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Defence Committee

Obsolescent and outgunned: the British Army's armoured vehicle capability: Government Response to the Committee's Fifth Report of Session 2019–21

First Special Report of Session 2021–22

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The Defence Committee

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First Special Report

On 14 March 2021 the Defence Committee published its Fifth Report of Session 2019–21, *Obsolescent and outgunned: the British Army's armoured vehicle capability* (HC 659). The Government's response was received on 6 May 2021, and is appended to this report.

Government Response

Our formal response to the committee's report recommendations and conclusions is set out below. The Committee's findings are highlighted in bold, with the Government's response set out in plain text. For ease of reference, paragraph numbering in brackets refers to the order in which they are presented in the Committee's Report.

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)

By way of background, the broad and demanding requirement of Future Rapid Effects System (FRES), that included Multi-Role Armoured Vehicle (MRAV), could not easily be met. In addition, other factors including complex commercial arrangements, significant planning round savings, changing global threats and evolving requirements all played a part in driving delay in the decision-making process, and impacted upon timely delivery of new capabilities. However, many of the 2011 NAO "*cost effective delivery of an armoured vehicle capability*" observations and recommendations have been implemented in the Army's delivery approach including trading requirements, pursuing off the shelf solutions with growth potential and longer-term incremental acquisition.

It is worth noting that Boxer is now on contract with a more agile off the shelf commercial approach. It has a more realistic performance, cost and time requirement and is based on existing and proven vehicles and enabling technologies. Whilst the UK did stop its MRAV programme, its earlier participation in the Boxer Programme has provided retained rights and benefits in rejoining it.

The MOD acquisition system has also evolved significantly in the past decade with various initiatives across the Army, DE&S and the MOD which are supporting improved approaches. The Army Operating Model has embraced Programme, Portfolio and Project Management as a professional business approach over the last 5 years creating a more robust and disciplined approach across requirement setting, delivery management and governance. DE&S transformation has delivered stronger functional management and project controls in its delivery and a more disciplined business relationship with Front Line Commands, whilst its commercial and improved market engagement has, for example, accelerated the procurement of Boxer saving time and resource and providing a stronger understanding of products that best meet the requirement. The Army has also contributed to the MOD's acquisition and approvals transformation initiative with several pathfinders and exemplar approaches applying previous lessons to future approaches.

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)

The Army, DE&S and the MOD have continued to improve Defence acquisition. Many of the 2011 NAO "*cost effective delivery of an armoured vehicle capability*" observations and recommendations have been implemented in the Army's delivery approach including trading requirements, pursuing off the shelf solutions with growth potential and longer-term incremental acquisition.

Capability requirements have been refined and the Army is committed to identifying more realistic performance, cost and time requirements that are based on existing and proven vehicles and technology. In addition, we have invested in open systems and generic vehicle architectures while also prioritising power, weight and space growth potential to ensure these vehicles are future proofed.

The Land Industrial Strategy will adopt a longer-term approach to procurement and through life support. This will allow improved incremental technology insertion and better whole life cost management. This, combined with the Army's increased focus on Future Force Development and experimentation, will allow the MOD to keep capabilities contemporary and partner more strategically with the industrial base and key allies and exploit technology as it matures with much greater confidence in performance, cost and time.

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)

The Department notes the Committee's comments and acknowledges that defence acquisition has faced challenges in the past, including within its Armoured Fighting Vehicle portfolio. Whilst defence acquisition remains inherently challenging and complex, our approach has evolved significantly over the past decade, including improved programme, portfolio and project management, stronger functional management and project controls. The introduction of a three step approvals process, with the Strategic Outline Case as a new and earlier approval point, provides upfront clarity of programme scope and understanding of key risks, enabling these to be evaluated and the strategic direction for individual programmes to be agreed at an earlier stage. These changes provide a sound basis for the delivery of future programmes following the Integrated Review.

The National Audit Office has recognised that Defence is making progress. For example, in its March 2020 report into Defence Capabilities,[1] the NAO noted that the MOD has reduced delays to delivering programmes over the last ten years. The Army recognises, however, that the NAO 2020 report still shows that there are areas for improvement.

1 https://www.nao.org.uk/wp-content/uploads/2020/03/Defence-capabilities-delivering-what-was-promised.pdf

The introduction of Defence Major Projects Portfolio (as part of the Government Major Projects Portfolio) has resulted in regular scrutiny through the Infrastructure and Projects Authority (IPA) Gateway audits, which have reinforced that progress is being made.

