

Report of the Armoured Cavalry Programme (Ajax) Lessons Learned Review



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Report of the Armoured Cavalry Programme (Ajax)

Lessons Learned Review

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1. Introduction

1.1. The Armoured Cavalry Programme is intended to deliver transformational change to the armoured fleet through the introduction of the Ajax family of vehicles, greatly enhancing the fighting capability of the British Army. The development of the programme has been slow and considerable difficulties have arisen, including concerns that noise and vibration may have caused harm to users of the vehicles during trials.

1.2. In December 2021, a report into health and safety on the Armoured Cavalry Programme by David King, Director Health, Safety and Environmental Protection in the Ministry of Defence (“the MOD”) was published. David King found failings in the handling of health and safety concerns raised during vehicle trials, and also in the acquisition system of the MOD more generally.

1.3. In May 2022, I was formally asked by the Secretary of State for Defence to carry out a review into the Armoured Cavalry Programme, based on Terms of Reference that had been published in March 2022. A copy of my Terms of Reference are included at the end of the Report, in [Annex B](#). The particular focus of the Review would be on how the MOD shares and elevates issues across the Department and the Front-Line Commands, looking at systemic and process issues as well as individual action and inaction. Based on my findings, I was asked to identify lessons and make recommendations to help the MOD deliver major programmes more effectively in future.

1.4. Given the limited nature of my Terms of Reference, I have not sought to examine or make findings on wider issues in relation to the programme which are of interest and have been reported on elsewhere, such as whether the right kind of vehicles have been procured, whether the MOD has obtained value for money, the nature and causes of technical problems with the equipment, and whether blame for delays and technical problems should be attributed to MOD or its contractors.

1.5. In the past year, I have immersed myself in the ways of working of the various constituent parts of the MOD acquisition system. I have interviewed a large number of individuals associated with the Armoured Cavalry Programme, and read thousands of pages of documents. The people that I met gave willingly of their time to the Review. I was impressed by their commitment to the programme; they all want to see the Armoured Cavalry Programme succeed. It was clear that some people worked extremely long hours, including regular work at weekends, on the programme. A number of them were also greatly affected by the COVID-19 pandemic, and the various lockdowns and restrictions, which made working life incredibly difficult.

1.6. Some of the people that I met demonstrated anxiety at the very fact of the Review, believing that reviews of this kind are not a helpful way of learning lessons for the future. Others were especially anxious that the Review would be some kind of ‘witch-hunt’, with blame being attached to specific individuals for problems with the Armoured Cavalry Programme. Concern was expressed that the Review would negatively impact the MOD’s wider efforts to improve psychological safety and to encourage appropriate challenge. I have taken these views on board, and they are reflected in the methodology that I developed as well as in my approach to this report.

1.7. This report does not identify people by name, referring instead to the role they fulfilled. It distinguishes between successive incumbents only by reference to the date of a particular action or decision. Nor does this report attribute blame to individuals. This is because the Review has not seen any evidence of misconduct by any person involved in this programme, let alone gross misconduct, and nothing to justify any disciplinary action. At its highest, I consider that a number of errors of judgment were made at various points, and that ‘optimism bias’ infected some of the thinking of senior individuals working on the programme. The failures that I identified were systemic and institutional.

1.8. This report should not be regarded as a definitive history of the Armoured Cavalry Programme. First, the Review has only examined in detail the period between late 2018, when the ‘Recast’ process that reset the programme was nearing its conclusion, and mid-2021 by which stage the full extent of the problems with the programme was known at all levels of the MOD. Second, the report has focused on those problems from the perspective of the MOD and not from that of General Dynamics Land Systems UK (“GDLS-UK”), the manufacturer of the vehicles.

1.9. When this Review commenced in May 2022, there was great uncertainty as to the future of the Armoured Cavalry Programme. Thankfully, that situation has now changed, and there are seeds of optimism for the future. At the Defence Select Committee meeting on 11 January 2023, David Williams, Permanent Secretary at the MOD, stated that a “*workable solution*” had been found to the vehicle’s noise and vibration problem, and the vehicle had successfully been through the user validation trials.

1.10. The findings made by the Review will not come as much of a surprise to anyone who is familiar with reports into other government programmes, in particular the Department for Transport/Infrastructure and Projects Authority report from transport (“*Lessons from transport for the sponsorship of major projects*”). Many of the issues that have plagued public sector transport infrastructure projects are evident here.

1.11. One of the key findings of the Review was a lack of appreciation of diverse and contrary voices, especially from those working on the 'shopfloor'. These voices were not fully included, and were too easily dismissed. This led to individuals going outside of their chain of command to ensure that their voices were heard in the right places.

1.12. There was also a marked failure to escalate information about problems for situational awareness purposes. I found that seniors would appreciate knowing, rather than being kept in the dark, about problems even if the risks were not clearly evidenced. They might have been able to provide advice or intervene to assist in resolving the problems. This was particularly the case with respect to the emerging concerns around noise and vibration. Not only was there a failure to escalate those concerns properly, but it took a considerable amount of time before anyone looked at the matter strategically and asked what was really going on.

1.13. I was also struck by the emphasis on keeping to time: that the Initial Operating Capability ("IOC") date of July 2020 was "*immovable*". Although there was a clear strategic rationale for meeting this date, the undue focus on that date had negative effects, creating pressure within the MOD and driving a number of unhelpful behaviours.

1.14. It was clear to me that the various constituent parts of the MOD acquisition process did not always work well together. I identified friction in the relationship between DE&S (the delivery agent for the equipment side of the project) and Dstl (the executive agency which provides scientific and technical expertise and advice to the MOD), as well as between DE&S and the Senior Responsible Owner ("SRO", the Army's single point of contact for the Armoured Cavalry Programme). This friction was not caused by personalities, but by the way in which the different entities saw their role on the project and how they viewed the roles of others.

1.15. It was also clear to me that the relationship between DE&S and the manufacturer of the vehicles, GDLS-UK, was not an easy one. There were disputes between the parties over many issues. It was not my role to make findings with respect to those disputes, however, and nothing in this report is intended to read as such a finding. Nor does the report consider whether it would be appropriate to direct criticisms at GDLS-UK, as issues concerning the culture and performance of GDLS-UK fall outside of my Terms of Reference.

1.16. Against this background, the Review identifies a number of lessons from the Armoured Cavalry Programme that I consider can usefully be applied elsewhere. I do not consider that there needs to be a wholesale re-configuration for the delivery of programmes with different institutional models. Rather, I consider that lots of relatively small improvements can be made which should

cumulatively have a substantial impact on the ability to deliver programmes more smoothly. I hope that this Review can be regarded as a 'case study' of difficulties that a programme can encounter. I hope it will be labelled 'required reading' for SROs, and other senior personnel, working on procurement projects for the MOD.

1.17. The structure of the report is as follows: Executive Summary (Chapter 2), which summarises the main findings of the Review; Methodology (Chapter 3), which explains the processes and procedures of the Review and how the findings in the report were arrived at; Background section (Chapter 4), which summarises the findings and conclusions from previous reports on and reviews into the Armoured Cavalry Programme. It also summarises the findings and conclusions from reports on other Government equipment projects that have identified some of the same problems that are apparent in the Armoured Cavalry Programme; Programme delivery, governance, assurance and escalation (Chapter 5) provides a brief explanation of the principal organisations and roles involved in delivering the Armoured Cavalry Programme, and summarises the guidance available to them on when to elevate issues; Chronology (Chapter 6) this sets out a detailed chronological account, and the Review's analysis, of the main problems in the Armoured Cavalry Programme. This includes examination of the extent to which risks, issues, and problems were communicated and elevated, and where this did not happen the reasons for that. The chronology focuses on the equipment project (i.e. developing and producing the vehicles) as this was the area of the programme that experienced the greatest problems; Lessons Learned (Chapter 7), from the evidential underpinning described in Chapter 6, the Review sets out the lessons it believes should be learned from the Armoured Cavalry Programme and, where appropriate, makes recommendations to help the Department deliver programmes more effectively in future.

1.18. In carrying out this Review, I have been greatly assisted by Cecilia Ivimy, a supremely talented barrister, and Dr. Benjamin Sanders, a civil servant who served as Secretariat to the Review with great skill and devotion. I am immensely grateful for their support. Any errors or omissions in this report are mine alone.

Clive Sheldon KC

19 May 2023

2. Executive Summary

2.1. In accordance with the Terms of Reference published in March 2022, the particular focus of this report is not on what went wrong with the Armoured Cavalry Programme, and why it went wrong, but on how the MOD shares and elevates issues across the Department and the Front-Line Commands, looking at systemic and process issues as well as individual action and inaction. Based on my findings with respect to these matters, I have sought to identify lessons and make recommendations to help the MOD deliver major programmes more effectively in future.

2.2. Chronology

2.2.1. The complexity of the Armoured Cavalry Programme, which involved a huge technical and design, demonstration and manufacturing challenge worked on by hundreds of personnel and a number of different entities, is detailed in the chronological account in Chapter 6.

2.2.2. The chronological account is presented primarily from the perspective of MOD witnesses and documents, and provides a good picture of how and when the different organisations within MOD became aware of problems and the extent to which they shared or elevated this awareness.

2.2.3. The problems identified with the Armoured Cavalry Programme were numerous. They included problems with: scheduling; technical issues; safety issues; implementation of a huge and complex contract; and the management of contractual disputes. The Chronology tracks how these problems were escalated and addressed over time. The Review found that problems with scheduling, and technical and safety issues were not properly escalated.

2.2.4. COVID-19

2.2.4.1. Although the report makes only occasional reference to it, it is also critical to understand the impact of the COVID-19 pandemic. The period from early 2020 to mid-2021 was critical for the programme. At the same time, normal processes were disrupted, and teams dislocated, as a consequence of the national lockdowns (in March to June 2020, November 2020, and January 2021) and subsequent gradual easing of restrictions. This disruption made it harder for the project team in Defence Equipment and Support (“DE&S”) to understand whether schedule delays were due to the restrictions or some other cause.

2.2.4.2. Several witnesses told the Review that the move to online meetings meant that normal opportunities for sharing situational awareness (e.g. through informal discussions in the margins of meetings, or casual conversations in the office) were lost. The fact that the Infrastructure and Projects Authority, who downgraded their delivery confidence assessment to Red in early 2021 after the Senior Responsible Owner (“SRO”) brought them in to review the programme, were not asked to review the programme in 2020 was probably also due to the COVID restrictions.

2.2.5. Schedule

2.2.5.1. The contract to design and demonstrate the vehicles had been awarded to General Dynamics Land Systems UK (“GDLS-UK”) in 2010. In 2014, before that phase was complete, GDLS-UK were awarded the contract to manufacture the vehicles, numbering 589 in total, with six different variants. An Initial Operating Capability (“IOC”) was due to be delivered in July 2020, with Full Operating Capability (“FOC”) met in December 2025.

2.2.5.2. By late 2017 there was an increasing divergence between the demonstration and manufacture phases, and significant delays to design, trials and vehicle delivery. Negotiations to reset the contract (known as “Recast”) began in late 2017; heads of agreement were reached in December 2018, and the contract amendments were concluded in May 2019.

2.2.5.3. The Recast process successfully resolved a number of complex issues. Decisions were taken to increase the overlap between the demonstration and manufacture phases and to deliver the vehicles’ capabilities incrementally (via a series of ‘capability drops’ with interim vehicles retrofitted to bring them up to the final build standard). This increased the risks later in the programme, although this was not fully recognised at the time.

2.2.5.4. At the end of Recast, DE&S were forecasting that the IOC would not now be met until September 2021, 15 months late. Significantly, it was decided to adjust the definition of IOC, by reducing the number and capability of the vehicles required, rather than delay the date for IOC. The December 2025 date for FOC was also left unchanged. A December 2018 Information Note from the SRO notifying the Investment Approvals Committee of the outcome of the Recast negotiations did not make the changes to the IOC definition and the forecast date explicit.

2.2.5.5. The margin built into the schedule to IOC had been used up by February 2019 and continued to slip: in July 2019 the Programme Director within the Army’s programme team reported to the SRO that, even with additional resources, there was only a 30% chance of achieving the revised IOC definition by July 2020; by September 2019 that assessment had reduced to 10%. Those

assessments, however, were not reflected in reporting to the Centre, where delivery was described as “*challenging*” but “*achievable*”.

2.2.5.6. In January 2020, the Project Manager within the DE&S project team briefed the SRO and Director Land Equipment (“DLE”) that eight out of the eleven critical milestones due in 2019 remained incomplete and no vehicles had been delivered. This triggered corporate awareness of the extent of the problems with the schedule. At a Defence Major Projects Portfolio (“DMPP”) Sponsor Group meeting at the end of February 2020, the MOD’s Director General Finance took the view that neither the original nor the post-Recast definition of IOC could be achieved on time.

2.2.5.7. There followed an intensive period of work to produce a risk-adjusted schedule to IOC, and subsequently a risk-adjusted schedule to FOC. A Review Note proposing an In-Service Date of January 2021 (for delivery of training systems and 13 vehicles of the non-turreted variants) and an IOC date of June 2021 (for delivery of 12 vehicles of the turreted AJAX variant) was submitted to the Investment Approvals Committee at the end of September 2020. Work on the FOC schedule was still on-going in mid-2021.

2.2.5.8. During 2020 and until April 2021, reporting to the Centre was that overall delivery confidence was Amber/Red, but IOC for June 2021 was rated as Green and FOC in 2025 as Amber/Green. Ministers and the Investment Approval Committee were reassured that proposed operational use of vehicles by the Army planned for 2023 and 2025 was “*on track*”.

2.2.5.9. In April 2021, the Infrastructure and Projects Authority downgraded their delivery confidence assessment to Red and advised that a further programme reset would be required. This triggered further senior engagement, including briefings to Ministers. As at July 2021, no dates could be confidently forecast for either IOC or FOC.

2.2.6. Safety and technical problems

2.2.6.1. The DE&S project team engaged the Defence Science and Technology Laboratory (Dstl) to provide expert technical advice on various aspects of the vehicles. Dstl subject-matter experts provided advice to the DE&S project team by email, in meetings, in periodic reports, and exceptionally by letter. Many technical and safety concerns were raised by Dstl during 2018, 2019 and 2020 which were not addressed to their satisfaction.

2.2.6.2. Although they did not receive the periodic reports, some of these concerns were shared by members of the Technical Safety team within the Army’s Capability Directorate (“Capability Safety

team”). In September 2019, the team briefed the Land Equipment Safety Officer on a range of safety issues (which did not include noise and vibration) and expressed concern at the idea that these were to be mitigated through limitations of use (i.e. procedural controls).

