, in July 2003, the Ministry of Defence decided to withdraw from the MRV programme, primarily on the grounds that it was too heavy to be transported on a C-130 Hercules transport aircraft (Boxer weighs up to 36 tonnes).<sup>147</sup> At the point of cancellation the Department had sunk £57m into the programme. Sixteen years later, the Ministry of Defence signed a £2.8 billion contract to procure over 500 of these vehicles (now known as Boxer) to meet the Army's Mechanised Infantry Vehicle requirement.

15) While both TRACER and MRV had been cancelled by 2003, the Army's requirements to replace its increasingly obsolete armoured vehicle fleets, and to meet the need for a medium-weight, rapidly deployable force remained pressing. The Ministry of Defence's next solution for this requirement was to be the Future Rapid Effects System (FRES). The programme had been in Concept phase since 2001, and moved into Assessment in 2004, with an initial In-Service Date of 2009.<sup>148</sup><sup>149</sup> This was a highly ambitious programme aimed at replacing the Saxon, FV430 and CVR(T) fleets with over 3,000 vehicles in Heavy, Utility and Reconnaissance families that would meet 16 different battlefield roles.<sup>150</sup> A key issue for FRES was balancing deployability with protection. By 2006 the Department had increased the weight limit from 17 tonnes to between 25–30 tonnes and accepted that its new medium-weight vehicles would not be transportable by C-130 aircraft but should be light enough to be lifted by the new A400M transporter.<sup>151</sup> Our predecessor Committees raised concerns with the FRES programme on a number of occasions.; in 2007 a Committee report on the FRES programme concluded that “nine years after the 1997 Strategic Defence Review, the Army's requirement for a medium-weight vehicles remains unmet”<sup>152</sup> and,

“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

145 Report by the Comptroller and Auditor General: 'Ministry of Defence The cost-effective delivery of an armoured vehicle capability', HC 1029, Session 2010–12, 20 May 2011, para 2.4

146 Report by the Comptroller and Auditor General, Ministry of Defence: Major Projects Report 2002, pp111–112

147 Flach, P. Lessons from the Procurement of Armoured Fighting Vehicles, RUSI Defence Systems, June 2010.

148 Concept and Assessment are the early stages in the Ministry of Defence's CADMID acquisition lifecycle. See [www.asems.mod.uk/guidance/manual/acquisition-lifecycle](http://www.asems.mod.uk/guidance/manual/acquisition-lifecycle)

149 Defence Committee, The Army's requirement for armoured vehicles: the FRES programme, Seventh Report of Session 2006–07, 6 February 2007, p3

150 Report by the Comptroller and Auditor General, Ministry of Defence: Major Projects Report 2006, p162

151 As the National Audit Office noted in 2011, this had the paradoxical effect of allowing “the Multi-Role Armoured Vehicle, which by then was undergoing final testing in The Netherlands and Germany, to re-enter the Future Rapid Effect System Utility Vehicle design competition”. Report by the Comptroller and Auditor General: 'Ministry of Defence The cost-effective delivery of an armoured vehicle capability', HC 1029, Session 2010–12, 20 May 2011, para 2.11

152 Defence Committee, The Army's requirement for armoured vehicles: the FRES programme, Seventh Report of Session 2006–07, 6 February 2007 para 92

the survivability and deployability is particularly acute: satisfying both requirements may prove impossible. It is high time the MoD decided where its priorities lay”.<sup>153</sup>

16) The FRES programme struggled to resolve the weight versus protection conundrum, and faced a range of commercial, funding and technical issues. The In-Service Date for the first variant (FRES Utility Vehicle) slipped repeatedly from 2008 to 2012 and finally to 2015. The combination of difficulties faced by the programme increased the overall risk level to unacceptable levels, and the FRES programme was cancelled in 2008, with £133 million having been spent.<sup>154</sup> In 2009 our predecessor Committee concluded that:

“The FRES programme has been a fiasco. In February 2007 we concluded that the MoD’s attempts to meet its medium-weight vehicle requirement had been a sorry story of indecision, changing requirements and delay. Two years later the story is, incredibly, even worse. Whilst we recognise that the MoD’s equipment requirements need to reflect changing threats, that is no excuse for the MoD’s behaviour in this programme; they have wasted their and industry’s time and money. The FRES Utility Vehicle programme was, from the outset, poorly conceived and managed. The MoD must work out what its requirements are for medium-weight armoured vehicles and identify lessons from the saga of the FRES Utility Vehicle programme”.<sup>155</sup>

Aspects of the FRES programme (for example development of the 40mm main weapon system) would subsequently be pulled into the current Ajax reconnaissance vehicle programme (which was formerly known as FRES Scout).