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 Department notes the Committee's comments and recognises the importance of skills and internal capability in future delivery of defence procurement and support. DE&S has undergone a significant transformation programme over recent years, including a focus on people and skills, the introduction of a functional management approach to match suitably skilled people to roles, and the attainment of formal qualifications where appropriate. For example, all of the most senior DE&S finance and accounting staff have professional Chartered Accounting qualifications and nearly 90% of commercial staff are CIPs qualified or are studying for qualifications. 97% of Project Managers have completed Non-Commercial Contract Management training and 47% of senior Project Managers have achieved APM Registered & Chartered Project Professional status.

Improved approaches to commercial and financial management in DE&S have delivered some £5 billion of genuine efficiencies against the Equipment Plan over the Annual Budgeting Cycle 2020 period. DE&S is committed to growing the diversity and professionalism of its people and to recruit, train and retain the optimal mix of skills for the future to ensure that it is well positioned to respond to the outcomes of the Integrated Review. However, it should be acknowledged that delivering the growing programme of work from the positive Defence settlement will remain challenging in face of headcount pressures, but we are seeking to address this through ongoing reform work.

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)

Whilst modernisation and upgrading of existing, and entry into service of new Armoured Fighting Vehicles (AFVs) has taken far longer than originally intended, the Department's focus on urgently procuring the right kit for its operations in the Middle East cannot be underestimated. Urgent Operational Requirements for the campaigns in Iraq and Afghanistan over this period saw the procurement of critical capabilities such as Mastiff,

Ridgeback and Husky amongst others. This was a decision also taken by our allies, such as the US who also focussed on UORs. It should be noted that during the period 1997 to 2020 the Army has delivered the following programmes, some of which are classed as AFVs:

- **Challenger 2 Main Battle Tanks (ISD – 1998)**. 408 platforms delivered (including Driver Training Tanks). There are currently 227 currently in service.
- **Viking All-Terrain Vehicle (Protected) (ISD – 2005)**. 150 delivered with an additional 24 Viking Mk 2 ATVs ordered in 2009. Contract for 99 upgrades (of Mk1 to Mk2 standard) completed in 2016.
- **Panther Command and Liaison Vehicle (ISD – 2006)**. 400 platforms to the Armoured & Mech Inf Bdes.
- **Titan** (Bridge Layer) (**ISD – 2007**). 33 platforms.
- **Trojan** (Multi-purpose engineer vehicle) (**ISD – 2007**). 33 platforms
- **Foxhound Protected Patrol Vehicle (ISD – 2012)**. 401 platforms
- **Terrier (ISD – 2014)**. 60 platforms.

In addition, the Army has delivered some significant capability enhancements to the operationally deployed AFV fleets including new armour fits for Challenger 2 (CR2) as well as upgrades to its lethality and reliability; applique armour for Warrior and upgrades to Bulldog to improve survivability, mobility and lethality.

The NAO has acted upon the Committee's recommendation to conduct a study into AFV procurement which the Department will fully support.

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)

CR2 Life Extension Project (LEP) considered a range of comparative off-the shelf alternatives as part of its recent Full Business Case submission. The underpinning logic on the grounds of affordability and meeting our requirements were fully tested by both the Department's internal scrutiny and assurance and that of HMT. This showed that CR2 LEP offers a better value for money solution than the German LEOPARD 2 or US M1 ABRAMS, while supporting UK prosperity and the growth of high-quality engineering jobs around the UK.

Both alternative platforms are older than CR2[2] and whilst they have both been iteratively upgraded, they still remain less capable than CR2 LEP will be on delivery. The costs

2 Leopard 2 is over 60 years old.

associated with any alternative platform must also include replacements for the Army's armoured repair and recovery (CRARRV), armoured engineering (TITAN, TROJAN) and Driver Training Tanks. The full cost of integrating a new platform adds approximately 40% to the Control Total,[3] making the procurement of these alternatives unaffordable. Both internal scrutiny by the MOD[4] and more widely by the Major Projects Review Group[5] both agreed and confirmed that the current strategy is both affordable and delivers better value for money. In addition, CR2 LEP will be manufactured in the UK, centred on factories in Telford. At least 60% of the RBSL contract will be undertaken with the UK supply base, including the devolved nations, generating and sustaining up to 500 jobs in the West Midlands, Glasgow, Newcastle upon Tyne and the Isle of Wight; supporting the UK prosperity agenda and economy.

The option to fit Challenger with an auto-loader was also considered and dismissed early in the competitive assessment phase on capability and technical feasibility grounds and it is not believed it would deliver any substantial benefit.