2.2.6.3. The Part 2 Safety Case was jointly signed off by GDLS-UK and the Senior Safety Responsible within DE&S in December 2019. Unusually, because of concerns about lack of evidence to support safety assurances, this was a ‘qualified’ sign off; the Safety Case stated that, although the vehicle had not been fully evidenced to be ‘Safe by Design’, adopting the limitations of use outlined within the Safety Case would ensure the vehicle was ‘Safe to Operate’.

2.2.6.4. At around the same time, the first two Capability Drop 1 vehicles were delivered to the Armoured Trials and Development Unit (“ATDU”), within the Capability Directorate, in preparation for vehicle trials to commence in March 2020. These trials were carried out under a Safety Advice Letter, which was finalised in March 2020. Although ATDU crews had reported concerns about vibration while carrying out rehearsals for these trials in December 2019, the Commanding Officer ATDU accepted the advice of the Senior Safety Responsible that the vehicles could be operated safely using a combination of procedural controls and a noise and vibration calculator. The trials were halted almost immediately by the first national lockdown due to COVID-19 in March 2020 and did not resume until June 2020.

2.2.6.5. Shortly before the first national lockdown members of the Capability Safety team approached the Land Systems Safety Regulator (“LSSR”) team, part of the Defence Safety Authority, with a number of safety concerns, including noise and vibration. They subsequently provided a number of emails and documents to the LSSR team, which summarised them into a report which they issued on 6 May 2020. The report was withdrawn the following day and not reissued. On 13 May 2020, the Capability Safety team sent an updated version of their September 2019 safety brief to the Land Equipment Safety Officer; this time noise and vibration were among the safety concerns identified. The concerns identified in the LSSR report and in the safety brief to the Land Equipment Safety Officer were discussed at various meetings during May and June 2020.

2.2.6.6. The Part 3 Safety Case was a pre-requisite for vehicles to be delivered to the Field Army for training. This was jointly signed by the DE&S Project Manager and the Army’s Assistant Head Ground Manoeuvre in July 2020 and reflected their belief at the time that the limitations of use and other procedural controls were sufficient to enable the vehicle to be operated safely.

2.2.6.7. DE&S commissioned testing on noise and vibration levels. The Institute of Naval Medicine carried out tests in August 2020 and reported their findings in September; the Field Army

Environmental Monitoring Team conducted noise trials in August and November 2020. On 9 November 2020, the SRO banned dynamic use of the vehicles.

2.2.6.8. The SRO, DLE and Chief of Materiel (Land) were first aware in general terms of the noise and vibration concern from late spring or summer 2020. Neither they nor the Army's Director Capability ("DCap") understood that noise or vibration posed a significant risk to the programme over and above other safety hazards identified, or that crews may potentially have been harmed in trials as a result of noise and vibration, until autumn 2020. Concerns about harm to crews in the trials were not raised in writing with DCap, and it was only in autumn 2020 that he became aware that crews had reportedly been injured by noise and vibration in the ATDU trials. The Minister for Defence Procurement was only informed on 13 November 2020.

2.2.6.9. Trials at ATDU recommenced in March 2021 under a new Safety Advice Letter. In April 2021 the Commanding Officer ATDU became increasingly concerned about the safety of his crews following further reports of injuries. In June 2021 he sent DCap a draft brief stating that he was no longer content to hold the risk for the safety of trials involving extended periods of driving; this was the first time that the risk was formally elevated through the Duty Holding chain.

2.2.6.10. On 25 June 2021, in response to a report by Millbrook Proving Ground Ltd on their further vibration testing, the SRO again halted trials.

2.3. Principal findings and lessons

2.3.1. In such a complex programme as the Armoured Cavalry Programme, it is inevitable that escalating and elevating problems will be challenging. With so much concurrent activity it is frequently difficult to see the wood for the trees. There are also difficult judgments to be made about what issues should be raised and when. Nevertheless, the Review found that some significant problems with the Armoured Cavalry Programme (notably problems with scheduling, and technical and safety issues) were not elevated in a timely and appropriate manner. Reporting was at times lacking, or unclear, or overly optimistic. That led to senior personnel and Ministers being surprised to discover in late 2020 and early 2021 that the programme was at much greater risk than they had appreciated.

2.3.2. However, the Review found that the failures cannot be laid at the feet of any one individual or group of individuals. Rather, there were a number of interacting issues – structural, cultural and leadership – which led to the failures to appreciate, escalate and resolve problems earlier. The Review has sought to disentangle these issues, so that lessons can be learned for the future.

2.3.3. A close reading of Chapter 6 and Chapter 7 is needed in order to understand fully the Review's findings and conclusions, the lessons learned, and the intent behind the recommendations. However, the principal points that the reader should take away are as follows.

2.3.4. First, the relationships between different entities within or associated with MOD were at times fractious and involved guarding of territory. This was seen most clearly in the relationship between DE&S and Dstl. Although Dstl's subject-matter experts were well regarded, the technical and safety concerns they raised were often not resolved to their satisfaction. It was also seen in the relationship between DE&S and the SRO. There was evidence that DE&S "misappreciated" the fundamental importance of the SRO position, and significant concerns and issues were discussed and decided within the DE&S chain of command without input from the SRO. The Review identified a need for greater information sharing, trust, and collaboration between MOD entities.

2.3.5. Second, the SRO role is critical, as it provides a single point of contact and accountability for the programme. However, the SRO had to split their time between the Armoured Cavalry Programme and several other roles; had very limited ability to influence, let alone control, the equipment project; and lacked the ability to increase the level of resources for the programme, even though doing so might have reduced risk.

2.3.6. Third, there were overlapping and, at times, unclear responsibilities and accountabilities between MOD entities. Issues sometimes "fell between stools". This was seen most clearly in relation to the trials of the vehicles, where senior people in different entities assumed that others would spot if there were significant problems. It was also clear that, on occasion, people were working in "silos" which inhibited sharing, understanding and escalation of information. The Review identified a need for better briefing to, recording of, and follow up to, Programme Board meetings, as a key forum for bringing together the different entities.

2.3.7. Fourth, and linked to this, individuals' concerns sometimes got "stuck" due to people taking a rigid view of their remits and of reporting lines, as well as difficulties in sharing information "horizontally" between entities. DE&S discouraged Dstl from sharing their concerns on a range of technical issues directly with the Capability Safety team. With regard to safety concerns, those within the Capability Directorate line management chain were clear that it was not for them to escalate matters that strictly speaking should have been raised through the Duty Holding chain.

2.3.8. Fifth, the Review saw evidence of individuals showing initiative and courage in going outside their chain of command to report their concerns to other entities. This cannot be relied upon,

however, as a way of achieving a positive result in every programme, as too much depends on the audacity of the individuals involved. The Review has identified the need for a designated person, independent of the chain of command, to whom concerns can be reported and who can “join the dots” and provide advice.

2.3.9. Sixth, at times issues got stuck because of a “leave it with me” attitude. Some individuals showed a clear desire to resolve problems at their level, and not to bother overworked leaders unless strictly necessary. This was due in part to the “can do” attitude of those involved and a cultural sense that elevating problems was a sign of failure. This was particularly true in relation to the noise and vibration problems, where there was a reticence to escalate concerns before they were understood and evidenced. The Review understands that decisions on when to escalate involve a difficult balance, and that it is generally desirable (and clearly advantageous in an operational context) to seek to resolve issues at lower levels if possible. Nevertheless, the Review concluded that, in relation to acquisition programmes, there needs to be greater emphasis on seeking advice and sharing information. The Review has identified a need for individuals to be encouraged to brief for “situational awareness” and not only action, and for entities involved in delivering programmes to encourage and foster a “challenge culture”.

2.3.10. Seventh, people “on the shopfloor” frequently had a better understanding and feel for what was really happening with the programme, but they were not always listened to. The Review identified a need to capture dissenting/contrarian opinions from more junior staff.

2.3.11. Eighth, at various times, problems were communicated ineffectively by more junior staff and not followed up. The Review saw that more formal reports with a clear recommendation helped to “land” the problems more effectively with senior leaders. The Review identified a need for individuals to brief senior leaders, in writing and in a structured way, on issues of concern.

2.3.12. Ninth, senior leaders did not always communicate back to more junior staff the actions or decisions that they had taken in response to their raising of concerns. This made junior staff feel that they were not being listened to and impacted on morale. This was particularly the case with the concerns of more junior staff that DE&S senior leadership was ineffective at holding GDLS-UK to account. The Review identified a clear need for senior leaders to give feedback and explain decisions clearly to their teams.

2.3.13. Tenth, inadequate numbers of personnel, and poorly sequenced turnover in personnel, exacerbated the issues with the programme. The Review found that, despite lack of resource being repeatedly identified as a risk by the Infrastructure and Projects Authority, the MOD was slow to

increase numbers, particularly in the Army programme team. Overwork made it harder for individuals to take time to think strategically; there was instead constant fire-fighting. Changes in key personnel in rapid succession led to a loss of knowledge about the programme, which took time to build up again. The Review identified a need for key personnel to remain in post for longer, for changes in key personnel to be better managed, and for resource requests to be followed up.

2.3.14. Eleventh, the reporting on the programme to MOD Head Office and to Ministers was unduly optimistic. The quarterly Portfolio Management Reporting System (“PMRS”) reports, the Information Notes to the Investment Approvals Committee, and submissions to Ministers frequently put a positive spin on progress and did not make some of the problems explicit. Nor did they reflect dissenting voices, such as that of the Programme Director whose view on the achievability of the Initial Operating Capability date was significantly more pessimistic, and more realistic, than that of the SRO. The same “glossing” and optimism were seen in evidence to Parliamentary Select Committees. The Review identified a need for reporting to present a balanced, “warts and all”, account and for dissenting voices to be included.

2.3.15. Twelfth, although there were various reviews of the progress of the Armoured Cavalry Programme by external bodies and parties, many of which made some very sensible recommendations for moving the programme forwards, there was limited and selective follow-through on those recommendations and no follow-up to see if recommendations were being implemented. The Review identified a need to monitor recommendations and provide challenge where they had not been followed through.

2.3.16. Thirteenth, the emphasis on ‘Keeping to time’ with respect to the IOC date, whilst valuable for strategic and programmatic reasons, led to unsatisfactory behaviours and negative effects. It added to the pressure on the DE&S project team and Army programme team, and led to the focusing of effort on near-term milestones at the expense of later milestones, increasing the risks to the back end of the programme. It also led to compromise on safety issues, and influenced decisions at various points to continue with vehicle trials despite safety concerns.

2.4. Recommendations

2.4.1. In making recommendations, the Review recognises that there is a difficult trade-off between putting in place proper processes and creating overly bureaucratic structures which side-line good judgment.

2.4.2. The Review makes a total of 24 recommendations. These do not aim to achieve a wholesale re-configuration for the delivery of major programmes. None is a magic bullet. Rather, they represent relatively small improvements, which cumulatively should help the MOD avoid similar problems in future.

2.4.3. Of these: four are aimed at improving the working relationship between DE&S and Dstl [Recommendations 2-5]; five are aimed at improving the support and information provided to the SRO [Recommendations 6-10]; five are aimed at improving the processes for holding to account and assurance [Recommendations 11-15]; and eight are aimed at improving information flows and escalation [Recommendations 16-23]. The full list of recommendations is set out at [Annex A](#).

3. Methodology

3.1. Introduction

3.1.1. On 19 May 2022, the Minister of State for Defence Procurement wrote on behalf of the Secretary of State for Defence to appoint me formally to lead the Review, and to confirm the Terms of Reference [see [Annex B: Terms of Reference](#)], which had been published on 30 March.

3.1.2. During the intervening period the Review had started to read through the materials (documents, letters, and emails) that had previously been provided to the National Audit Office for their report into the Armoured Cavalry Programme, to request additional information relevant to the Terms of Reference, and to schedule informal scoping discussions with people and organisations to assist the Review to understand the MOD's acquisition process and the Armoured Cavalry Programme and to identify the key issues for investigation. In addition, an email address to which people could send information they wished to bring to the Review's attention was set up.

3.2. Documents received

3.2.1. The Review wrote to the principal teams involved in delivering and assuring the Armoured Cavalry Programme in Army Headquarters, Defence Equipment and Support ("DE&S"), and MOD Head Office to request documentation that was relevant to the Terms of Reference. As a result of these requests, the Review received a considerable number of documents. Follow-up requests were made as the Review identified areas that required further investigation. The Review received disclosure of documents throughout the evidence-gathering and report-writing stages. In many cases, witnesses referred during interviews to material which the Review had not seen and which they subsequently provided. Having begun with approximately 400 documents, this had increased (including duplicates) to nearly 1,200 by the end of July and nearly 1,800 by the end of December. In addition, Defence Science and Technology Laboratory ("Dstl") provided a cache of over 2,000 emails (many with attachments) detailing their work to identify, highlight, and advise on resolutions for a range of technical issues with the vehicles. In all, the Review has considered tens of thousands of pages of evidence.

3.2.2. The disclosure is wide-ranging and varied. It is not confined to the Armoured Cavalry Programme and includes reports by the National Audit Office and by Parliamentary Select

Committees on the MOD's Equipment Programme and other acquisition programmes, and by the Infrastructure and Projects Authority on major programmes in the MOD and other Departments.

3.2.3. The disclosure relating to the Armoured Cavalry Programme is also varied, and includes Ministerial submissions; Information Notes and Review Notes submitted to the Investment Approvals Committee; reports of Infrastructure and Projects Authority reviews of the programme; records of meetings (including the Programme Board and the Executive Committee of the Army Board); regular progress reports by Dstl and General Dynamics Land Systems UK ("GDLS-UK") to the DE&S project team; correspondence between DE&S and GDLS-UK; contemporaneous handwritten notes of meetings or discussions and emails; and submissions made by GDLS-UK to House of Commons Defence Select Committee inquiries, a response from GDLS-UK to the Health and Safety Report produced by David King, and the submission of GDLS-UK to the National Audit Office. Much of the documentation is commercially sensitive; some is compartmentalised.

3.2.4. The Review is confident that it has seen the vast majority of documents that are relevant to the Terms of Reference. The Review does not consider that any documents have been deliberately withheld. The Review's focus, in accordance with its Terms of Reference, has been on the escalation of problems within the MOD and its various entities. It has not seen any documentation internal to GDLS-UK or other third-party suppliers.