17) While the FRES programme stalled and ultimately unravelled, the British Army had become fully engaged in the campaigns in Iraq (from 2003) and Afghanistan (from 2006 in Helmand province). In the main war fighting phase of the Iraq campaign (in Spring 2003) the UK’s armoured forces employed their heaviest vehicles (Challenger 2, Warrior, and others), where they performed well. However, in the subsequent occupation phase, and operations in Helmand province in Afghanistan, these heavily armoured vehicles were not appropriate for stabilisation operations. In lieu of having a medium-weight class of vehicles, British forces had to fall back on the use of much lighter vehicles such as lightly armoured Landrovers (for example the Snatch vehicles, which had previously been used in a public order role in Northern Ireland).

18) As insurgent activity in both Iraq and Afghanistan intensified and these actors increasingly made use of roadside improvised explosive devices (IEDs) to target UK and Coalition military forces, it became apparent that the lightly armoured vehicles being

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153 Defence Committee, *The Army’s requirement for armoured vehicles: the FRES programme*, Seventh Report of Session 2006–07, 6 February 2007 para 92

154 Report by the Comptroller and Auditor General: ‘Ministry of Defence The cost-effective delivery of an armoured vehicle capability’, HC 1029, Session 2010–12, 20 May 2011, para 2.19

155 Defence Committee - Third Report, *Defence Equipment 2009*, Session 2008–09, 10 February 2009, para 95

used by UK forces offered inadequate levels of protection against the evolving threat.<sup>156</sup> At least 36 UK personnel were ultimately killed in attacks while being transported in these light vehicles.<sup>157</sup> In 2009 the Defence Committee concluded:

“We are concerned at the increasingly sophisticated nature of the threat and the consequent vulnerability of UK Forces travelling in Snatch Land Rovers ... In the long-term, FRES may offer a solution to the difficulties associated with the Snatch, but its introduction is too far off to offer an answer to current operational needs in Iraq. The MoD should consider an “off the shelf” purchase as an immediate and interim replacement for Snatch, even if it does not fulfil the long-term capability requirement. It is unsatisfactory that the lack of capability was not addressed with greater urgency much earlier”.<sup>158</sup>

In his evidence to this inquiry, Nicholas Drummond noted the consequences of not having suitable vehicles as a result of decisions not to see programmes through to completion: “If you do not have that vehicle, that means you have to send troops into combat without protected mobility and that will put their lives at risk. That is the situation we got into with the Snatch Land Rover in Iraq in 2006”.<sup>159</sup>

19) In response to the increased IED threat and faced with the inadequacy of its light armoured vehicles, the Ministry of Defence embarked on a large-scale process to procure a range of vehicles (Protected Patrol Vehicles) that could protect personnel while enabling mobility in both Iraq and Afghanistan. In 2011, the NAO reported that the Department had spent or intended to spend £2.8 billion on the urgent operational procurement of these vehicles.<sup>160</sup> As of September 2020, the Army had 2,101 of these vehicles in its holdings.<sup>161</sup> The NAO noted that if the FRES programme had delivered some of the vehicles planned, this additional cost might have been reduced but would not have been completely avoided. Following the draw-down of UK forces in Iraq and Afghanistan, the Army retained these vehicles and subsequently they have been used to equip some armoured cavalry regiments and armoured infantry battalions.<sup>162</sup>

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156 In 2007, the Chief of Defence Procurement told the Defence Committee that operational experience in Iraq and Afghanistan, in particular the threat posed by IEDs, had resulted in the armour requirements for the FRES programme to be increased. This influenced the decision to increase the weight requirement for FRES noted in paragraph 16. Defence Committee, *The Army's requirement for armoured vehicles: the FRES programme*, Seventh Report of Session 2006–07, para 37.