The Key Performance Milestones for CR2 LEP are as follows:

KPM	Event	Date
1	Preliminary Design Review	30-Jan-20
2	FBC Submitted to IAC	09-Dec-20
3	Interim Design Review 1	04-Aug-21
4	Critical Design Review (CDR)	20-Oct-22
5	Achieve Technology Readiness Level (TRL)7 for new Modular Armour (nMA)	08-Mar-23
6	Ready for Trials	03-May-24
7	Ready for Manufacturing	25-Jul-25
8	Logistic Support Date	30-Jun-27
9	Ready for Training	18-Jun-27
10	Initial Operating Capability (IOC)	30-Nov-27
11	Full Operating Capability (FOC)	22-Nov-30
12	Programme Closure	12-May-31

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)

CR2 has been in service for over 20 years and requires modernisation to ensure that it can meet its operational requirements which is why the Army initiated the CR2 LEP. The CR2 LEP has recently been approved and the Army is committed to ensuring that the project runs smoothly and on time, and potentially even brought forward. Following the Integrated Review and CR2 LEP approval the detailed plans for transition from CR2 to Challenger 3 (CR3) are now under development to ensure that the Army can meet current and future outputs with capabilities that are fit for purpose.

3 Based on Australian experience of additional pan Defence Line Of Development costs of procuring Abrams – Australian NAO report: Acquisition of the ABRAMS Main Battle Tank Dated 17 July 2007.

4 Through the MOD's Joint Requirements Oversight Committee (JROC) and Investment Appraisals Committee

5 On behalf of the IPA and HMT

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)

The Department notes the Committee's concerns about historical progress on the Warrior Capability Sustainment Project (CSP). The drivers of cost growth and schedule delay related primarily to the technical and engineering challenges around systems integration, including those associated with the inclusion of the qualified cannon build standard, which were not sufficiently understood at the outset by either party. Although the decision has now been taken as part of the Integrated Review to no longer upgrade Warrior, we recognise that we need to learn the lessons from this programme to improve future performance in delivering our Armoured Fighting Vehicle capability as part of Integrated Force 2030. Our programme of acquisition reform is addressing these issues, and we now have systems in place both to identify lessons and to conduct checks and balances as programmes are delivered. For example, the DE&S Delivery Endorsement Committee reviews projects for their achievability and where lessons are identified these are shared amongst the project delivery community. This, coupled with our new approvals and delivery framework, will ensure that we are better placed to respond to the challenges afforded by complex defence procurement programmes in the future.

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)

The Department is committed to this weapons system and agrees with the Committee for the need for accountability and transparency on the programme. The higher cost of the 40mm ammunition and weapon system reflects its increased capability against more demanding threats; increased effectiveness will reduce the amount needed to be fired, whilst increased synthetic training will also reduce live fire costs.

Furthermore, cooperation with France, who have had success in integrating the weapon, on the 40mm Cased Telescoped Weapons System (CTWS) has allowed the UK to share cost in 40mm ammunition development and cannon and ammunition qualification. Manufacturing resilience is improved, with CTWS ammunition able to be assembled from components in either country. Shared use of the weapon system has allowed collaborative learning and delivers useful operational interoperability. The CTWS also supports a number of manufacturing and engineering jobs across several key BAES sites including Glascoed, Washington, and the Bishopton Site in Scotland.

A Full Business Case for the initial operational stock purchase of 40mm in 2019 outlined the estimated whole life costs for 40mm ammunition. This was subject to internal independent assurance.

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)

A decision has now been taken as part of the Integrated Review to no longer upgrade Warrior due to some of the issues highlighted by the Committee, but also the Army's capability requirements to meet current and future threats.

The Integrated Review has set the British Army on a course of radical transformation. Under 'Future Soldier' the Army will transform to become one that is more agile, more integrated and more expeditionary – ready for the next challenge, not the last. Two Heavy Brigade Combat Teams will be formed from the modernisation of two Armoured Infantry Brigades. Over the next decade these will be equipped with Ajax armoured reconnaissance, Challenger 3 Main Battle Tanks and Boxer mechanised infantry vehicles. As part of this modernisation we intend to accelerate and enhance the Boxer programme to deliver full operational capability by 2030. Boxer will become the primary mechanised infantry platform for the Army as Warrior retires.