3.3. Interviews conducted

3.3.1. The Review conducted two different types of interview (informal and formal) with people ranging from 'the shopfloor' to senior leadership positions in MOD Head Office, the Army, DE&S, Dstl, and the Defence Safety Authority. Whereas the Review took brief notes of informal meetings, a near-verbatim transcript of formal interviews was sent to the witness to approve or correct and, if necessary, to amplify or clarify their comments.

3.3.2. In addition to informal scoping discussions with around 20 people, the Review spoke informally to around 10 people to clarify specific points or to ascertain whether they were able to provide new information and should be formally interviewed. Some of those who had been spoken to informally were subsequently interviewed formally to get their evidence on the record.

3.3.3. The Review conducted formal interviews with over 40 people. The Review sent packs of documents to witnesses to enable them to refresh their memories ahead of the interview. Some

interviewees provided documents at the interview. Questions relating to these documents were raised at the interview or shortly afterwards. On some occasions, interviewees were shown documents at the interview, and they had the opportunity to comment on them at the interview or shortly afterwards.

3.3.4. The MOD arranged for the Government Legal Department to provide, at no cost to the individual, independent legal advice and support to any witness who wished to take up the offer. A number of those whom the Review interviewed had legal support during their interview. The Review has not read anything into any witness' decision to take up (or not) the offer of legal assistance.

3.3.5. During the formal interviews it was apparent that some witnesses had difficulty in recalling the sequence of events. This is unsurprising given both the passage of time and the complexity of the programme, which resulted in multiple concurrent activities. It was also apparent that many witnesses' recollection was coloured by hindsight, and that they were viewing events through the prism of the noise and vibration issue which had taken on greater significance than much of the contemporaneous documentation reflects. A number of witnesses expressed a certain mistrust that this Review was seeking to apportion blame rather than to identify lessons. In some cases, this led people to be more circumspect 'on the record' than they had been when speaking to the Review informally. For these reasons, the Review has preferred, and wherever possible relied upon, contemporaneous documentation as providing a more accurate picture of events.

3.3.6. Whilst the overwhelming majority of current and former personnel engaged fully with the Review, three people declined to be interviewed. In one case this was due to scheduling problems, and as the Review only wished to put questions to them in relation to a narrow point it was able to obtain this information from another person.

3.3.7. More significant, however, was the decision by a former Director Land Equipment ("DLE") not to speak to the Review. This individual now occupies a senior position within a company that provides equipment to the MOD and explained that his decision was motivated by a potential conflict of interest.

3.3.8. The Review also sought to interview the Vice President of GDLS-UK. Lawyers acting for the company in their commercial dispute with the MOD responded stating that "*While the dispute continues it would be inappropriate for [their client] to discuss with you and your team... matters relating to the Ajax Contract, not least because MOD's management of the Contract at all levels may form part of any arbitration that may result from a failure to achieve amicable resolution.*" The lawyers stated that they might be open to considering a request for written questions. The Review decided not to pursue this approach. It would be inconsistent with the way in which other witnesses would be

questioned. It would prevent the Review from getting a sense of the credibility or reliability of the witness, insofar as that was necessary. It would also prevent the Review from benefitting from the natural ebb and flow of oral questions and answers: this allows for easy follow-up of answers, for picking up on incidental comments and so forth. GDLS-UK were, however, provided with extracts of a draft report and were given an opportunity to provide comments. Those comments were carefully considered when finalising the report.

3.4. The report

3.4.1. As the Review is concerned with helping the MOD to learn lessons, the report refers to the people involved in this programme by reference to their role at the time rather than by name. Whilst it is appreciated that this introduces some potential for confusion within the Chronology section (as, where the postholder changes, it may not always be clear to the reader which incumbent took the action or decision), the Review considers that this is fairer to those involved in the programme.

3.4.2. Except where the Review is making a recommendation, the report uses the nomenclature of the time (e.g. Main Gate Business Case instead of Full Business Case, Director Support instead of Director Programmes) for posts, organisations, and processes. To avoid confusion, where a post was renamed during the period on which the Review has focused (e.g. Chief of Materiel (Land) to Director General (Land)), the report has used the original designation.

3.4.3. Since 2 February 2023 this report has undergone a thorough fact-checking and sensitivity-checking process. As the report includes some implicit or direct criticisms of individuals, teams, and organisations, it has also undergone a thorough ‘Maxwellisation’ process.¹ The Review has carefully considered the representations received from those people and organisations criticised in the draft report, and where it accepts that the criticism was unfair has made the necessary changes.

3.4.4. So as to provide necessary context for the Review’s consideration of the sharing and escalation of issues, and the Review’s consideration of the leadership, culture and governance of the MOD, it is necessary for the report to refer to and comment on some of the views held and expressed

¹ “A Review of ‘Maxwellisation’”, November 2016, at p.3: *“‘Maxwellisation’ is a procedural practice which derives its name from litigation in the early 1970s involving Robert Maxwell. It is the practice whereby a person who faces criticism in a public report is given an opportunity to respond to such criticism prior to publication of the report. This is done either by providing the person with the passages of the draft report containing the proposed criticism or by providing a summary or the gist of the proposed criticism.”*

<https://publications.parliament.uk/pa/cm201617/cmselect/cmtreasy/maxwellisation/a-review-of-maxwellisation-24-11-16.pdf>

by a variety of personnel and organisations within MOD about the safety and quality of the vehicles produced by GDLS-UK, as well as other issues which may form part of a contractual dispute between GDLS-UK and DE&S (MOD), such as responsibility for problems with the schedule. Nevertheless, in keeping with its Terms of Reference, the Review does not make, or purport to make, findings with respect to any of these issues and this report should not be read as having done so or treated as such.

4. Background

4.1. Introduction

4.1.1. The Armoured Cavalry Programme will deliver the Army's first fully digital armoured fighting vehicles, replacing the Combat Vehicle Reconnaissance (Tracked) vehicles which have been in service since the 1970s. Originally intended to achieve Full Operating Capability ("FOC") in 2025, this has been thrown into doubt by successive delays to the programme's In-Service and Initial Operating Capability ("IOC") dates.

4.1.2. Designed around a Common Base Platform, the Armoured Cavalry Programme will give the Army a total of 589 vehicles in six variants:

- AJAX variant – 245 vehicles. A turreted version of the vehicle with a 40mm cannon, this will be used for intelligence surveillance, target acquisition and reconnaissance.
- APOLLO variant – 50 vehicles. The repair version of the vehicle, this will be used for towing damaged vehicles and lifting heavy parts.
- ARES variant – 93 vehicles. The base version of the vehicle, this will be used as an armoured personnel carrier.
- ARGUS variant – 51 vehicles. This will be used for engineer reconnaissance.
- ATHENA variant – 112 vehicles. This is the command and control version of the vehicle.
- ATLAS variant – 38 vehicles. This will be used as a recovery vehicle.

4.1.3. As explained in the Defence Command Paper² produced as part of the Integrated Review of Security, Defence, Development and Foreign Policy ("Integrated Review"),³ these vehicles will combine with other armoured fighting vehicles, including the Boxer vehicles being delivered under the Mechanised Infantry Programme, to form Armoured Brigade Combat Teams and Deep Reconnaissance Brigade Combat Teams. The Brigade Combat Teams have superseded the previous concept of operations (in which the vehicles would be used to form a Strike Battlegroup and Strike Brigade) referred to in many of the documents seen by the Review and below.

² Ministry of Defence, "Defence in a competitive age," CP 411, March 2021, <https://www.gov.uk/government/publications/defence-in-a-competitive-age>

³ "Global Britain in a competitive age: The Integrated Review of Security, Defence, Development and Foreign Policy", CP 403, March 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975077/Global_Britain_in_a_Competitive_Age_the_Integrated_Review_of_Security_Defence_Development_and_Foreign_Policy.pdf

4.2. Previous reports relating to the Armoured Cavalry Programme

4.2.1. This Review is described as a ‘follow-on review’.⁴ It is appropriate, therefore, to set out briefly the principal findings and conclusions of previous reports on the Armoured Cavalry Programme and other relevant reports.

4.2.2. National Audit Office report

4.2.2.1. The National Audit Office has reported on the Armoured Cavalry Programme twice: in May 2011 as part of a wider report into armoured vehicle programmes,⁵ and again in March 2022⁶ following a request from the House of Commons Defence Committee.⁷ The former explains the genesis of the programme (which at that time was known as the Specialist Vehicles project and formed one element of the larger Future Rapid Effects System programme), while the latter provides the most complete overview of its subsequent development and difficulties over the intervening decade.

4.2.2.2. Given the number of armoured vehicle programmes that had been commenced since 1992 and subsequently cancelled or delayed, the May 2011 report concluded that “*the Department’s standard acquisition process for armoured vehicles has not been working*”⁸ and did not represent value for money.⁹ It made five recommendations including that, except where there is a compelling need to integrate “*advanced, but immature, technologies. . . the Department should have a default position of purchasing off-the-shelf equipment which can be incrementally upgraded in the future, if necessary.*”¹⁰ However, the March 2022 report found that the eventual design for the armoured vehicles not only relied upon technologies (including the 40mm cannon for the AJAX variant) that were still immature at the point that the manufacturing contract was let but also was so highly specified as to make it “*in effect, a bespoke technology which is more complex than other armoured vehicles.*”¹¹

⁴ Hansard, 29 March 2022, Column 39WS, <https://hansard.parliament.uk/Commons/2022-03-29/debates/22032981000018/ContingentLiabilityForAjaxLessonsLearnedReview>

⁵ Report by the Comptroller and Auditor General, “Ministry of Defence: The cost-effective delivery of an armoured vehicle capability,” HC 1029, 20 May 2011, <https://www.nao.org.uk/wp-content/uploads/2011/05/10121029.pdf>

⁶ Report by the Comptroller and Auditor General, “The Ajax Programme: Ministry of Defence,” HC 1142, 11 March 2022, <https://www.nao.org.uk/wp-content/uploads/2022/03/The-Ajax-programme.pdf>

⁷ House of Commons Defence Committee, “Obsolescent and outgunned: the British Army’s armoured vehicle capability,” Fifth Report of Session 2019-2021, HC 659, 14 March 2021, <https://committees.parliament.uk/publications/5081/documents/50325/default/>, at p.3 .

⁸ HC 1029, at p.6.

⁹ Ibid, at p.10.

¹⁰ Ibid, at p.11.

¹¹ HC 1142, at p.7.

4.2.2.3. The March 2022 report found that the programme's subsequent difficulties were the result both of the way that it had been set up and of the way in which it had been implemented. In particular, it found that:

“9. The Department and GDLS-UK did not understand the scale of work or technical challenge, resulting in insufficient contingency in the programme schedule. As we have seen many times on other government programmes, the Department and GDLS-UK under-estimated the scale and sequencing of work which meant that the programme schedule was over-optimistic. . . . This meant the overlap between the demonstration and manufacture stages was much greater than originally anticipated, which made addressing design issues more complex and added risk because of the need to manage complex delivery and retrofitting schedules. . .

10. The Department has not managed the programme effectively. It did not establish effective governance arrangements or the necessary resources to manage the programme. There were multiple lines of reporting and complex assurance arrangements; insufficient senior management time; a high turnover of senior staff; an under-resourced programme management team; and an ineffective programme board. We also found that the Department had weak project controls with an over-emphasis on achieving its IOC target date, which meant that it prioritised time and cost over capability. As a result, it pressed ahead with the programme without resolving performance issues. . . .

11. The Department and GDLS-UK reset the contract in 2018, but this did not resolve the programme's underlying problems. . . . work on the programme slowed during this extended period of renegotiation, compressing the programme's schedule, and the reset added complexity with multiple build standards and vehicles from early capability drops having to be upgraded. The programme continued to encounter technical and safety issues, and the revised schedule was based on over-optimistic assumptions. . . . Consequently, GDLS-UK missed its first 11 revised milestones, and by December 2021, 18 out of 36 critical milestones were outstanding, 10 of which were six months or more late. . . .”¹²

¹² Ibid, at p.8.

4.2.2.4. The report concluded that *“The Department’s and GDLS-UK’s approach was flawed from the start as they did not fully understand the scale or complexity of the programme. A series of programme management failures have since led to missed programme milestones and unresolved safety and technical issues.”*¹³

4.2.2.5. The National Audit Office made five recommendations for how to progress the Armoured Cavalry Programme,¹⁴ including to “agree a credible delivery plan” to both IOC and FOC; to “reassess the way in which the programme is governed and resourced;” and to “improve the management information” around progress and risks.

4.2.3. Public Accounts Committee report

4.2.3.1. Having received the March 2022 report, the Public Accounts Committee took further evidence before producing their own report in May 2022.¹⁵ Their findings regarding the overall programme closely mirror those of the National Audit Office:

*“The Department has once again made fundamental mistakes in its planning and management of a major equipment programme. Ajax’s design is based on a pre-existing vehicle, but the Department’s 1,200 capability requirements meant that, in effect, it was developed from scratch. However, the Department and General Dynamics did not fully understand the complexity and challenges of this hybrid approach and did not manage design changes effectively. . . . Ajax’s problems were exacerbated by inadequate governance and programme management failures. The current senior responsible owner, appointed in October 2021, is the first to be full-time, but even he has additional corporate roles and responsibilities. The programme’s reset in 2018 introduced greater complexity and the revised programme schedule was unrealistic. While the profile of upfront investment before large-scale manufacture is unsurprising, the increased overlap of the demonstration and manufacturing phases means that unresolved technical and safety issues have remained whilst production continues. . . .”*¹⁶

¹³ Ibid, at p.12.

¹⁴ Ibid, at pp.12-13.

¹⁵ House of Commons Committee of Public Accounts’ Seventh Report of Session 2022-23, “Armoured Vehicles: the Ajax programme,” HC 259, 25 May 2022, <https://committees.parliament.uk/publications/22478/documents/165765/default/>

¹⁶ Ibid, at p.5.

4.2.3.2. Another of its findings is also of particular relevance to this Review:

“The failure to escalate and address noise and vibration issues in a timely manner shows that the Department must simplify its over-complex safety processes and change behaviours. . . . It was slow to escalate concerns about noise and vibration because its processes were over-complicated, and parts of the Department lacked authority to ensure safety issues were addressed before trials began. . . .”¹⁷

4.2.3.3. The report made six recommendations, all of which have been accepted by the MOD.¹⁸

4.2.4. Health, Safety and Environmental Protection review

4.2.4.1. In June 2021, the Ministry of Defence’s Permanent Secretary directed David King, the Director Health, Safety & Environmental Protection, to conduct a ‘sprint’ review *“to provide a single, validated, version of events relating to issues arising with the Ajax programme, and to make recommendations”*.¹⁹ The review was completed within a period of around three and a half weeks, although it took until December 2021 to finalise and publish the report.