157 Sturcke, J. ‘[Snatch Land Rovers: the ‘mobile coffins’ of the British army](#)’, *The Guardian*, 1 November 2008, accessed 2 February 2021; Brady, B. ‘Brown finally axes Snatch Land Rovers linked to 36 Army deaths’, *The Independent*, 7 March 2010; Richardson, L. ‘Troop training and equipment inadequate’, says coroner, *The Independent*, 9 March 2010.

158 Defence Committee - Third Report, *Defence Equipment 2009*, Session 2008–09, 10 February 2009

159 Oral evidence: *Progress in delivering the British Army's armoured vehicle capability*, HC 659, Tuesday 6 October 2020, Q8

160 Report by the Comptroller and Auditor General: ‘Ministry of Defence The cost-effective delivery of an armoured vehicle capability’, HC 1029, Session 2010–12, 20 May 2011, para 15

161 [Armoured Fighting Vehicles: Procurement](#), Question for Ministry of Defence, UIN 87492, tabled on 9 September 2020

162 The Ministry of Defence has recently announced its intention to dispose of some of these vehicle fleets, including Mastiff, Ridgeback and Wolfhound. See Army: [Vehicles, Question for Ministry of Defence UIN 65952](#), tabled on 29 June 2020

## Lessons from recent experience

20) The above summary of the past two decades of UK armoured vehicle procurement leads us to highlight a number of significant lessons for the future, many of which have been identified previously. These include requirements setting, programme funding and programme management.

21) The Ministry of Defence and the Army embarked on a series of overly-ambitious procurement programmes which were too reliant on the development of nascent technologies in order to deliver viable capabilities; within these programmes; and, there was a reluctance to trade-off capability requirements (such as vehicle weight) leading to programme cancellations and vacillation around decision-making. This was compounded by the desire to adapt requirements to concurrent operational experience. Too often the Ministry of Defence has aimed to deliver the 100 per cent solution tomorrow, rather than the 80 per cent solution today. This conclusion is supported by Francis Tusa in his evidence to us:

“We have to stop specifications creep ... We have to accept the 80% solution. That has been known about for probably 50 years ... To give an example of that, back in 2006 or 2007 ... the then Defence Procurement Minister ... ordered the trials of truth down at Bovington. He said to all the main armoured vehicle manufacturers, “Bring your vehicles to Bovington. Stop PowerPoint engineering. We are going to run trials and we will base our decisions on that”. The problem is that the Piranha version was selected and the Army then started changing it and going, “I want to add this, this and this”. It was a pretty disastrous outcome”.<sup>163</sup>

The NAO highlighted the consequences of this in 2011:

“Complex requirements have been set which rely on technological advances to achieve a qualitative advantage over the most demanding potential adversaries... [t]here has not been an effective means to assess the costs, risks and amount of equipment needed to meet these requirements in the early stages. These demanding requirements often reduce the scope to maximise competition which in turn can lead to cost increases, delays to the introduction of equipment into service and reductions to the numbers of vehicles bought to stay within budgets”.<sup>164</sup>

22) A lack of coherence in programme funding repeatedly destabilised projects; between 2005 and 2011, the Department removed £5.6 billion in savings measures from its armoured vehicle programmes, resulting in delays to new vehicles being introduced.<sup>165</sup> Procurement practices and skills were frequently found wanting; in 2011 the NAO concluded that the failure to introduce any new vehicles since 1997 indicated that, “the Department’s standard acquisition processes for armoured vehicles was not working”.<sup>166</sup> Subsequently

163 Oral evidence: Progress in delivering the British Army’s armoured vehicle capability, HC 659, Tuesday 6 October 2020, Q17

164 Report by the Comptroller and Auditor General: ‘Ministry of Defence The cost-effective delivery of an armoured vehicle capability’, HC 1029, Session 2010–12, 20 May 2011, para7