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)

The Department notes the Committee's comments and appreciates their concerns about delays in delivery of this capability to the front line. AJAX represents the first major procurement of an Armoured Fighting Vehicle that is fully digitised with an Electronic Architecture. This step change in capability and increased level of system complexity has brought technical challenges, including around the operation of the Fire Control Panel on the turreted variant, which have required thorough analysis to ensure a safe system is released to Service. Whilst the integration of the 40mm weapon system has undoubtedly increased the technical challenge, there are a number of other technical challenges that GDLSUK are working through and need to overcome in parallel to this particular issue, we continue to work collaboratively with the Prime Contractor, General Dynamics UK, to overcome these issues and ensure delivery of the capability to the required standard.

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)

There is no suggestion that the weapons system has contributed to the delays on AJAX and we remain committed to it. While there are alternatives to the 40mm cannon, they do not meet the lethality requirements and are unable to fire the new Cased Telescopic Ammunition. The cannon and ammunition that has been selected for AJAX is stabilised, so that it can fire on the move, and it can defeat both Infantry Fighting Vehicles and Main Battle Tanks. The cannon can also fire programmable ammunition such as airburst at high elevation against a range of airborne and urban targets significantly enhancing its utility and effectiveness. The HMT, IAB and the then-Minister for Defence Equipment and Support approved the selection the 40mm cannon and cased Telescopic Ammunition in March 2008.

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. 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)

It is fair to recognise this programme has been more demanding and challenging than originally envisaged as the first next generation modern, digital AFV. As in any complex acquisition there are several risks and challenges that materialise in the demonstration and pre-production phases which the MOD looks to manage and mitigate against thorough analysis and by learning from previous programmes and experiences. It should be noted that these delays are not always technical in nature; some are programmatic as spending is adjusted to reflect contract performance, the Department's annual planning round and affordability challenges. However, issues are now being addressed and this learning is driving an improved approach into other programmes.

As indicated in the response to paragraph 10, the Department is embarking on a new transformational approach where operational versatility will deliver political and strategic choice between 'operate' and 'fight'. The focus will remain on two modernised Heavy Brigade Combat Teams with the necessary supporting elements. There are no current plans to develop an Infantry Fighting Vehicle variant of AJAX.

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)

Age is not always an indicator of capability and it should be recognised that the FV430 series (now called Bulldog (BD)) has had a series of upgrades to enhance its mobility, lethality and protection. It has been used successfully on operations in Iraq where it proved to have significant utility. It remains fit for its specific operational purpose, providing the armoured backbone of the 3rd UK Division. The planned replacement for BD is the Armoured Support Vehicle (ASV). The analysis to identify the future requirement will now be completed by the Army to deliver a timely replacement. This may deliver an earlier Out of Service Date (OSD) than the originally planned date of 2030.

It should be noted that numerous nations including Australia and USA are still using their BD equivalent, the M113 which has a similar length of service. The US are replacing them through the Next Generation Combat Vehicle programme and the Australians through LAND400.

Digital Spine

The Land Environment Tactical Communication Information Systems (LETacCIS) programme will provide the digital backbone for the deployed force from individual soldier, through the vehicle platforms, right the way to Divisional and Corps HQs. This digital backbone consists of the radio/bearers, user devices, associated infrastructure and applications required by soldiers, armoured vehicles or headquarters to plug into, in order to gain information advantage over our adversaries.

The LETacCIS programme consists of multiple sub-programmes and projects. In the last six months the Bowman Combat, Infrastructure and Platform Battlefield Information System Application (BCIP 5.6) has reached full operational capability and a logistics support contract was awarded to Babcock to provide support to the entire LETacCIS portfolio, breaking away from the previous prime contractor and opening up the supply chain. In the next six months the programme will launch competitions for the design and integration partners for the Army's Dismounted Situational Awareness (DSA) project and TRINITY the Army's next generation wide area network capability. Other projects within the programme are at differing states of maturity, as expected in an enduring programme of this nature and scale.

What is critical is its coherent integration onto platforms. In this context, platforms are nodes on the network, so the network enhances the effectiveness of each platform by making information available to it. To ensure we accomplish this, the Army has instigated the Mission Systems Integration (MSI) project and defined an open vehicle digital architecture (Land System Open Architecture (LOSA)). The MSI will try to best align existing platform architectures to the LOSA and will enforce the LOSA standard for new platforms. In essence the platform will be certified to operate on the network and this will become a key requirement.

With regards to ensuring delivered capability is technically relevant and effective, one of the four LETacCIS principles is Evolutionary Capability Delivery. This aims to field capability that exploits new technology, is responsive to changing threats and not just

pushed by obsolescence. It also focuses on delivering quicker modular upgrades rather than monolithic system capability drops. Work is ongoing with Defence's Acquisition and Approvals Transformation Programme examining options to expedite digital capability delivery. Examples include judging approvals based on technical risk and complexity rather than simply monetary value.