4.2.4.2. The report concluded that

“101. . . . The root cause that allowed a vehicle to cause potential harm to Army personnel through noise and vibration during the trials process was not a failure of a single individual or Defence Organisation. It was a complex combination of the Armed Forces’ relationship to harm and weaknesses in MOD’s acquisition system. The impact of Covid was also felt, both delaying trials and making communication more difficult.

102. From a cultural perspective, the Army did not believe it was potentially causing harm to people, especially from vibration, as it was tacitly expected that soldiers can and should endure such issues. Society and the law expect MOD to

¹⁷ Ibid, at p.6.

¹⁸ “Treasury minutes: Government response to the Committee of Public Accounts on the Seventh report from Session 2022-23,” 2 September 2022, <https://committees.parliament.uk/publications/28485/documents/171648/default/>

¹⁹ Ministry of Defence, “HS&EP Ajax Noise and Vibration Review,” 10 December 2021, at p.30, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1041370/20211210-HSEP_Ajax_Noise_and_Vibration_Review.pdf

do better and requires it to have systems in place that protect its people from harm.

103. Within the acquisition system, safety is not viewed as an equal partner to cost, schedule and military capability, and the culture in MOD does not currently ensure safety is considered within strategic decision-making.

104. To have confidence that the events covered in this report will not be repeated, culture change needs to be progressed in the two areas above.”²⁰

4.2.4.3. The report includes 15 detailed findings, of which the following are of particular relevance to the present Review:

*“**Finding 5:** The management, reporting and escalation of safety risk is fragmented across the Ajax programme. The Overall Project Risk Register is managed by DE&S, Army manage a subset of Programme Risks and the [Joint Safety and Environmental Panel] is responsible for reviewing specific safety risks and hazards. This inhibits the effective management, reporting and escalation of risk.”²¹*

*“**Finding 7:** DE&S did not accurately reflect expert opinion from Dstl and others on the risk to Ajax crews from noise and vibration in the advice they provided to Army. This enabled activity to continue when it should have been stopped or paused until stronger controls were put in place.”²²*

*“**Finding 9:** The [Main Gate Business Case 2] decision to run concurrent demonstration and manufacture phases added significant complexity by requiring all parties to manage the demonstration, manufacture, fielding and support of six different vehicles at eventually four build standards/capability drops. This is not what teams are used to managing and it was clearly evidenced to the Review Team that the decision to move away from the understood capability lifecycle process had led to confusion, disagreement, frustration and in some cases paralysis of decision making across the Ajax programme. . . .”²³*

²⁰ Ibid, at p.28.

²¹ Ibid, at p.19.

²² Ibid, at p.22.

²³ Ibid, at p.23.

“Finding 15: The level of assurance from the Defence Land Safety Regulator (DLSR) appears to be well below the scale in the Air and Maritime domains.”²⁴

4.2.4.4. The report makes 20 recommendations,²⁵ all of which have been accepted by the MOD.

4.3. Other reports relevant to this Review

4.3.1. National Audit Office’s report on Defence capabilities

4.3.1.1. In March 2020, the National Audit Office published a report which examined *“the extent and causes of delays and shortfalls in bringing capabilities into service. . . [and] the completeness of the Department’s system to monitor the delivery of capabilities”*²⁶ across the (at the time 32) programmes that comprised the MOD’s Defence Major Projects Portfolio (“DMPP”).

4.3.1.2. Among its key findings, the following are of particular relevance for this Review:

“9. The Department faces specific recurring challenges which affect the delivery of capabilities, of which the most persistent is late or faulty equipment delivery by the supplier. Our case studies and other analysis show that a range of factors affect delivery of each capability. In some cases, poor performance by suppliers has persisted over a number of years and has compromised the operation of capabilities. [Senior Responsible Owners] of 10 of the 32 most significant capabilities currently being delivered report serious concerns about supplier engagement or delivery performance, from poor quality control to lack of transparency about progress. . . .

10. Commands and delivery teams lack capacity and skills, which affects delivery of the capability. Under-resourced project and delivery teams contribute to delays in delivery. Six of the 32 DMPP capabilities face shortfalls of more than 20% in their programme teams. Our 2019 report Reforming the civilian

²⁴ Ibid, at p.26.

²⁵ Ibid, at Annex B, pp.32-34. Although Annex B actually lists 21 recommendations, two (Recommendation 3 and Recommendation 11) are identical.

²⁶ Report by the Comptroller and Auditor General, “Defence capabilities – delivering what was promised,” HC 106, 12 March 2020, at p.6, <https://www.nao.org.uk/wp-content/uploads/2020/03/Defence-capabilities-delivering-what-was-promised.pdf>

workforce drew attention to the issue of a lack of suitably qualified and experienced personnel in the Department. There are particular shortages of engineering and commercial staff, and some teams are very reliant on consultancy support. . . . A shortfall in the number of [Senior Responsible Owners] has led to some individuals being spread across multiple projects. . . .”

. . . “13. The Department declares key project milestones as achieved, without the intended capability always being delivered at that point. Departmental guidance permits the declaration of a milestone even if performance does not meet acceptance criteria, or if testing to confirm criteria have been met is incomplete. The Department allows exceptions for a variety of reasons, but the most frequently used in our case studies was that progress was “good enough”, despite criteria not being met. In some cases, this affected the Department’s ability to use the capability in the way intended. . . . Exceptions should be granted on the basis that there is a timebound plan for their resolution, but this was not the case in most of our sampled case studies. . . .”

. . .

“15. Head Office currently does not have the information it needs to hold Commands fully to account and make strategic decisions. Easy access to consistent information across the entire portfolio is vital for holding Commands to account and for making strategic decisions. Head Office has a strategic role in capability delivery and therefore concentrates on the DMPP. The Department has a central data system for collecting information on this subset of programmes, but . . . There are limitations with the central data collected, which can be out of date when presented to senior decision-makers. . . .”²⁷

4.3.2. Infrastructure and Projects Authority’s report on project sponsorship

4.3.2.1. In April 2019 the Department for Transport and the Infrastructure and Projects Authority jointly published a report on lessons for the sponsorship of major programmes which were “most directly applicable to other infrastructure projects delivered through arm’s length bodies sponsored by

²⁷ Ibid, at pp.8-10.

central government departments, but are intended to inform wider government projects including defence systems and major ICT projects.”²⁸

4.3.2.2. This report identified 24 lessons across five themes (A to E), of which the following are of particular relevance to this Review:

“(A) Accountability must be unambiguous. Separating policy from delivery allows organisational specialisation but creates boundaries and the scope for blurred accountabilities. Departments need to establish clear accountabilities for both individuals and organisations. . . . In turn Departments need to set clear sponsor requirements, provide a stable operating environment, the space to permit delivery without losing oversight, and to support delivery organisations. . .”²⁹

“(B) Behaviour matters more than process. There are common traits that can lead to the wrong behaviours and decisions on major projects. These are not easily countered even with clear accountabilities and structural checks and balances. They need to be searched for, recognised when they exhibit, and actively countered through calm and objective assessment of the evidence and by instilling the right behaviours within and between organisations.”³⁰

“Challenge the objectivity of delivery confidence assessments. Traits encourage leaders to interpret progress reporting as absolute fact, to view them too positively, and to assess them without healthy scepticism. Leaders should actively seek multiple views on delivery confidence, reward rather than deter the escalation of issues, and know how to test reported progress against the realities on the ground.”³¹

“(C) Control schedule and benefits as well as cost. A major project’s success is measured against its delivery of the agreed scope and benefits within the budget and schedule. Most projects focus on cost at the expense of the other

²⁸ Department for Transport/Infrastructure and Projects Authority, “Lessons from transport for the sponsorship of major projects,” April 2019, at p.6, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/796294/dft-review-of-lessons.pdf.

²⁹ Ibid, at p.9.

³⁰ Ibid, at p.10.

³¹ Ibid, at p.10.

success factors rather than protecting benefits and schedule. Projects fail to manage cost and time to target as the targets themselves are often locked-in too early and before there is sufficient evidence to gauge their feasibility.”³²

“Use an evidenced range rather than a single target date. In-service dates are routinely missed because they are set without rigorous planning or evidence including reference class data and schedule contingency. In-service dates are often set politically in advance of formal advice or sufficient evidence. Premature commitments to definitive In-Service Dates should be avoided, and ranges used instead until uncertainty is reduced.”³³

“Increase focus on managing schedule. Delays increase costs and normally lose or defer benefits. Money can be wasted seeking to accelerate towards unachievable dates, and when despite this, delays occur they impact both end-users and other projects. Start from the presumption that delays cannot be recovered.”³⁴

[Emphasis added]

³² Ibid, at p.11.

³³ Ibid, at p.11.

³⁴ Ibid, at p.12.

5. Programme delivery, governance, assurance and escalation

5.1. Introduction

5.1.1. Following the review by Lord Levene³⁵ the MOD introduced a delegated operating model under which its Head Office (referred to as ‘the Centre’ by many of those the Review interviewed) sets the governance framework and the overarching strategies and policies, and the outputs are delivered by the Front-Line Commands (Royal Navy, Army, Royal Air Force, and Strategic Command) in conjunction with the Delivery Agents and other enabling organisations. This model deliberately confers considerable autonomy on the Front-Line Commands and on Delivery Agents such as DE&S, with the Head Office cast in a strategic leadership, coherence, and assurance role.

5.1.2. A number of entities are involved in delivering and assuring the Armoured Cavalry Programme. The following section provides an overview of the principal ones referred to in this report.

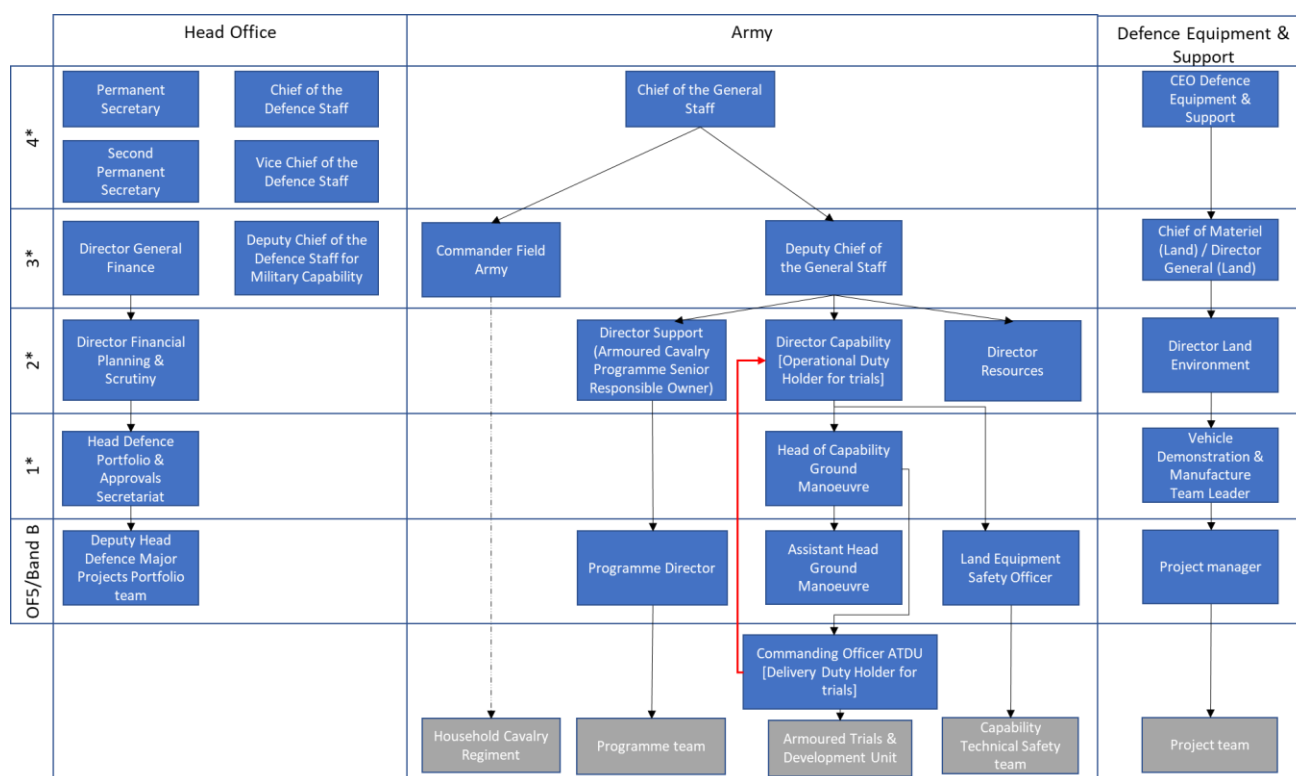


Figure 1: Simplified hierarchy of roles and responsibilities in the principal organisations referred to

³⁵ Lord Levene of Portsoken KBE, “Defence Reform: An independent report into the structure and management of the Ministry of Defence,” 2011, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/27408/defence_reform_report_struct_mgt_mod_27june2011.pdf

5.2. Assurance

5.2.1. Head Office

5.2.1.1. *Investment Approvals Committee*

5.2.1.1.1. The Investment Approvals Committee is the body responsible for major investment decisions. Chaired by the Director General Finance on behalf of the Permanent Secretary, its membership comprises the Vice Chief of the Defence Staff, Chief Operating Officer, Chief Scientific Officer, Chief Information Officer, Deputy Chief of the Defence Staff for Military Capability, Chief of Defence Logistics and Support, and a non-executive director.

5.2.1.1.2. The Committee considered and approved the Main Gate Business Cases for the Armoured Cavalry Programme, and the subsequent Information Notes (alerting the Committee to issues with meeting those approvals) and Review Notes (seeking to reset those approvals).

5.2.1.1.3. The Committee is supported by the Defence Portfolio and Approvals Secretariat, which formally submits to Ministers on the outcome of the Committee's consideration of Business Cases and Review Notes. The Committee notifies the Senior Responsible Owner ("SRO") of the outcome of its deliberations in a document known as an 'Outletter'.

5.2.1.2. *DMPP Sponsor Group*

5.2.1.2.1. The DMPP Sponsor Group is chaired by the Director General Finance. There is significant overlap between its core membership and that of the Investment Approvals Committee: the Vice Chief of the Defence Staff, the Deputy Chief of the Defence Staff for Military Capability, the Chief Operating Officer, and Chief Scientific Adviser are all members.