165 Report by the Comptroller and Auditor General: ‘Ministry of Defence The cost-effective delivery of an armoured vehicle capability’, HC 1029, Session 2010–12, 20 May 2011, paras 3.11–3.12

166 Report by the Comptroller and Auditor General: ‘Ministry of Defence The cost-effective delivery of an armoured vehicle capability’, HC 1029, Session 2010–12, 20 May 2011, para 4

the Committee of Public Accounts concluded that “there [was] poor accountability for long-term equipment projects”.<sup>167</sup> Frequent changes in personnel within project teams and a lack of ingrained technical knowledge and understanding of armoured vehicle development have also been cited as contributing factors to the failure to deliver new vehicles to the Army.<sup>168</sup>

23) In evidence to this inquiry, Lockheed Martin UK noted that that where the Ministry of Defence acts as a systems integrator or provides assets or resources to the contractor (known as Government Furnished assets or resources - GFX) that “it is important for it to have the necessary resources, capacity, and focus to perform that role, including continuity in technical staff”.<sup>169</sup>

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167 Committee of Public Accounts, ‘The cost-effective delivery of an armoured vehicle capability’, HC 1444, Fifty-ninth Report of Session 2010–12, 9 December 2011, para 6

168 Flach, P. Lessons from the Procurement of Armoured Fighting Vehicles, RUSI Defence Systems, June 2010.

169 Written Evidence submitted by Lockheed Martin UK, para 20

## Conclusions and recommendations

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### The developed of UK armoured vehicle capability since the Cold War

1. Even in the sorry recent history of the Army's attempts to procure Armoured Fighting Vehicles, MRAV—now Boxer—stands out as a stark example of how shifting priorities and indecision about requirements lead to increased costs and failure to deliver new capabilities. (Paragraph 18)
2. The Ministry of Defence and the Army embarked on a series of overly-ambitious procurement programmes which were too reliant on the development of nascent technologies in order to deliver viable capabilities; within these programmes; and, there was a reluctance to trade off capability requirements (such as vehicle weight) leading to programme cancellations and vacillation around decision-making. This was compounded by the desire to adapt requirements to concurrent operational experience. Too often the Ministry of Defence has aimed to deliver the 100 per cent solution tomorrow, rather than the 80 per cent solution today. (Paragraph 23)
3. Procurement practices and skills were frequently found wanting; in 2011 the NAO concluded that the failure to introduce any new vehicles since 1997 indicated that, “the Department's standard acquisition processes for armoured vehicles was not working”. Subsequently the Committee of Public Accounts concluded that “there [was] poor accountability for long-term equipment projects”. This process is, self-evidently, still not working a decade later. (Paragraph 24)
4. We are concerned that the Ministry of Defence, and in particular Defence Equipment and Support may not have sufficient technically qualified staff and capacity to manage effectively the multiple armoured vehicle procurement and upgrade programmes that are currently underway. Given both the large amounts of taxpayer's money at stake and the importance of such programmes for our war fighting capability should deterrence fail, this appalling situation has now become completely unacceptable and must be rapidly reformed, including, if necessary, by senior management changes at DE & S Headquarters at Abbey Wood. (Paragraph 25)

### The UK's armoured forces today

5. We are astonished that between 1997 and late 2020 (with the exception of a small number of armoured engineering and Viking protected mobility vehicles) the Department had not delivered a single new armoured vehicle from the core procurement programme into operational service with the Army. It is clear that the Ministry of Defence's armoured vehicle programmes requires independent scrutiny. *We ask the National Audit Office to revisit this issue to establish the costs incurred since its 2011 report, progress in delivering current programmes, current armoured capability gaps and the coherency and delivery realism of the Army's current portfolio of armoured vehicle programmes, particularly in the context of the forthcoming Integrated Review.* (Paragraph 27)
6. We note that the Department's recent experience of upgrading older vehicles with new weapons and turrets has been difficult, resulting in additional costs and delays

in delivering the required capability. The Challenger 2 LEP calls for the integration of a new digitised turret and main gun, along with other upgrades, within an existing hull. *When making the decision on whether to proceed with the programme, the Department must ensure that it has reduced such risks as far as possible and fully weighed the options between upgrade and an off-the-shelf replacement. The Department should also provide us with a timetable for the programme and explain what alternatives have been considered. We also believe that the Department should examine the possibility of fitting Challenger with an automatic loader.* (Paragraph 38)