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)

The Department agrees with the Committee on the desirability of acceleration of Boxer and whilst there have been financial constraints the MOD is intending to accelerate and enhance the programme, intending to deliver full operational capability by 2030. The Boxer programme will continue to learn to lessons from AJAX and previous procurement programmes.

The plan is to iteratively upgrade Boxer throughout its life. By shifting to a longer-term approach to investment planning, the Army intends to create a more virtuous relationship between Defence and its suppliers, a theme which will be picked up in the Land Industrial Strategy. Open electronic architectures (a key feature of new and upgraded armoured vehicles) enables the use and upgrading of novel sensors and effectors as well as enhancing command and control. This could also foster: increased investment in UK intellectual property (especially in areas of national technological advantage); growth of the UK's high-tech Defence industrial capability (including the generation of jobs and skills); closer collaboration with our unique network of international allies and partners (building on the lessons from programmes like F-35); and greater support to UK land system exports (tapping into the clear opportunity to achieve a greater share of the global land systems export market).

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)

The Department fully supports the aspiration for commonality of platforms and modularity of capability where this is appropriate given the potential implications on cost and performance. This is something we have considered in commissioning sensors for AJAX that can be used across different platforms.

The Land Equipment Platform Strategy will reduce the number of platform types in service with the Army and future procurement decisions will be linked to this strategy.

The Army has already adopted LOSA. This is a systematic (i.e. system of systems approach) to reduce the burden of introducing new systems or sub-systems to our land capabilities. It is achieved by following a set of open, modular and scalable standards; from a vehicle perspective they are encapsulated in the Generic Vehicle Architecture. Generic Vehicle Architecture standardises the physical, electrical and data interfaces to make upgrades simpler to test, prove and integrate.

Modularity will be achieved through:

- Development of 'Through Life Capability Management Plans'.
- Ensuring sufficient size, weight and power in our future capabilities to enable 'growth' and 'change' through life; this could involve identification of capabilities that may need to be integrated in the future. This is called Installation Provision Made in Design (IPMD) – as an example, the BOXER team identified the potential future requirement to fit an Active Protection System (APS).
- Ensuring the mission system architecture (also referred to as the electronic architecture) has been designed correctly from the outset (i.e. with growth and resilience in mind).

This approach will reduce, but not remove, the challenge of modular upgrades and their integration. Work is ongoing to ensure that this approach is as compatible as it can be other Services and allies. Modularity and iterative upgrades are also key parts of the proposed Land Industrial Strategy.

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)

Following SDSR 15 and subsequent planning round decisions, the modernisation programme was placed under increasing pressure, resulting in challenges to fully meet SDSR ambition.

The Department has learnt from this and sought to fully resource the propositions within the recent Integrated Review and defence Command paper, the £24 billion additional funding received by Defence was drawn out of the threat assessment and helps ensure we match our ambitions

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)

With the Full Business Case for CR2 LEP now approved and a contract awarded, a joint effort between RBSL and the MOD is investigating ways in which the current delivery timeline can be accelerated. Work is also ongoing on accelerating Boxer. This will be passed through Departmental scrutiny to ensure that any additional cost in creating additional industrial capacity is affordable and delivers value for money. These findings are due to report back to the Secretary of State with a view to submitting a formal adjustment via a Review Note before the end of 2021.

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)

It is inconceivable that the UK would engage in Divisional artillery duel with Russia. Not only would we be shoulder to shoulder with our NATO allies, the Army in a conflict scenario would rely on a series of effectors to respond to our adversaries' artillery, including an Air Power component. However, to enhance capabilities in this area the Integrated Review announced £800 million over 10 years for Mobile Fires Platform (self-propelled 155mm gun with automated turret), and the MOD has developed two significant programmes: the Close Support Fires Programme; and the Land Deep Fires Programme (LDFP). The Committee may recall the recent announcement of an important LDFP upgrade to our Multiple Launch Rocket System (MLRS) missile launchers (into action almost immediately, life extended to 2050, able to fire longer range missiles) and of collaborative development with the US on the Guided MLRS-Extended Range missile (150km range). The MOD is also developing specific payloads to deliver the effects required against key target sets.