5.2.1.2.2. The purpose of the Sponsor Group is to provide challenge and support to SROs of major programmes. The Sponsor Group's examination of a programme could be triggered by a request from the SRO or instigated by the Defence Portfolio and Approvals Secretariat (which receives quarterly Portfolio Management Reporting System ("PMRS") reports from the SRO, and is in regular discussion with SROs and programme teams) if they had reason for concern.

5.2.1.3. Defence Portfolio and Approvals Secretariat

5.2.1.3.1. The Defence Portfolio and Approvals Secretariat provides support both to the Investment Approvals Committee and to the DMPP Sponsor Group.

5.2.1.3.2. Under the PMRS, reports are sent in standard form quarterly by the SRO to the Defence Portfolio and Approvals Secretariat. They are the main form of reporting to the MOD Head Office for projects in the DMPP. They include a short narrative which records the SRO's observations on the programme, together with dashboards setting out Red/Amber/Green ("RAG") ratings for aspects of the programme, key milestones, financial information and a table of key risks. However, they do not provide an up-to-date picture of the programme as the information in the report reflects the status of the programme in the previous quarter.

5.2.2. DE&S

5.2.2.1. In May 2018 the DE&S project team engaged the Defence Quality Assurance Field Force via a Request for Government Quality Assurance to provide on-going assurance of the Armoured Cavalry Programme equipment project. The Defence Quality Assurance Field Force is part of DE&S' Directorate of Engineering Safety and is functionally independent of DE&S' Land Domain.

5.2.2.2. In response to concerns from the project team, it carried out two in-depth audits of the equipment project: in February 2020 and June 2021.

5.2.2.3. In January 2019 CEO DE&S tasked a 'Red Team' (which included members of the DE&S project team, as well as project control, engineering, schedule and risk experts from DE&S) *"to provide an independent view on the robustness of the schedule to IOC within the baseline. Assess schedule risk and how [Vehicle Demonstration and Manufacture] intend to govern and control the residual risk. Test the assumptions behind maintaining the IOC date of Jul 20. Provide a view of whether the proposed programme baseline contains a robust schedule where the nature and consequence of risks in the forward programme have been captured and modelled"* [see [6.3.3.6](#)]

5.2.2.4. Although the Red Team review had anticipated a more formal assurance of the schedule in around June 2019, this was delayed. The Integrated Baseline Review involving both DE&S and GDLS-UK personnel ran from September to December 2019 and reported in February 2020. It assessed the technical risk, schedule risk and resource risk as Amber, and management process risk as Amber/Red.

5.2.3. Infrastructure and Projects Authority

5.2.3.1. The Infrastructure and Projects Authority were set up to be a centre of expertise for major projects, and to provide independent scrutiny and assurance of projects in the Government Major Projects Portfolio (“GMPP”). They support the Cabinet Office and HM Treasury in the oversight of major projects.

5.2.3.2. The Infrastructure and Projects Authority have several areas of activity: they provide advice and support to SROs in delivering GMPP programmes; they provide training (e.g. the Major Projects Leadership Academy) and guidance for SROs; and they oversee and assure GMPP programmes. The timing of these assurance reviews is dictated by the SRO. The reports of these assurance reviews are intended to provide the SRO with “*objective ground truth*.”

5.3. Delivery roles and responsibilities

5.3.1. The Army

5.3.1.1. Capability Directorate

5.3.1.1.1. The Capability Directorate was the directorate within Army Headquarters responsible for developing the Army 2035 and Future Soldier concepts, for managing the Army’s Equipment Plan budget, and for acting as Capability Sponsor for all equipment capability in the Army. It was headed by the 2* Director Capabilities (“DCap”),³⁶ who reported to the Deputy Chief of the General Staff (“DCGS”).

5.3.1.1.2. As the Capability Sponsor for the programme, DCap was also responsible for specifying and then monitoring that the vehicles met key user requirements, and for ensuring their integration, when delivered, with current and future capabilities. In that role members of the Capability Directorate liaised with the Field Army.

5.3.1.1.3. DCap was responsible for maintaining the Part 3 Safety Case and was advised on that by a safety team within the Capability Directorate of the Army (the “Capability Safety team”) led by the Assistant Head Technical Safety, known as the Land Equipment Safety Officer. The Part 3 Safety

³⁶ Under the new Army Operating Model (which was introduced after the period on which this Review has focused) this directorate has been redesignated Futures Directorate, and is headed by Director Futures.

Case was signed on behalf of DCap by the Assistant Head Ground Manoeuvre [see Box A after [6.3.2.6](#)]

5.3.1.1.4. The responsibilities of the Land Equipment Safety Officer are set out in Army Command Standing Order 1201 (“Land Equipment Safety Management Instruction”). His responsibilities as the Army Competent Advisor and Inspectorate for Equipment Safety are set out in Army Command Standing Order 4001 Part 2 (“The Policy for Army Competent Advisors and Inspectorates (ACAI)”). These include providing safety advice and guidance to stakeholders and the chain of command, leading for Army HQ on whole-body vibration and noise-induced hearing loss, and monitoring and reporting on safety risks held by DCap.

5.3.1.1.5. Separately, DCap was the Operating Duty Holder (“ODH”) for the trials being conducted by the Armoured Trials and Development Unit (“ATDU”) [see Box H after [6.5.2.2](#)].

5.3.1.1.6. The ATDU is one of six Trials and Development Units under the Capability Directorate. The Commanding Officer ATDU is a Lieutenant Colonel. His line management chain was to the Head of Capability Ground Manoeuvre (1* Brigadier) as his first reporting officer, and then DCap (2* Major General) as his second reporting officer. Separately, the Commanding Officer ATDU was also the Delivery Duty Holder (“DDH”) for the trials [see Box H after [6.5.2.2](#)].

5.3.1.2. Support Directorate

5.3.1.2.1. The Support Directorate was the directorate within Army Headquarters responsible for delivering programmes.³⁷ It was headed by the 2* Director Support (“DSp”), who reported to DCGS. In this role, he had responsibility for all engineering, logistics, munitions and supply issues. In addition to this appointment, DSp was also the SRO for four (subsequently reduced to three and then two) major programmes, including the Armoured Cavalry Programme.

5.3.1.2.2. The SRO is the key role in programme delivery. The role of the SRO is to co-ordinate and cohere the different Defence Lines of Development (“DLODs”) necessary to meet the programme’s capability objectives. There are typically eight DLODs: training, equipment, personnel, information, concepts and doctrine, organisation, infrastructure and logistics. In the Armoured Cavalry Programme, the most significant DLOD was equipment, i.e. the design and manufacture of the

³⁷ Under the new Army Operating Model (which was introduced after the period on which this Review has focused) this directorate has been redesignated Programmes Directorate, and is headed by Director Programmes.

vehicles. As explained below, an external contractor (GDLS-UK) was appointed to design and manufacture the vehicles and this contract was managed by DE&S.

5.3.1.2.3. The SRO is personally accountable to the Chief of the General Staff for delivering and realising the benefits of the Armoured Cavalry Programme. The SRO is also personally accountable to the Permanent Secretary, to Ministers, and to Parliamentary Select Committees (including the Public Accounts Committee). Essentially, therefore, the SRO has direct responsibility and accountability for implementation of the Armoured Cavalry Programme. The responsibilities of the SRO are set out in their letter of appointment [see [5.5.4](#)].

5.3.1.2.4. SROs for major projects are also subject to the Osmotherly Rules³⁸. According to the Osmotherly Rules, the SRO for a major project is *“in a special position in that they are expected to account for and explain the decisions and actions they have taken to deliver the projects for which they have personal responsibility. This . . . relates to implementation (not policy development) for the project.”* A Parliamentary Committee may wish to take evidence from an SRO. If they do so this *“will be on the understanding that the SRO will be expected to account for the implementation and delivery of the project, as defined by published SRO appointment letters approved by the relevant Minister, and for their own actions.”*

5.3.2. DE&S

5.3.2.1. DE&S are described as a bespoke trading entity. They are an arm’s-length body of the MOD with responsibility for acquiring equipment and materiel for the Armed Forces and for providing through-life support for equipment used by the Armed Forces. DE&S are headed by a Chief Executive Officer (“CEO”), who holds the equivalent of a 4* rank. The CEO is an accounting officer and holds a delegated authority from the Permanent Secretary in MOD Head Office.

5.3.2.2. The non-executive Board of DE&S has an advisory function and provides the CEO with challenge and guidance. It was explained to the Review that the Board monitors major projects that DE&S are working on, such as the Armoured Cavalry Programme’s equipment project.

5.3.2.3. DE&S transact £10 billion per year worth of business, and employ 11,500 people operating in four domains, one of which is the Land Domain. The Land Domain is headed by the 3* Chief of

³⁸ Cabinet Office, “Giving Evidence to Select Committees: Guidance for Civil Servants” 17 October 2014, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/364600/Osmotherly_Rules_October_2014.pdf

Materiel (Land) (“CoM(L)”), subsequently renamed Director General Land (“DG (Land)”). At one point this post had responsibility for four 2*-led operating centres (Land Equipment, Weapons, Logistics, and Helicopters) – a total of around 4,500 people, although responsibility for the Logistics Operating Centre has since been transferred elsewhere – and was responsible for some 50 Category A programmes.

5.3.2.4. The Land Equipment Operating Centre consists of around 1,200 people and is headed by the 2* DLE. It is principally composed of three areas, which reflect the CADMID Capability Lifecycle:³⁹ Land Concepts and Assessments; Vehicle Demonstration & Manufacture (“VDM”); and Vehicle Support. The VDM area was headed by the 1* VDM Team Leader and was responsible for delivery of not only the Armoured Cavalry Programme equipment project, which accounted for around 65% of his time, but also the Warrior Capability Sustainment Programme and the 40mm cannon common to both programmes. He also had responsibilities in relation to in-service turret weapon systems. Below the VDM Team Leader, the Ajax Project Manager ran the project team delivering the Armoured Cavalry Programme equipment project. According to the quarterly PMRS reports from the SRO into the Centre, although the project team increased in size over time (from 66 in financial year 2018/2019 to 80 in 2019/2020, and to around 100 in 2020/2021), it required “*over 120 to deliver all its outputs.*” It did not achieve that level of resource until the fourth quarter of 2021/2022.

5.3.2.5. With respect to the Armoured Cavalry Programme’s equipment project, the project team engaged Dstl to provide expert advice on various aspects of the vehicles and was responsible for ensuring that GDLS-UK delivered in accordance with the contract.

5.3.3. Dstl

5.3.3.1. Dstl describe themselves as “*the science inside UK defence and security*”. They are an executive agency of the MOD which provide scientific and technical expertise and advice to the MOD. Their staff are predominantly civil servants and made up of scientists and engineers. Dstl are headed by a Chief Executive of 2* equivalent rank who chairs an Executive Management Committee, made up of nine executive directors of 1* equivalent rank. Each of the nine executive directors heads a Division; five are science and technology, the remainder are enabling functions such as finance and human resources. A non-executive Board provides support and challenge.

³⁹ The CADMID Capability Lifecycle consists of six phases: Concept, Assessment, Demonstration, Manufacture, In-Service, and Disposal.

5.3.3.2. Dstl derive their operating cost budget from a system of charging customers across MOD and wider government. Dstl were contracted and paid directly by DE&S to provide advice on the Ajax equipment project. The Dstl team working on Ajax, led by a Team Leader, sat within the Platform Systems Division but drew on expertise from across Dstl.

5.3.4. General Dynamics

5.3.4.1. General Dynamics Corporation (“GD Corporation”) are a large US-based aerospace and defence company. In 2021 they had more than 100,000 full-time employees. They consist of four business groups: Aerospace, Marine Systems, Combat Systems and Technologies⁴⁰.

5.3.4.2. The Combat Systems group comprises three businesses:⁴¹ General Dynamics European Land Systems, which is described as “a *Europe based business unit of General Dynamics Corporation*”⁴²; General Dynamics Land Systems (“GDLS”), which operates in several markets including the UK;⁴³ and General Dynamics Ordnance and Tactical Systems.

5.3.4.3. The main contractor contracted to deliver the Ajax vehicles is GDLS-UK, which is one of two business areas that make up General Dynamics United Kingdom Limited.

⁴⁰ <https://www.gd.com/>

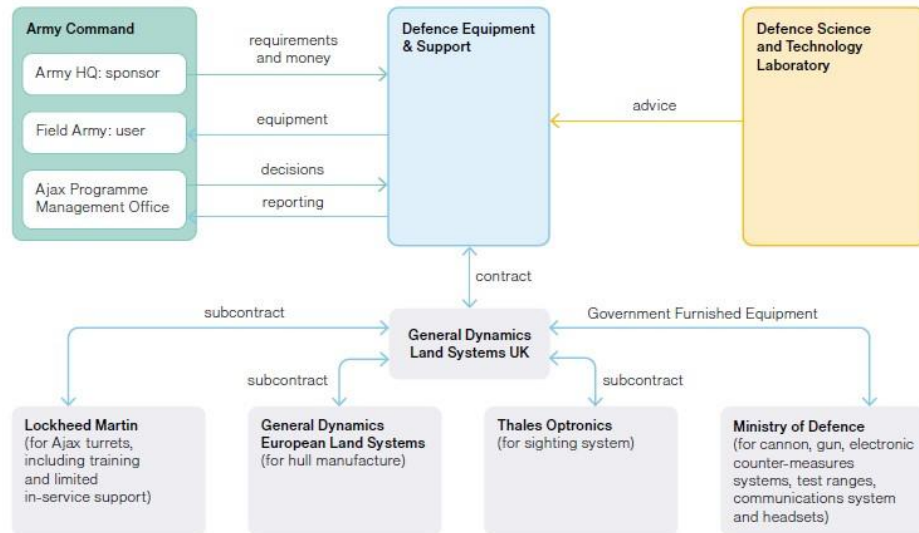
⁴¹ <https://www.gd.com/our-businesses/combat-systems>

⁴² <https://www.gdels.com/>

⁴³ <https://www.gdls.com/>

Roles and responsibilities in the Ajax programme

Defence Equipment & Support manages the relationship with the prime contractor



Notes

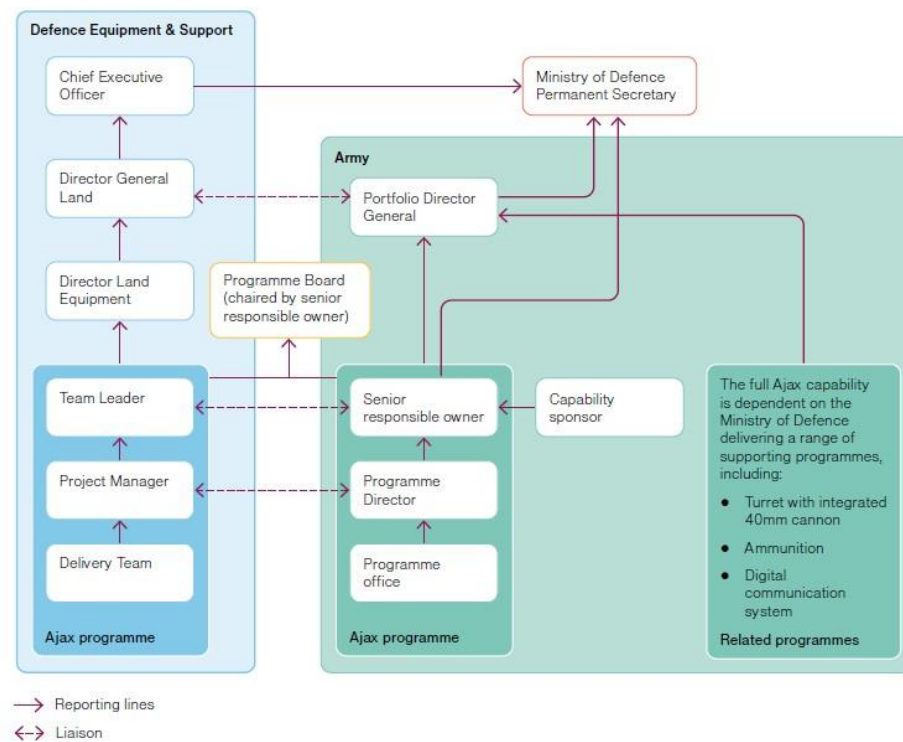
- 1 The chart shows the main relationships between teams and organisations named in this report. The programme governance is in Figure 7.
- 2 The Ministry of Defence is responsible for procuring and supplying some components to General Dynamics Land Systems UK, including the cannon, purchased under a contract with CTA International and the communications system, purchased under a contract with General Dynamics Mission Systems.