7. We do not want to see the Army forced to ensure a lengthy capability gap as a consequence of emergent technical and integration issues. *The Department should confirm to us that the UK's main battle tank capability is currently fit for purpose and will remain so until Challenger 2 LEP reaches Full Operating Capability (assuming this project is approved later in 2021).* (Paragraph 39)
8. Despite having spent around 50% of the allocated budget (£800 million), the programme has yet to place a manufacturing contract. The programme has a current in-service date of 2024 (originally planned for 2017) and is some £227 million over budget. After a decade of effort, this abject failure to deliver against both cost, (with an overrun now totalling over a quarter of a billion pounds of public money) and timescale (ISD seven years late) is clearly totally unacceptable. Nevertheless, it is symptomatic of the extremely weak management of Army equipment programmes, by both DE & S and the Army Board itself, in recent years. (Paragraph 42)
9. *The Ministry, which mandated this weapons system, should therefore now be fully transparent about the cost of this new, highly specialised ammunition and its implications for the full life-cycle costs of the vehicle (and indeed for Ajax, which utilises the same weapon system).* (Paragraph 44)
10. We note the significant delay and expenditure on the continuation of the Warrior CSP and that, after nine years and over £400 million in sunk costs, the Department has still to decide on the placement of a production contract. *We would expect the Department to assess carefully the merits of continuing with the programme against both the potential for further technical challenges and whether the upgraded vehicle is still the best option for the Army in light of the Integrated Review. The Department should set out what steps it is taking to ensure there is no capability gap* (Paragraph 47)
11. The first vehicles were originally due to be delivered to the British Army in April 2017, however this was delayed. In May 2020 it emerged that the delivery of the first batch of Ajax vehicles was to be delayed further as they were found not to be ready to be accepted into service. It is not exactly clear what caused this delay but, in its evidence to the inquiry GDLSUK stated that delays had occurred in agreeing requirements and challenges with the integration of the 40mm weapon system mandated by the Ministry of Defence - similar to the issue on the Warrior programme. (Paragraph 50)
12. The Ajax programme, which is now also seriously delayed, is yet another example of chronic mismanagement by the Ministry of Defence and its shaky procurement apparatus. This is particularly worrying, as Ajax is fundamental to the establishment and deployment of the Army's new Strike Brigades, which are intended to be a key



part of its future order of battle. *As the Ministry materially contributed to delays to both Warrior and Ajax—by insisting on a complex, new generation 40mm cannon, when other tried and tested alternatives were available—they should now publicly justify why this decision was taken and by whom in Main Building, on the Army Board or at DE & S and what urgent action is now being taken, to mitigate its obviously deleterious effect.* (Paragraph 51)

13. We note that difficulties with the Ajax programme have again arisen in part as a consequence of the Army's desire to develop a bespoke vehicle capability (albeit one based on an existing but modified ASCOD 2 hull), with a plethora of complex requirements, and the need to integrate a novel weapon system technology. We welcome the assurances from General Dynamics Land Systems UK that the challenges facing the Ajax programme have been largely resolved and look forward to these new advanced vehicles being delivered to frontline units as soon as possible. The Ministry of Defence must ensure that there are no further delays to this expensive programme. We also note that there may be potential synergies between Ajax and a revised requirement for an armoured infantry fighting vehicle. *The Ministry of Defence must ensure that there are no further delays to this expensive programme. We also note that there may be potential synergies between Ajax and a revised requirement for an armoured infantry fighting vehicle. In the event that the Warrior Capability Sustainment Programme does not proceed the Army should explain how that Infantry Fighting Vehicle role would be fulfilled and if a further AJAX variant may be a potential candidate, with the associated benefits of in-service support.* (Paragraph 54)
14. We recognise that the Army must prioritise its equipment spending to specific areas of capability, but consider it unacceptable that the replacement of the FV430 series may not be in service until the 2030s, meaning that this vehicle will have been in service for some 70 years. *We urge the Department to seek options to bring a replacement for the FV430 series earlier than currently planned. The Army should update us on the status of the programmes that will provide the 'digital spine' referred to by Lt. General Tickell.* (Paragraph 57)
15. We welcome the decision to procure the Boxer armoured vehicle for the British Army, albeit more than ten years later than would have been the case had the UK stayed in the original multi-national consortium. *As part of the Integrated Review and associated funding decisions, the Department should seek to accelerate the procurement of Boxer to ensure the Army receives this new capability as soon as possible. In particular we are astonished that the current contract only provides for production of one vehicle a week. In parallel, the British Army, while exploring the range of options Boxer may offer, should learn the lessons of previous failures and avoid adding additional requirements while it is being delivered. Once the vehicle is in-service options to incrementally add upgrades or extra capability may be pursued.* (Paragraph 60)
16. We believe that commonality of platforms and modularity of capability such as sensors and weapon systems will be an essential element in maintaining an effective and capable Army. *The Department should ensure that future decisions around procuring new vehicles give greater weight to the undoubted benefits offered by both commonality of vehicle hulls and the modularity of equipment and weapons systems.*