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)

This area is indeed one of Defence's top priorities. One of the Army's four prioritised 'sunrise capabilities,' the Category 'A' Land Ground-Based Air Defence (GBAD) Programme comprises Short-Range Air Defence (SHORAD), including Counter-Unmanned Aerial Systems (C-UAS), Medium-Range Air Defence (MRAD), and GBAD Fire Control Systems (FCS). The Programme will deliver a system of survivable, layered, and digitally connected platforms that will enable the Land Environment to Protect, Engage, Constrain, and Fight, as part of the UK's Integrated Air and Missile Defence (IAMD), granting surface freedom of action from the tactical to the operational level. Land GBAD Specialist GBAD capabilities will be complemented by generalist capabilities to counter threats from increasingly prevalent small Unmanned Air Systems (UAS). The Counter-Small-UAS project adds mass to UK's short and medium range air defences from 2023, with soldier-borne and mobile systems. All components of the GBAD system will be capable of evolving to keep pace with rapidly developing threat technologies.

The LDFP includes Deep Fires Rocket System (DFRS) and associated munitions. It will transform land deep surface-to-surface fires capability; exploit the benefits of Defence digitalisation and investment in longer range missiles to enhance the UK's pan-domain deep effects capability; modernise and enhance the joint force; reinforce collaboration and interoperability with the US and key allies; and offer UK prosperity opportunities. As well as being capable of firing current and future MLRS munitions, a modernised DFRS will have the required mobility, reaction time, and protection to survive against a peer enemy and help win the joint deep battle. The UK has recently signed two contracts with the US DoD to recapitalise our common MLRS platforms (IOC 2026) and collaborate on the development of the Guided MLRS-Extended Range missile and subsequent warhead spiral development (Initial Operating Concept 2025).

The Close Support Fires Programme (CSFP) includes the Mobile Fires Platform (MFP) and the Tactical Guided Munition Indirect (TGMI). It will transform the close surface-to-surface fires capability of the Army, providing cost effective and near precision fires out to over 40km. CSFP will be a critical component of non-discretionary joint forces capability and a modernised Army, supporting both the Heavy Brigade Combat Teams and the wider Division. MFP and TGMI will future-proof our indirect fires capability, ensuring it is organised to operate and designed to fight. With enhanced mobility, accuracy and automation, MFP will have utility across the Integrated Operating Concept framework, and across the spectrum of deployments from small numbers on discrete operations to the generation of the warfighting capability required for high intensity operations. MFP and TGMI will complement Deep Fires, reaching out to the MLRS minimum effective planning range of 40km, and providing a critical element of the 'any sensor, any effector' vision. Further ammunition projects will facilitate ever greater utility for MFP by increasing the range, anti-armour capability and through the introduction of novel effectors, ensuring the capability is 'future-proofed' to outmatch the threat and keep pace with our closest allies. The CSFP aims to exploit platform commonality and opportunities for collaboration with our closest allies to efficiently deliver capability.

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)

Overmatch is not as simple as quantity versus quantity and the Department has articulated how the Land Component intends to 'Operate' and 'Fight' in the modern era. The aim is to 'overmatch' adversaries across the battlespace in both the physical and cyberspace. The modernisation programme will deliver strategic choice through operational flexibility ensuring that that the Army is ready to deal with new and emerging threats.

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)

The Integrated Review has set the British Army on a course of radical transformation. Under 'Future Soldier' we will transform to become an Army that is more agile, more integrated and more expeditionary – ready for the next challenge, not the last. The Army proposition was based on an understanding of current and future NATO requirements and the UK contribution to NATO.

As part of the Integrated Review the Army will:

- Invest c£1.3 billion in armoured capability by upgrading 148 main battle tanks to Challenger 3.
- Accelerate and enhance the Boxer programme to deliver full operational capability by 2030. It will become the primary mechanised infantry platform for the Army.
- Procure a new ground-based air defence system to give the Army the capability to defeat all modern airborne threats, including small drones.
- Invest over £250 million over ten years in the Guided MLRS (GMLRS) which will provide an upgraded long-range rocket artillery platform.
- Invest over £800 million over ten years on a new automated Mobile Fires Platform to deliver enhanced close support artillery systems and greater operational mobility.
- Invest over £200 million over ten years in a new electronic warfare and signals intelligence.
- Introduce a new medium lift helicopter in the mid-2020s will enable a consolidation of the Army's fleet of medium lift helicopters from four platform types to one.

This will allow the Army to generate two Heavy Brigade Combat Teams formed from the modernisation of two Armoured Infantry Brigades. Over the next decade these will be equipped with Ajax armoured reconnaissance, Challenger 3 Main Battle Tanks and Boxer mechanised infantry vehicles. We will also have a fleet of AH-64E aircraft, the most advanced variant of Apache, which will replace the Apache AH Mark 1.

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)

There is an acknowledged pressing need for Defence to address GBAD. The Land GBAD Programme will deliver both SHORAD/MRAD capabilities from 2026, for which funding profiles are in place.