Source: National Audit Office analysis of Ministry of Defence information

Figure 2. Roles and responsibilities (source: NAO report "The Ajax programme")

Ajax programme governance since 2016

The programme's governance arrangements have multiple components



Source: National Audit Office analysis of Ministry of Defence data

Figure 3. Governance (source: NAO report "The Ajax programme")

5.4. Governance

5.4.1. Introduction

5.4.1.1. The programme's formal governance framework is described in the Armoured Cavalry 2025 Programme Plan, which was issued by DSp on 20 January 2017 and updated on 26 April 2018. The 2018 Programme Plan was not reissued following the change of DSp in 2019, as he did not consider that the governance framework required amendment. The same structures remained throughout his tenure.

5.4.1.2. The Programme Plan states that the Executive Committee of the Army Board would act as the Portfolio Direction Group for the programme, and that the programme would be "*managed as part of D Sp's sub-portfolio with a core team*" consisting of the SRO, Programme Director, Programme Manager, two Deputy Programme Managers, and a Business Change Manager (to be provided by the Field Army). The Programme Director was not full-time as he was also Programme Director for the Challenger Life Extension Programme. This was an exceptionally small number of personnel to be dealing with a programme of this scale. The Review received evidence that resource was a constant issue. Although the Programme Office was temporarily augmented by 'borrowing' personnel from elsewhere in the Army's Support Directorate, the basic structure and resourcing of the Programme Office was maintained during the period the Review investigated. (Subsequently, after the full extent of problems with the programme became evident in 2021, additional resource was added. A full-time SRO was appointed in October 2021 and the programme team is in the process of being expanded to 29 posts.)

5.4.1.3. The Programme Plan provided that a lead was to be appointed for each of the projects (of which the Programme Plan lists 11, including the eight DLODs) that constitute the Armoured Cavalry Programme. In practice, the Review was told that compliance with this aspect of the Programme Plan varied over time and with different personnel and "*did not survive contact*". Information on the various projects was brought together in the CIWG (variously "Change Integration Working Group" or "Capability Integration Working Group"), which was co-chaired by the Programme Manager and Business Change Manager (a Field Army post).

5.4.1.4. Information on each DLOD was also reported into the Programme Board, which was the principal forum through which issues were raised to the SRO for resolution, and through which he provided direction and guidance on the programme as a whole. Both the CIWG and the Programme

Board were initially held quarterly (“*linked to DMPP reporting timelines*”), although these became more frequent as delivery confidence reduced.

5.4.1.5. As explained above, the project team at DE&S was much larger than the Programme Office, consisting of between 66 and around 100 personnel for much of the period on which the Review has focused, although it also suffered from resource issues and not all posts were filled. In particular, it had “*insufficient safety experts to deal with the complexity introduced through overlapping demo and manufacture phases.*”

5.4.2. Reporting

5.4.2.1. The Armoured Cavalry 2025 Programme Plan specifies that there should be monthly reporting from each of the Project Leads via a “*project dashboard*” to the Programme Management Office, to support the Programme Board and CIWG. The Review was informed, however, that this reporting was not implemented. There was routine monthly reporting on the equipment project against various metrics (milestones, contract variations, costs etc.) using a DE&S reporting tool (the Corporate Management Information System, or “CMIS”). These reports were internal to DE&S, however, and were not provided to the Programme Office.

5.4.2.2. It also specifies the following requirements for quarterly reports on the programme to various Army governance fora and to MOD Head Office:

25. ... *The reporting of programme status upwards is a responsibility of the [Programme Management Office] and is outlined below:*

- a. **Reporting to DMPP.** 3 monthly, through the PMRS .*
- b. **Reporting to [the Executive Committee of the Army Board] (acting as the Army [Portfolio Direction Group]).** 3 monthly, reporting for info only.*
- c. **Reporting to the Army [Portfolio Progress Group].** 3 monthly, reporting for info only.*
- d. **Reporting to D Sp’s [Portfolio Progress Group].** 3 monthly.*

5.4.2.3. As noted above [see [5.2.1.2.2](#)], PMRS reports are submitted by the SRO – quarterly, in arrears – to the Defence Portfolio and Approvals Secretariat’s DMPP team in MOD Head Office. These PMRS reports were also used to satisfy other internal and external governance requirements, including the GMPP and the MOD’s quarterly Performance and Risk Reviews.

5.5. Escalating issues

5.5.1. Introduction

5.5.1.1. There is no single document that provides clear guidance on what and when matters should be elevated or otherwise referred to others for resolution, nor on what action someone should take when an issue is elevated or referred to them. The Deputy Chief of the Defence Staff for Military Capability told the Review that much depends on individuals' judgment, but that as those in more senior positions are selected for their judgment and experience this *"seems entirely reasonable."* Others told the Review that more comprehensive guidance would be undesirable and might even be counterproductive since, as the Head of the Defence Portfolio and Approvals Secretariat put it, *"people will see it as a process and if things don't fit (or weren't in the training) they will get ignored or worse every issue will be escalated rather than being dealt with at a level that is appropriate. This could mean that actually less [sic] issues are raised or more issues are raised to inappropriate levels."*

5.5.1.2. The one relevant document is the Acquisition System Handbook, dated 26 January 2018. This expects issues between the Customer (in this case, the Army) and the Delivery Agent (DE&S) to be resolved at the lowest possible level and refers to the periodic Customer Review meetings at which the Customer and Delivery Agent hold each other to account for delivery against the agreed Command Acquisition Support Plan. With regard to escalation routes, it states:

"4.2.15. Issues should be resolved at the lowest possible level, making use of the assigned individual accountabilities. If required, escalation of unresolved issues from Annex-level to Main Document-level should be used, with issues resolved through the Agreement Plan Customer Review process.

4.2.16. For remaining unresolved issues, potential escalation routes are in place (by exception), via:

- Escalation within the Customer/Delivery Agent above Agreement Plan Owner level;*
- The Customer Voice, to represent the Customers' consolidated view of the Delivery Agent's performance overall;*
- The Delivery Agent can similarly escalate issues to the holding to account forum, if necessary;*
- Departmental holding to account process to the Permanent Secretary and [Chief of the Defence Staff]."* [Emphasis added]

5.5.1.3. This idea of exceptionality is carried through into Annex A to the Army's Command Acquisition Support Plan 2018, which is the Annex relating to the equipment and support to be delivered through the Land Equipment Operating Centre (including the Armoured Cavalry Programme):

*"7. **Ways of working.** Governance of [Command Acquisition Support Plan 2018] and performance review is accomplished via a series of meetings highlighted in Figure 1 below. These meetings must be jointly supported by the Army and [Land Equipment Operating Centre] Portfolio Teams as necessary and will be held three times a year. It is incumbent on attendees to resolve issues at the lowest level and escalate them by exception. . . ."* [Emphasis added]

5.5.2. Policies and orders

5.5.2.1. The Army's Risk Policy is set out in Army Command Standing Order No. 1109, dated August 2019. It states that it is compliant with JSP 892 and *"directs how risk management is to be conducted within the Army."*

5.5.2.2. With regard to risk escalation, it states:

*"2. **Commanders.** Commanders at all levels are responsible for ensuring appropriate risk management is adopted to identify and manage the risks in their area. This should not be onerous, should be tailored to that area and can be conducted as part of the estimate process. . . . Commanders are responsible for escalating key risks in-line with the criteria set by their commander, and 1* commanders and above are to record their risk management activities in an up-to-date risk register. . . ."* [Emphasis added]

*"20. **Risk Escalation.** Commanders and risk owners should clearly articulate a risk appetite and the triggers for escalation. Risks that are outside the appetite set are escalated. Risks can also be escalated if the risk owner no longer has the ability to treat the risk or for consideration at the next level up, ie for awareness, to prevent future surprises or to have a specific decision or action taken.*

Escalating a risk does not transfer the risk; accountability is retained at the original level.” [Emphasis added]

5.5.2.3. With regard to governance, Annex C to Army Command Standing Order No. 1109 states:

*“12. **[High-Level Budget] Owners and 2* Directors.** [High-Level Budget] Owners and 2* Directors are responsible for implementing effective risk management within their area of responsibility and ensuring appropriate risk management activities are taking place. Key responsibilities in this regard are: . .*

*.
d. Escalate significant risks, for action or information, that could affect the delivery of [Army Command Plan] outputs or the Army’s Strategy to the [Coherence and Performance Management Group] for consideration for escalation to [the Executive Committee of the Army Board].” [Emphasis added]*

5.5.3. Letters of delegation

5.5.3.1. Army

5.5.3.1.1. The Review has seen letters delegating certain authorities from the Chief of the General Staff to DCGS (in two versions); and from DCGS to DSp.

5.5.3.1.2. The letter of delegation from the Chief of the General Staff to DCGS, dated 1 August 2019, is principally concerned with financial delegations, and contains no references to escalating or referring issues (either up the chain of command or to Head Office) for resolution. Nevertheless, it clearly envisages that significant risks will be escalated to DCGS, and from him to the Chief of the General Staff and the Executive Committee of the Army Board: *“The [Executive Committee of the Army Board] and I will require periodic input from you to allow the board to take appropriate command, risk and major investment decisions and prepare for my 'Performance and Risk Review' sessions with the Chief of the Defence Staff and the Permanent Secretary (Perm Sec).”*

5.5.3.1.3. A letter of delegation from DCGS to DSp, dated 14 August 2019 states: *“You are personally accountable to me for. . . (e) Reporting on performance and risk.”*

5.5.3.2. DE&S

5.5.3.2.1. The Review has seen letters delegating certain authorities from the MOD Permanent Secretary to CEO DE&S; from CoM(L) to DLE; and from DLE to the VDM Team Leader.

5.5.3.2.2. Whilst none provides any direction on escalating issues with equipment projects, the first of these, dated 5 July 2018, explicitly requires CEO DE&S to keep Ministers apprised of any matters likely to generate parliamentary or media interest:

“I would emphasise that in exercising your responsibilities as [Chief Executive], you must give full consideration to the potential Parliamentary, political, policy and presentational aspects of all proposals, to the interests of MOD, wider Defence and other Government Departments and the need to consult with the appropriate policy staffs and Ministers on these wider aspects when appropriate.”

The Review was informed that CEO DE&S had regular weekly meetings with the Minister for Defence Procurement at which he discharged the requirement to keep Ministers routinely apprised. Specific reporting to Ministers on matters relating to the Armoured Cavalry Programme is discussed further below.

5.5.3.2.3. With regard to financial matters, the letter of 5 July 2018 and the letters of delegation to DLE, dated 21 February 2021, and to the VDM Team Leader, dated 10 June 2020, confer a high degree of autonomy. These letters only require the recipients to bring to the attention of the Director General Finance or Permanent Secretary issues of financial regularity and propriety, or any “*novel and contentious items, or issues raising questions of financial principle.*”

5.5.3.2.4. With regard to Health, Safety and Environmental Protection, both the letter of delegation to DLE and the letter of delegation to the VDM Team Leader require them both “*to inform [CoM(L) and DLE respectively] immediately*” when they lack “*sufficient suitably qualified and experienced personnel (SQEP) and financial resources*” to maintain safety and environmental standards, and to “*encourage actively the timely referral of decisions about significant risks to the appropriate level of authority.*” Despite the lack of qualified resource to produce the Safety Cases being highlighted by both the ‘Red Team’ review and by the Infrastructure and Projects Authority in 2019 [see [6.3.3.6](#) and [6.3.3.8](#)] this does not appear to have happened. The Review was told that resource issues were escalated in 2020 and 2021: in June 2020, in response to requests from VDM TL and DLE, additional resource was brought in from the commercial sector to assist with live crew clearance activity; in

March 2021, suitably qualified and experienced personnel from the cancelled Warrior Capability Sustainment Programme were retained to bolster the Ajax project team; and in May 2021, an external review of resource resulted in further resource being allocated to VDM.

5.5.4. Letters of appointment

5.5.4.1. The Review has not seen the letter appointing the SRO for the Armoured Cavalry Programme who was in the role in the period to April 2019. It is not clear whether the draft letter of appointment for the incoming SRO, dated April 2019, was issued. However, apart from references to the amount of time to be spent on the programme (which increased from 25% to 30%), and to forthcoming milestones, it is virtually identical to the letter of appointment that was subsequently issued on 15 September 2020 by the new Chief of the General Staff. Both set out a route by which significant issues relating to the programme would be notified to Head Office, and where necessary elevated to the MOD Permanent Secretary and Defence Board:

“2. Director General Finance (with the Vice-Chief of the Defence Staff, the Deputy Chief of the Defence Staff for Military Capability, and the Chief Operating Officer as required, supported by the Defence Portfolio and Approvals Secretariat (DPAS)) will routinely represent the Permanent Secretary’s interest in supporting and holding you to account as SRO, referring matters to the Defence Board or Permanent Secretary as necessary.”