*It should be a matter of course that weapon systems and, for example, refrigeration units for vaccines, can be moved easily between platforms, even if produced by different manufacturers. (Paragraph 61)*

17. We are alarmed by the revelation to this inquiry that a core aspect of the plans set out in the 2015 SDSR will not be met. *In its response to this Report the Ministry of Defence should provide a detailed explanation of the specific shortfalls (equipment, logistic support, personnel et cetera) that have led to this situation, setting out when these were first identified, and what plans exist to rectify this in a given timescale. (Paragraph 65)*
18. While we welcome the ongoing efforts to modernise the fleet, new vehicles will only trickle into service over the next four years, and it seems unlikely that they will do so in sufficient numbers to make a material difference by 2025. For example, the Ministry of Defence does not expect to contract for the upgrade of Challenger 2 until later this year (assuming the Integrated Review concludes that heavy armour should be retained). Given the recent history of UK armoured vehicle programmes, it seems unlikely that enough upgraded vehicles will have been completed, tested and brought into service within four years. (Paragraph 72)
19. An “artillery duel” between a modern British and Russian division would now only be likely to end one way—and not necessarily to the British Army’s advantage. (Paragraph 76)
20. We share our witnesses’ concern that, considering recent experience in Ukraine and elsewhere, UK armoured forces may find themselves at a serious disadvantage in terms of artillery capability and air defence when facing a peer adversary. *The Ministry of Defence must urgently pursue options to address shortfalls in artillery, air defence and anti-drone capabilities. (Paragraph 77)*
21. It is alarming that for at least the next several years UK armoured forces may find themselves overmatched by their most challenging peer adversary. During the Cold War, the British Army and its NATO counterparts sought to offset the numerical advantage held by the Warsaw Pact through the superior quality of its equipment, training, and people. While we do not believe Army personnel have diminished in their capability and motivation, it does appear that our heavy armoured equipment has fallen behind in terms of both quantity and quality. (Paragraph 78)

### The future of UK armoured capability

22. We share Brigadier Barry’s concern about the message that any reductions in the Army’s ability to conduct high-intensity warfighting in defence of NATO may send to both our allies and adversaries. Whatever the specific conclusions that emerge from the Integrated Review, the Army must retain (or perhaps regain) its credibility. From the evidence provided we doubt whether, currently, the Army has sufficient armoured capability to make an effective contribution to NATO deterrence. *We have agreed this report before publication of the Integrated Review: in its response, the Department should set out what effect any reduction in the Army’s headcount as a result of the Review will have on delivery of armoured vehicles and on the Army’s ability to deploy them. (Paragraph 89)*