Regarding the threat from Unmanned Aerial Systems (UAS), in the short term the RAF has a Counter-small UAS operational concept demonstrator (SYNERGIA) for the protection of static locations, and the Army has a similarly static capability deployed overseas as an Urgent Capability Requirement. The Army's intent, through the Land GBAD Programme, is to bring into service a core Counter-small UAS capability for deployment with dismounted Very High Readiness manoeuvre units in 2023.

The Army does have an excellent dismounted Anti-Tank capability, but the ability to fire Anti-Tank Guided Missile (ATGMs) from under armour is being addressed through the Battle Group Organic Anti-Armour (BGOAA) programme. Present technologies do not allow AFVs to launch 'fire and forget' ATGMs on the move, requiring the firing platform to remain static, making it vulnerable.

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)

Our current AFV fleet remains broadly fit for purpose against the most likely threats but must be modernised to ensure they can deal with future threats. The current modernisation programme is delivering a competitive advantage, intending to create a fleet of highly advanced, digitised platforms able to deal with future challenges, but one that will adapt to emerging threats through iterative enhancements and upgrades. While previously frustrated by a number of challenges, including the immaturity of some technology, there is now far greater confidence in the Army modernisation programme and that it is based on technology that is sufficiently mature.

In the future, focussed investment in Research and Development, alongside our allies, will ensure that technology is only considered for inclusion when it is sufficiently mature. This is a key aspect of the Land Industrial Strategy that seeks to iteratively upgrade our capabilities so that they can adapt to emerging threats and exploit advances in technology when it is appropriate to do so.

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)

The LETacCIS programme provides the digital backbone for the deployed force from individual soldier, through the vehicle platforms, right the way to Divisional and Corps HQs. This digital backbone consists of the radio/bearers, user devices, associated infrastructure and applications required by soldiers, armoured vehicles or headquarters to plug into, in order to gain information advantage over our adversaries.

The LETacCIS programme consists of multiple sub-programmes and projects. In the last six months the BCIP 5.6 has reached full operational capability and a logistics support contract was awarded to Babcock to provide support to the entire LETacCIS portfolio, breaking away from the previous prime contractor and opening up the supply chain. In the next six months the programme will launch competitions for the design and integration partners for the Army's DSA project and TRINITY the Army's next generation wide area network capability. Other projects within the programme, are at differing states of maturity, as expected in an enduring programme of this nature and scale.

Crucial to the success of the programme is the coherent integration of the systems onto platforms. In this context, platforms are nodes on the network, so the network enhances the effectiveness of each platform by making information available to it. To ensure we accomplish this, the Army has instigated the MSI project and defined an open vehicle digital architecture (LOSA). The MSI will try to best align existing platform architectures to the LOSA and will enforce the LOSA standard for new platforms. In essence the platform will be certified to operate on the network and this will become a key requirement.

With regards to ensuring delivered capability is technically relevant and effective, one of the four LETacCIS principles is Evolutionary Capability Delivery. This aims to rapidly field capability that exploits new technology, is responsive to changing threats and not just pushed by obsolescence. It also focuses on delivering quicker modular upgrades rather than monolithic system capability drops. Work is ongoing to ensure Defence's approvals processes are better optimised for digital capability delivery.

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)

The Department will develop and introduce a Land Industrial Strategy and absolutely sees the benefits of doing so, noting the positive expenditure on the Maritime and Air domains. The new Defence and Security Industrial Strategy acknowledges that the

ability to generate technologically advanced land systems and integrate them rapidly is a leading priority. The Land Industrial strategy, will envision an innovative, productive and globally competitive land industrial and technology segment in the UK that can export UK products, collaborate domestically and internationally on key defence projects, and contribute to our national prosperity.

Co-operation with allies in the Land Domain is a central theme in the Land Industrial Strategy. Not only does this improve interoperability, it allows science and technology sharing, creates economies through volume, and offers a more resilient global supply chain. There are also export benefits to be had. Lessons from BOXER, F35 and the FCAS projects, which all have strong international components, have been applied to the Land Industrial Strategy design

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)

The Army's Future Ground Combat System (FGCS) will replace the close combat capability from around 2040; the capability requirements are being informed by the most up to date threat assessments from Defence Intelligence and DSTL. The Future Ground Combat System is currently in its concept phase.

The UK has recently been granted Observer Status in the Franco-German Main Ground Combat System programme. The Army also continues to discuss the FGCS requirement with the US, who are evolving their Next Generation Combat Vehicle programme.