5.5.4.2. The letter specifically requires the SRO to report on the programme’s progress against its approvals:

“10. You are responsible for submitting business cases and reports as appropriate to the Army Investment Committee and Investment Approvals Committee. In doing so, you will monitor the programme’s status, its forecast timescales, costs and benefits, and key risks and dependencies. You are to report issues (including any likelihood of exceeding approved tolerances) openly and transparently.” [Emphasis added]

5.5.4.3. By contrast, the letter of appointment issued to the current SRO on 1 October 2021 provides greater clarity around reporting and escalation. With regard to reporting it states that the SRO is responsible both for “*bringing to the attention of the Accounting Officer any material changes in the programme which could require a new Accounting Officer Assessment to be completed and published*” and for “*ensuring the honest and timely reporting on the position of the programme to the*

Infrastructure and Projects Authority while it remains on the GMPP and for providing reports and information to the Defence Portfolio and Approvals Secretariat as required.”

5.5.4.4. In relation to escalation, the October 2021 letter states explicitly:

“You will be held accountable for the delivery of its objectives, with policy intent and outcomes expected. This encompasses securing and protecting its vision, ensuring that it is governed responsibly, reported on honestly, escalated appropriately and for influencing the context, culture, and operating environment of the programme. ... Where issues arise which you are unable to resolve, you are responsible for escalating these to the DMPP Sponsor Group and Ministers if appropriate.” [Emphasis added]

5.5.4.5. For the first time the 1 October 2021 letter of appointment also gives the SRO a specific role in relation to programme expenditure: *“You should note that where expenditure is considered novel, contentious, repercussive, or likely to result in costs to other parts of the public sector, HM Treasury approval will be required, regardless of whether the programme expenditure exceeds the delegated authority set by HM Treasury.”*

5.5.5. Programme documents

5.5.5.1. The Armoured Cavalry 2025 Programme Plan envisages that risks and issues should normally be resolved at the CIWG, failing which they would be brought to the Programme Board for discussion and resolution:

“22. Programme Boards (PBs). ...

b. Attendance. *Considering the specific outputs of the PB described above, the attendance should reflect this and therefore be targeted at those who will deliver information and products to achieve the holding to account process or the escalation of risks and issues for SRO intervention. ...*

23. Change Integration Working Groups (CIWGs).

a. ... *The CIWG raises key risks and issues relating to integration and prepares [Contingency Plans] for 2* direction and guidance [at] the next PB.*

b. *The CIWG is responsible for resolving issues and managing risks where possible.”*

5.5.5.2. Whilst the Programme Plan provides no guidance on what and when the SRO should report or elevate elsewhere, the Armoured Cavalry 2025 Programme Mandate, dated 26 July 2016 – which provides the SRO with the Chief of the General Staff’s “*direction and guidance*” – requires him “*to inform and report any deviations that may occur*” from the approved “*Performance, Cost and Time (PCT) parameters*.” It also refers to escalating issues more generally but does not indicate to where:

“22. You, supported by the Armd Cav 2025 PB [Programme Board], should manage the risks associated with the delivery of the capability. Mitigation measures should be developed to reduce the risks to a tolerable level. Risks and issues, which the PB cannot resolve, should be escalated as required.”

[Emphasis added]

5.5.5.3. Further clarity can be found in the Army Operating Model, as modified in 2016,⁴⁴ which explains that the SRO is responsible *inter alia* for “*Escalating risks and issues that cannot be resolved at programme-level (by exception) to either the Sub-Portfolio or [Top-Level Budget] level [Portfolio Progress Group] (depending on type of programme);*” and that the “*[Top-Level Budget] level Portfolio Progress Group (PPG) . . . monitors trends and resolves issues/risks, with unresolved risks/issues escalated to [the Executive Committee of the Army Board] by exception.*”

⁴⁴ The Army Operating Model has since been substantially revised. The current version was published on 21 March 2022.

6. Chronology

6.1. Introduction

6.1.1. This section gives a chronological account of the programme, focusing on the perspective of the MOD. The chronology describes what appeared to MOD (including DE&S and Dstl) personnel working on the programme to be the main problems that were experienced with the programme, in order for the Review to determine the extent to which these problems were shared and elevated in a timely and appropriate way, and to identify lessons that could be learned about the leadership, culture and governance in MOD. The Review acknowledges, therefore, that GDLS-UK may have a very different perspective of the chronology.

6.1.2. Given its limited Terms of Reference, the Review does not make findings about the substance of the problems as perceived by MOD personnel, or the responsibility for them (for example, as to the existence or nature of any technical failings with the vehicles, compliance with noise and vibration legislative requirements, failures (by either GDLS-UK or MOD) to comply with contractual obligations, or whether any harms or injuries were caused by noise and vibration on the vehicles).

6.1.3. The focus of the Review has been on the period from Recast, which commenced in late 2017, through to July 2021. During this period the main problems for MOD personnel were the programme's schedule and the performance of the vehicles. These problems were not always fully escalated up the various chains of command through to Ministers. It was not until the Infrastructure and Projects Authority gave the programme a Red rating in March 2021, and trials and use of the vehicle were suspended due to concerns about noise and vibration in June 2021, that the full extent of the problems with the programme was understood throughout the Department and up to Ministerial level.

6.2. The procurement process and contractual arrangements

6.2.1. The Main Gate 1 business case for Ajax was approved in 2010. The MOD awarded GDLS-UK a contract for the demonstration phase and provision of training systems.

6.2.2. The Main Gate 2 business case for Ajax was approved in June 2014. In September 2014 the MOD awarded GDLS-UK the contract for the manufacture of 589 Ajax vehicles, in six variants.

That approach locked in certain financial savings; in addition, the contract was firm price with the risk of variation of price to be assumed by GDLS-UK at 2014 rates, protecting the MOD from emerging cost growth. It was also seen as necessary to commit to manufacture before the demonstration phase was complete in order to incentivise GDLS-UK to invest early in production. The contract provided for a limited overlap of the demonstration and manufacture phases.

6.2.3. IOC was fixed for July 2020, with the first vehicles to be received by the Army in 2017. FOC, when delivery of all vehicles would be complete, was fixed for December 2025. Both of these dates were at 50% confidence level, meaning that there was the same chance that the dates would or would not be achieved.

6.2.4. The procurement strategy approved at Main Gate 1 and affirmed at Main Gate 2 was for modified off-the shelf vehicles based on a common base platform. In the event, however, 1,200 user requirements were set which meant that the vehicles were in effect bespoke, but using an existing base platform.

6.3. 2017 to 2019: Recast

6.3.1. Recast Agreement

6.3.1.1. By the end of 2017 there were delays in design, demonstration and trials, and vehicles had not been delivered to schedule. There was an increasing divergence between the demonstration and manufacture phases. In late 2017, the parties began to renegotiate the contract. DE&S took the lead as the entity within MOD with responsibility for managing the contract with GDLS-UK. Originally expected to last a few weeks, the negotiations ended up taking 15 months. The negotiations were known as 'Recast'.

6.3.1.2. The Review was told that Recast was successful in a number of respects. In particular, it resolved a number of complex contractual disputes, including a dispute relating to the integration of the cannon. Recast also realigned some financial incentives which DE&S considered favoured manufacture over demonstration.

6.3.1.3. The negotiations introduced a new feature into the contract: it was agreed to develop the vehicle in five stages, or 'capability drops', numbered 0 to 4. The plan was to allow the Army early access to vehicles and build capability incrementally. Capability Drop 0 was the existing prototype.

Capability Drop 1 vehicles were intended to be delivered for service in the Army, but to be used for training purposes and not full deployment. Capability Drop 2 was intended to maintain stability in the supply chain and in production; it was not intended that any vehicles at this specification would be delivered to the Army. Capability Drop 3 vehicles were to be the first deployable vehicles. Capability Drop 4 vehicles were to meet the final vehicle standard. Each vehicle produced at a capability drop standard below Capability Drop 4 was to be retrofitted ahead of FOC to bring it up to the final standard required.

6.3.1.4. Work was done to improve both the Performance Management Baseline and the Integrated Programme Schedule, and to assure the schedule for delivery of vehicles to meet the definition of IOC at July 2020 and FOC at December 2025. The original Main Gate 2 IOC definition required delivery of 45 vehicles of six different types (a squadron of 25 vehicles, with a further two vehicles in January 2021, and an additional conversion training fleet of 18 vehicles). A risk adjusted schedule analysis conducted by DE&S during Recast showed that delivery of vehicles to meet this definition of IOC would not be met (at 50% confidence) until September 2021, over a year late; it showed, however, that 27 vehicles would be delivered by July 2020. The decision was taken not to move the date for IOC or FOC: the Review was told that the IOC deadline was seen as a 'red line' for a range of reasons, including the strategic need and reputational interests of the Army, and the project management benefits of maintaining the deadline. Instead, it was agreed that GDLS-UK would deliver sufficient (approximately 25) vehicles at Capability Drop 1 standard to conduct collective training prior to July 2020.

6.3.1.5. The original date for FOC was not moved; it was intended that once IOC had been achieved time would be made up to meet the original FOC date of 2025. Maintaining the original dates despite existing delays in the demonstration phase had the effect that the overlap of the demonstration and manufacture phase was significantly increased. At the time, maintaining the FOC date was considered realistic, in particular in light of the significant production that was underway. With hindsight, and as explained below, the schedule to both IOC and FOC was to prove unrealistic.

6.3.2. Issues neglected during Recast

6.3.2.1. The Review heard that for MOD personnel Recast did not address other important issues and in certain respects it exacerbated existing problems with the programme.

6.3.2.2. The Review heard that the Recast process had a detrimental effect on governance within DE&S, although this was disputed by the VDM Team Leader in post at the time. A number of witnesses told the Review that the Recast negotiations consumed management time, and that

management of the on-going programme was neglected. The Review heard various descriptions by DE&S project team members of this period as “*anarchy*” or “*chaos*”. The incoming VDM Team Leader said that there was a lack of governance when he joined in January 2019. A later audit by the Defence Quality Assurance Field Force in early 2020 found that escalation mechanisms were challenged during Recast and some DE&S project team members felt unable to raise concerns, or perceived that concerns were not addressed. That finding was consistent with accounts given to the Review.

6.3.2.3. DE&S project team members told the Review that they had significant concerns with the quality of work that GDLS-UK was producing, citing examples of what they considered to be visibly poor workmanship and inconsistencies between vehicles. There was a growing list of disputed technical issues, known in the DE&S project team as “*the zombie list*”, which were not addressed by the Recast negotiations. That list was acknowledged by a number of witnesses, including the VDM Team Leader. The SRO in post at the time of Recast explained to the Review that there was a need to prioritise four major technical areas known as “*the Quad*”, and a view was taken that technical issues which were not tackled would form part of the subsequent retrofit programme. That approach to resolving technical issues was to continue as the equipment project progressed, exacerbating the concertina effect, where more and more work was required to be done in the latter stages of the project without any extension of time.

6.3.2.4. At the same time, and linked to the technical issues, concerns about the generation of Safety Cases for the six variants of the vehicle were growing within the Dstl team (who were contracted by DE&S to provide expert technical advice on the equipment project). In February 2018, the Dstl team briefed their Platform Systems Division Head that, in their view, the Safety Cases being prepared for the Ajax vehicles were unsound. They briefed that “*at a working level*” the DE&S project team “*is fully in agreement with Dstl*”, but that design and verification and validation were behind schedule, and they perceived that there was pressure to continue production and bring platforms into service. Dstl team members expressed concern that the project team would be placed under great pressure to allow the platform into service, dealing with hazards not through design changes but on the basis of limitations of use and procedural mitigations.

6.3.2.5. In April 2018, a Senior Fellow at Dstl escalated concerns by writing formally to the DE&S VDM Team Leader to inform him that, in his view, the current Safety Case report was unsound. He stated that limitations of use and their derivation and validation were not sufficiently controlled or explained. He commented that “*If correct, any trial being conducted would potentially be unsafe, with a high risk of a near miss or accident*”. The Dstl Fellow told the Review that it was highly unusual for him to write a letter in these terms, and that similar letters in the past had led to programmes being halted while safety concerns were investigated. He believed that DE&S leaders did not appreciate the

seriousness of his concerns and that no sufficient steps were taken in response. The VDM Team Leader disagreed; he told the Review that he had responded to the letter, but that he could not get to the bottom of the concerns being raised. It was clear to the Review that the VDM Team Leader did not understand the letter to be as significant as the Dstl expert considered it to be, there was poor follow-up, and the issues raised by the Dstl expert were left unresolved. The Review saw no evidence that the Dstl letter was forwarded to the SRO or the Army programme team.

6.3.2.6. A meeting between Dstl and the DE&S project team took place in June 2018. According to a record of the meeting in the Dstl quarterly report for July 2018, Dstl raised a range of technical concerns with the vehicle and the Safety Cases, and stated that there was reluctance on the part of the DE&S project team to take Dstl's advice.

Box A: Safety Cases

A1. The Defence Policy for Health, Safety and Environmental Protection explains the purpose of the Safety Case as follows: "... *The use of a safety (or environmental) case provides the ability to understand the cumulative or interrelated risks from the use of the complex system and for this to be captured in a body of evidence. The Defence Standard definition of a Safety Case is 'a structured argument, supported by a body of evidence that provides a compelling, comprehensible and valid case that a system is safe for a given application in a given operating environment'.*"⁴⁵

A2. Regulation 4 of the Land System Safety and Environmental Protection: Defence Codes of Practice stipulates that "*Those holding safety and environmental responsibilities shall establish, use and maintain a valid Safety Case and Environmental Case, including summary reports, for land systems,*" and explains that "*A Safety Case is necessary in order to demonstrate that a system is acceptably safe in use; all risk has been reduced to a level that is As Low As Reasonably Practicable (ALARP) and that the system complies with applicable legislation.*"⁴⁶

⁴⁵ Defence Safety Authority, "DSA01.1 Defence Policy for Health, Safety and Environmental Protection," v1.0, 24 August 2016, at pp.15-16.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/548060/DSA01_Defence_Policy_for_Health_Safety_and_Environmental_Protection-20160804.pdf

⁴⁶ Defence Safety Authority, "DSA03.DLSR.LSSR Land System Safety and Environmental Protection: Defence Codes of Practice," v1.1, September 2019, at p.20.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1030156/20170804-DSA03_Guidance-DLSR-LSSR.pdf

A3. The Safety Case has a tripartite structure. Part 1 is intended to identify and refine the system safety requirements (including any legislative requirements with which the system must comply). Part 2 provides the evidence that the system can meet the system safety requirements set out in the System Requirements Document and Part 1 Safety Case, and that the system is 'Safe by Design'. Part 3 provides the evidence that the system is 'Safe to Operate,' and “***should confirm that all safety requirements have been met, that risks have been reduced to ALARP and that all the necessary arrangements are in place, including limitations if necessary, to ensure the proper and acceptably safe operation and support of the system on its introduction into service and throughout the system(s) lifecycle.***”⁴⁷

A4. The Safety Case comprises the totality of the arguments and evidence, which are then summarised in a Safety and Environmental Case Report. Ownership of these reports reflects the tripartite structure of the Safety Case: the Part 1 and Part 2 reports are signed by DE&S and the manufacturer of the equipment; and the Part 3 report is jointly signed by DE&S and the Army customer and is linked to acceptance into service. Within the Army, DCap was responsible for the 'Safe to Operate' aspect of all Land Equipment, which includes the maintenance of Part 3 Safety Cases. He carried out this function through the various Heads of Capability, with advice and assurance from the Land Equipment Safety Officer and the Capability Safety team.