23. The lack of a credible short-range air defence system for our land forces, especially in light of the rapidly increasing threat from unmanned aerial vehicles, is of particular concern. We have already noted in Chapter 3 that the Army is also overmatched in terms the artillery firepower available to our likeliest peer adversary and lacks the ability to fire anti-tank missiles from under armour. *The Ministry of Defence must ensure that these capability gaps are filled as a matter of urgency.* (Paragraph 90)
24. We share the concerns of our witnesses and our predecessors. It appears that, as part of the Integrated Review, there is a risk that the Army's current armoured capabilities (albeit in need of modernisation) are at risk of being denuded on the basis of promises of technically advanced 'jam tomorrow'. Experience has shown that these technologies have a long gestation period and may not be realised within useful timescales (for example the 'electric armour' concepts proposed in the late 1990s). It would be unacceptable for the Army to give up its heavy armoured forces only to be faced with a repeat of the FRES fiasco, followed by the need to urgently procure a new batch of vehicles to meet a sudden crisis. *The Department should not place its faith in a 'big bang' type development of its armoured capabilities, but rather should focus on the incremental development and experimentation approach aligned with our NATO allies.* (Paragraph 96)
25. *The Department must ensure that Project Morpheus is adequately resourced with technically qualified staff to facilitate coordination and integration with its current and planned armoured vehicle programmes. Based on the Department's track record in the Land sector we are concerned that the programmes necessary to deliver the capability described above will not be delivered in a timely manner and, given the pace of technology development in this field, may be obsolete before it is delivered. In order to retain a shred of credibility the Army must set out the programmes that comprise the capability described above along with a statement on whether each will be delivered in time to provide the capability described and how obsolescence will be avoided. Based on the Department's track record in the Land sector we are concerned that the programmes necessary to deliver the capability described above will not be delivered in a timely manner and, given the pace of technology development in this field, may be obsolete before it is delivered* (Paragraph 98)
26. We support the Ministry of Defence's initiative to develop a Land Industrial Strategy. *The LIS should place the land sector on an equal footing with the Air and Maritime sectors, providing industry with certainty for the coming decades and ensuring the Army has access to the technical and manufacturing base that will facilitate the development of new technologies as armoured warfare capabilities evolve. The Strategy should also make clear sustaining capability relies on co-operation with allies.* (Paragraph 103)
27. We agree that it is important the Ministry of Defence maximises the collaborative opportunities offered by the recent investments in the UK's armoured vehicles sector. *The Department should ensure that it leverages these advantages by making a clear decision about its participation in the Main Ground Combat System. A repeat of the MRAV/Boxer debacle would be unacceptable.* (Paragraph 105)

28. *We trust the creation of and adherence to the proposed Land Industrial Strategy will improve the UK's competitiveness in this sector. The Ministry of Defence, the British Army and their Industry counterparts must work together to map out the coming decades for the armoured vehicle sector.* (Paragraph 107)

## Conclusion

29. This report reveals a woeful story of bureaucratic procrastination, military indecision, financial mismanagement and general ineptitude, which have continually bedevilled attempts to properly re-equip the British Army over the last two decades. Even on the MoD's own current plans (but subject to the Integrated Review), we are still some four years away from even being able to field a "warfighting division", which, itself, would now be hopelessly under-equipped and denuded of even a third combat brigade. (Paragraph 108)
30. Were the British Army to have to fight a peer adversary—a euphemism for Russia—in Eastern Europe in the next few years, whilst our soldiers would undoubtedly remain amongst the finest in the world, they would, disgracefully, be forced to go into battle in a combination of obsolescent or even obsolete armoured vehicles, most of them at least 30 years old or more, with poor mechanical reliability, very heavily outgunned by more modern missile and artillery systems and chronically lacking in adequate air defence. They would have only a handful of long-delayed, new generation vehicles, gradually trickling into the inventory, to replace them. (Paragraph 109)

# Formal minutes

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**Tuesday 9 March 2021**

Members present:

Rt Hon Tobias Ellwood, in the Chair

Stuart Anderson

Rt Hon Kevan Jones

Sarah Atherton

Gavin Robinson

Richard Drax

Rt Hon John Spellar

Rt Hon Mr Mark Francois

Derek Twigg

## **1. Progress in delivering the British Army's armoured vehicle capability**

Draft Report (*Obsolescent and outgunned: the British Army's armoured vehicle capability*), proposed by the Chairman, brought up and read.

*Ordered*, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 109 read and agreed to.