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)

The Department welcomes and agrees with the Committee's recommendation and recognises that successful procurement depends upon a positive and collaborative relationship with industry. The Army's Armoured Fighting Vehicle modernisation programme, through our commitment to Ajax, Boxer and Challenger 3, has catalysed investment in the UK's onshore Armoured Fighting Vehicle industrial capability, which will develop and sustain a workforce skilled in high end engineering and software development. The Land Industrial Strategy, announced as part of the Defence and Security Industrial Strategy, will build on this by developing a greater partnership approach with industry and provide a more sustainable pipeline of work, thus driving new growth and investment, the development of new technologies and increasing the global competitiveness of UK products.

On the back of Army modernisation, and the £24 billion investment laid out in the Integrated Review, there is also a significant opportunity to grow land exports. The UK addressable market is sizeable and the department recognises the need to provide government impetus to UK land system exports. This is a key theme in Defence and Security Industrial Strategy and the Land Industrial Strategy work. As such, a Land Capability Campaigns Office has

been established under UK Defence and Security Exports leadership to help co-ordinate export campaigns across government and industry at a senior level – as part of a wider Team UK approach.

The prosperity benefits arising from increased investment in UK intellectual property, product development, skills, facilities and exports, will support this Government's aims to boost industrial productivity, 'level-up' the UK, promote trade and lower the UK's carbon footprint.

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)

Whilst there is some truth that there has been a lack of emphasis on the core AFV programme, the Department's pre-eminent focus on delivering large-scale, urgent operational requirements for the campaigns in Iraq and Afghanistan and its achievement in doing so should not be overlooked. Large scale, urgent operational requirements for specialist vehicles, armour upgrades and specialist equipment[6] were developed and delivered at record pace, but this naturally consumed financial resource, specialist personnel, time and importantly focus away from modernisation activity. This scenario was repeated in other allied nations and who are now also rapidly modernising.

The Integrated Review has set the British Army on a course of radical transformation. Under 'Future Soldier' the Army will transform to become one that is more agile, more integrated and more expeditionary – ready for the next challenge, not the last. Two Heavy Brigade Combat Teams will be formed from the modernisation of two Armoured Infantry Brigades. Over the next decade these will be equipped with Ajax armoured reconnaissance, Challenger 3 Main Battle Tanks and Boxer mechanised infantry vehicles. As part of this modernisation the intent is for Boxer programme to be accelerated and enhanced to deliver full operational capability by 2030.

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).

The Department agrees and acknowledges that the technical advantage of the UK over potential adversaries has diminished over the past two decades. The UK and other allies are now challenged by adversary investment in capabilities designed to counter our strengths and target our weaknesses. However, the threat platforms we are most likely to

6 Deliver of the Protected Mobility fleet, upgraded armour packs, new hulls for CVR(T), Vallon, small arms such as Sharpshooter

encounter are of almost identical age to ours, if not older. Our current AFV fleet remains fit for purpose against the most likely threats but must now evolve and adapt to this is a key aspect of the proposed Land Industrial Strategy. The current modernisation programme will deliver competitive advantage.

The issue of our peer adversaries' massed, long range fires is being addressed through a series of programmes to counter the threat posed by Unmanned Aerial Systems and their linked long range fires systems, as well as our ability to conduct precision and massed strikes against relevant targets.

The recent Defence Command Paper released as part of the Integrated Review further expands on the Integrated Operating Concept (published in 2020) which will allow our forces to be more versatile and flexible in delivering a range of tasks in the continuum between 'operate' and 'warfight.' The Department wishes to highlight that one of the core tenets of this approach is being 'allied by design', building defence capability with our NATO (and other) allied nations. We will work with our allies to mutually reinforce resilience from shared threats, this will be vital.

Conventional military capabilities are advancing in line with rapid technological change. Several states are developing land systems including anti-armour missiles and artillery, that can challenge the capabilities of many NATO nations in range and lethality, this is recognised and the Department through the Transformation fund and the recent announcements in greater investment in Research & Development is identifying the ways and means not only to counter threats but also to develop more agile, interconnected, and data-driven capabilities of the future, targeting generational leaps in capability development to outpace our adversaries.

The pace of technological change will require the Department to constantly adapt, experiment and take risks, to preserve strategic advantage. Through this approach, Defence will support the wider government ambition to build and leverage strategic advantage through Science and Technology to deliver national aims whilst developing UK prosperity through the Land Industrial Strategy.

The Department's intent is to evolve from a force that is primarily designed for the contingency of a major conflict and warfighting, to one that is also designed for permanent and persistent global engagement.