Annex and Summary agreed to.

*Resolved*, That the Report be the Fifth Report of the Committee to the House.

*Ordered*, That the Chair make the Report to the House.

*Ordered*, That embargoed copies of the Report be made available (Standing Order No. 134).

[Adjourned till Tuesday 16 March at 2.00pm]

## Witnesses

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The following witnesses gave evidence. Transcripts can be viewed on the [inquiry publications page](#) of the Committee's website.

### Tuesday 6 October 2020

**Francis Tusa**, Editor, Defence Analysis; **Nicholas Drummond**, Director, Aura Consulting Ltd.

[Q1–44](#)

**Peter Hardisty**, Managing Director, Rheinmetall BAE Systems Land (RBSL); **Carew Wilks**, Vice President, General Dynamics Land Systems-UK; **Lee Fellows**, Vice President and Managing Director, Lockheed Martin UK Ampthill

[Q45–71](#)

### Tuesday 20 October 2020

**Jeremy Quin MP**, Minister for Defence Procurement, Ministry of Defence; **Air Marshal Richard Knighton CB**, Deputy Chief of Defence Staff (Military Capability), Ministry of Defence; **Lieutenant General Christopher Tickell CBE**, Deputy Chief of the General Staff, British Army, Ministry of Defence; **Mr Chris Bushell**, Director General Land, Defence Equipment and Support, Ministry of Defence

[Q72–156](#)

### Tuesday 3 November 2020

**Brigadier (ret) Ben Barry**, Senior Fellow for Land Warfare, International Institute for Strategic Studies

[Q157–189](#)

## Published written evidence

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The following written evidence was received and can be viewed on the [inquiry publications page](#) of the Committee's website.

AVF numbers are generated by the evidence processing system and so may not be complete.

- 1 Anglo Engineering Concepts ([AVF0007](#))
- 2 Beaver, Paul (Director, Beaver Westminster Limited) ([AVF0015](#))
- 3 Dorman, Professor Andrew (Professor of International Security, King's College London); Professor Matthew Uttley (Professor of Defence Studies, King's College London); and Dr Benedict Wilkinson (Director of Research, Policy Institute, King's College London) ([AVF0006](#))
- 4 Drummond, Nicholas (Defence Industry Consultant and Commentator, Aura Consulting Ltd.) ([AVF0014](#))
- 5 General Dynamics Land Systems-UK ([AVF0011](#))
- 6 International Institute for Strategic Studies ([AVF0005](#))
- 7 KNDS (KMW NEXTER DEFENSE SYSTEMS) ([AVF0012](#))
- 8 Lister, Mr David; and Mr Jason Barnes ([AVF0003](#))
- 9 Lockheed Martin UK ([AVF0017](#))
- 10 Lockheed Martin UK ([AVF0008](#))
- 11 London, Mr ([AVF0002](#))
- 12 Ministry of Defence ([AVF0016](#))
- 13 Nettlefold, Julian ([AVF0001](#))
- 14 Rheinmetall BAE Systems Land (RBSL) ([AVF0013](#))
- 15 Witheridge, Mr. Michael ([AVF0004](#))

## List of Reports from the Committee during the current Parliament

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All publications from the Committee are available on the [publications page](#) of the Committee's website.

### Session 2019–21

Number	Title	Reference
1st	In Search of Strategy—The 2020 Integrated Review	HC 165
2nd	The Security of 5G	HC 201
3rd	Pre-appointment hearing for the Service Complaints Ombudsman	HC 989
4th	Foreign Involvement in the Defence Supply Chain	HC 699
1st Special	Armed Forces Covenant Annual Report 2018: Government Response to the Committee's Eighteenth Report of Session 2017–19	HC 162
2nd Special	Drawing a Line: Protecting Veterans by a Statute of Limitations: Government Response to the Committee's Seventeenth Report of Session 2017–19	HC 325
3rd Special	In Search of Strategy—The 2020: Integrated Review: Government Response to the Committee's First Report of Session 2019-21	HC 910
4th Special	The Security of 5G: Government Response to the Committee's Second Report of Session 2019–21	HC 1091