A5. Following Recast, it was intended that Safety and Environmental Case Reports would be produced not only for the different variants, but also for each Capability Drop. The Review was told that, unusually – and perhaps uniquely – the Part 2 Safety Case for the Capability Drop 1 ARES vehicle was 'qualified' as the trials evidence did not yet exist to demonstrate that it was 'Safe by Design'. This caveat also appears in the subsequent Part 2 Safety and Environmental Case Reports for the other Capability Drop 1 variants.

6.3.2.7. Senior members of the DE&S project team told the Review that in hindsight a further problem that they had with Recast was that it did not address the proper conduct and sequencing of

⁴⁷ Ibid, at p.26.

trials. Trials were required to verify and validate that requirements were being met, but also crucially to provide the evidence necessary to support the Safety Case. During 2018, while Recast was still ongoing Dstl had raised concerns about the approach to trials, including in their monthly and quarterly reports to the DE&S project team. The SRO in post at this time was not provided with copies of Dstl reports and told the Review that he was not aware of Dstl's concerns about the trials.

6.3.2.8. Subsequently the DE&S project team took the view that Safety Cases and delivery of vehicles were not supported by evidence which they considered to be adequate to establish that safety and technical assertions were valid. (The Review makes no findings as to whether this was in fact the case).

Box B: Recast: unintended consequences

B1. Whilst Recast had some important positive outcomes it also had a number of other effects which were to prove highly problematic for the programme as it progressed. The SRO who took over post-Recast said that, with the benefit of hindsight, in his view Recast had *“holed the programme below the water line.”*

B2. The overall effect of the decision not to move the FOC date despite the existing significant slip in the schedule was to concertina the remaining stages of the equipment project: the Recast agreement extended the overlap in demonstration and manufacture, required time to be made up, and required the remainder of the demonstration and manufacture phases, including the more complex Capability Drop process and provision of associated Safety Cases, to be completed within the original timescale.

B3. The decision to keep the original IOC date and to adjust the definition to allow IOC to be declared by reference to what performance (within constraints) had been met by that date, together with discrepancies between what the Army were prepared to declare as IOC and the contractual position, introduced a lack of clarity into what was required for IOC.

B4. The decision to keep the original IOC date also had the effect of prioritising time over performance. During 2020, for example, the DE&S project team asked GDLS-UK to prioritise certain work in order to meet the revised Army definition of IOC.

B5. The decision to accept Capability Drop 1 vehicles at IOC, which could be used for training but could not be deployed, exacerbated the position. The Review found that, as a result, the programme and project teams, and the Army and DE&S leadership, accepted significant constraints on the way the vehicles could be used, and put off resolving technical issues, on the basis that they would be solved by the time the Capability Drop 3 vehicles (intended to be deployable) were to be delivered.

6.3.3. Reporting on Recast and assurance

6.3.3.1. Heads of terms agreed at Recast were signed in December 2018. The SRO sent an Information Note to the Investment Approvals Committee on 17 December 2018 to inform the Committee of the outcome. The Information Note stated that the negotiations had settled legacy issues linked to delay in the project and achieved “*a mutually agreed new technical baseline (to include elements of new work) and a stable, risk adjusted, schedule, and a revised governance structure.*”

6.3.3.2. The Information Note did not state expressly that delivery of vehicles to meet the original IOC definition was not expected to be achieved before September 2021 [see [6.3.1.4](#) above]. Rather, the Information Note stated that “*The Army seeks to hold to Jul 20 as the IOC but accept risk against the definition*”. The Information Note explained this to mean that the Army would have a squadron of 25 vehicles in its possession by July 2020 but that there would be some technical constraints on the vehicles, notably in terms of the weapon system, and risk in delivering collective training elements. The Army (the Chief of the General Staff) was said to be “*content to carry this risk*”. An Annex to the Information Note set out a qualitative assessment of the capability to be delivered at IOC, assessing various elements at green, amber or red. (The Army’s commitment to the July 2020 IOC date resulted in some negative behaviours: see [7.9. Keeping to Time: Immovability of IOC](#) below.)

6.3.3.3. Having referred to the new IOC definition, the Information Note went on to state that “*Importantly, the Army is still able to deliver a Strike battlegroup in 2023 and a Strike Brigade in 2025 to meet its Joint Force 2025 commitments.*” This was a reference to intended future use of the vehicles by the Army, rather than to any milestones or requirements in the equipment contract.

6.3.3.4. On 14 January 2019, the quarterly PMRS report graded overall delivery confidence for the programme at Amber; the narrative section replicated some wording from the Information Note

concerning confidence about IOC and Joint Force 2025 commitments. With respect to capability, the SRO stated: *“I am satisfied that all the [Key User Requirements] can be met, albeit some elements such as reliability and certain survivability fixes will deliver post IOC.”*

Box C: RAG ratings

The definitions for the RAG ratings used in PMRS reports, and by the Infrastructure and Projects Authority when conducting reviews, are:

Green: *Successful delivery of the project on time, budget and quality appears highly likely and there are no major outstanding issues that at this stage appear to threaten delivery significantly.*

Amber: *Successful delivery appears feasible but significant issues already exist, requiring management attention. These appear resolvable at this stage and, if addressed promptly, should not present a cost/schedule overrun.*

Red: *Successful delivery of the project appears to be unachievable. There are major issues with project definition, schedule, budget, quality and/or benefits delivery, which at this stage do not appear to be manageable or resolvable. The project may need re-scoping and/or its overall viability reassessed.”*

6.3.3.5. Subsequently, on 18 January 2019, the DE&S Project Manager and the Army Programme Director formally agreed that DE&S would deliver by July 2020 a minimum of 27 vehicles at Capability Drop 1 standard, made up of 12 AJAX vehicles together with 8 ARES, 3 APOLLO and 2 each of ATLAS and ATHENA, to support ‘train the trainer’ training.

6.3.3.6. As noted above [see [5.2.2.3](#)] a ‘Red Team’ review of the schedule to IOC was conducted by DE&S in early 2019. It advised that the schedule to IOC was not realistic given performance to date and that urgent attention be given to resource issues, particularly on Safety Cases and live crew clearance. The Red Team advised that meeting the first two or three critical milestones would be the “acid test” and advised building confidence that the schedule was workable before formally committing to new dates. The Red Team also expressed the view that MOD did not “appear to completely

understand what went wrong since the last contract reset and without pinpointing this there is a risk that history will repeat.”

6.3.3.7. Notwithstanding the Red Team’s warning, the July 2020 and December 2025 dates for IOC and FOC were maintained without first assuring the next critical milestones were met. The Red Team’s warning about history repeating itself proved to be prescient. There was no evidence seen by the Review to suggest that DE&S sought to understand what had gone wrong in spite of the Red Team’s comments: indeed the first diagnostic analysis by DE&S leadership of lessons learned from the programme did not take place until October 2020, when one was conducted by the new 1* VDM Team Leader and 2* DLE. As early as February 2019, the schedule margin to IOC had already been used. There was a handover to the new SRO at a Programme Board meeting on 1 April 2019; the closing comments of the then outgoing SRO are recorded as: *“All are to concentrate on obtaining an Army-owned AJAX by Oct 19 in time for IOC in July 2020. All float [that is, time built into the Schedule] to IOC has now gone so this task required a greater push to ensure it is achieved.”* Schedule slippage would worsen through 2019.

6.3.3.8. Between 18 and 21 March 2019, the Infrastructure and Projects Authority conducted a Gateway Review of the programme. They issued their report to the SRO on 1 April 2019. The delivery confidence assessment was found to be Amber. The review team found that the programme was *“on track to deliver IOC by July 2020, however there are significant risks that need to be reviewed and actively addressed to ensure success”*. They identified, in particular, that there was a *“critical”* need for an increase in resources to manage the scale and complexity of work to achieve IOC, including suitably qualified and experienced personnel to meet the demand for Safety Cases to meet IOC and beyond. They commented on the tight schedule to IOC leaving little time to deal with any unforeseen or significant issues which might arise. In spite of the Infrastructure and Projects Authority’s recommendations, no significant additional resources were allocated to the programme. There does not appear to have been any monitoring or follow up to the Infrastructure and Projects Authority’s recommendations [see [7.7.2.4](#)].

6.3.3.9. The Outletter from the Investment Approvals Committee responding to the Information Note was not issued until 9 April 2019. The Investment Approvals Committee was not updated in the meantime on the Red Team findings in relation to the schedule, nor the immediate schedule slippage, nor the Infrastructure and Projects Authority review. In the Outletter, the Chair of the Investment Approvals Committee, the Director General Finance, commented that the solution to the problems with the programme seemed *“pragmatic”*. It was stated that the Deputy Chief of the Defence Staff for Military Capability would like to *“keep a close eye”* on performance against the recast programme and that *“accordingly a DMPP Programme Review will be scheduled by [the Defence Portfolio and*

Approvals Secretariat] to take place prior to the end of August 2019". That Review did not in the event take place. It appears simply to have been overlooked [see [7.7.2.5](#)].

Box D: Understanding of the project after Recast

D1. The Review found that the equipment project started the complex process of completing the demonstration and manufacture of the vehicle following Recast with governance issues, concerns that the schedule was not realistic, concerns about technical and quality problems with the vehicle, and concerns about the approach to trials which would be used to provide evidence necessary to support the Safety Case. At the same time, because of concurrent manufacture and demonstration (a feature of the original contract, with concurrency extended by Recast), vehicles continued to be built while the design was not finalised and concerns about technical issues remained unresolved. One witness described this as *"baking in risk downstream"*. Further, the cost of any future rectification was inevitably growing as more vehicles were being produced, affecting future assessment of whether risks were As Low As Reasonably Practicable ("ALARP"), because that assessment includes a cost-benefit analysis.

D2. Whilst various members of the project team at DE&S and the programme team in the Army understood elements of all these issues, the Review considers that, collectively, an overly optimistic view was taken that the project had been re-set and would perform significantly better in the future. This view was reflected in the short Information Note provided to the Investment Approvals Committee. As a result, the Review considers that the Investment Approvals Committee (and the Centre more generally) were given an overly optimistic view that the programme was on track at the start of 2019.

D3. The Information Note also reassured the Investment Approvals Committee that the schedule was risk adjusted and stable. Whilst that view was given in good faith, it is apparent that even at the time members of the project team were aware that the schedule to IOC was ambitious. One described it to the Review as *"it was throwing sixes, but it was just about doable"*. The Information Note also reassured that, even if the original IOC definition could not be met in 2020, the Army's deployment plans for 2023 and 2025 would not be affected. It did not indicate any risk in meeting the original FOC date of 2025. That was

important to the impression given that the overall ability of the programme to meet its performance and time approvals was not significantly at risk. Even in 2020, when the IOC date did have to be put back, and the FOC date was under review, the Investment Approvals Committee continued to be assured that the Army's Joint Force Commitments could be met in 2023 and 2025. With hindsight, the Review considers that, whilst it has no doubt about the genuine belief of those giving that assurance, it was over-optimistic even in 2019, and even more so in 2020.

6.4. 2019: Implementation of Recast

6.4.1. Schedule delays and IOC realism

6.4.1.1. It took a further five months to incorporate changes agreed during Recast into the contract, which was signed in May 2019. During 2019 and until February 2020, the programme progressed without further reporting to the Investment Approvals Committee.

6.4.1.2. In July 2019, the Programme Director held a route to IOC 'wargame', involving stakeholders from GDLS-UK, DE&S, Army Headquarters, the Field Army (the Household Cavalry Regiment) and others. The intention was to build a "*realistic*" assessment of the schedule (described as at 60% to 70% confidence). Following this exercise, the Programme Director reported that the revised IOC would not be achieved before January 2021, six months outside of approvals; with treatments, the date could be brought back to July 2020, but the assessment was that there was only a 30% chance of meeting that date, and it required additional resource.

6.4.1.3. At the Programme Board on 8 July 2019, options presented to the SRO were to acknowledge the risk and signal to the Centre via an Information Note with a Review Note to follow, or to treat the risk and drive towards the existing July 2020 date, redefining IOC again, if necessary, to exclude the turreted AJAX variant. The Review has not seen any Record of Decisions for that meeting. It is clear, however, that the SRO chose not to produce an Information Note or Review Note but continued to drive for the existing IOC. At the same time, no significant additional resource was provided.

6.4.1.4. The PMRS report dated 11 July 2019 rated overall delivery confidence at Amber, delivery confidence for IOC at Amber, and delivery confidence for FOC at Amber/Green. The narrative part of

the PMRS included the following: *“IOC remains unchanged. The Army seeks to hold to Jul 20 as the IOC but accept risk against the definition. We should have the IOC quantity of vehicles, although further slips to key equipment delivery dates since my last report are a major cause for concern. It is accepted that reliability will not be proven, and there will be short-term capability constraints. There is also an acceptable risk that not all collective training will have completed in time. Importantly a STRIKE Battle Group in 2023 and a Brigade in 2025 remain on track. ... IOC can still be met, although most of the Army’s contingency and float has now been used up.”*

6.4.1.5. That language was reflected verbatim in a two-page brief to the Minister for Defence Procurement on 31 July 2019. This was the only formal brief to Ministers on the programme during 2019.

6.4.1.6. In early September 2019, the Programme Director warned the SRO in a written brief that in his view there was now only a 10% probability of achieving a *“meaningful”* IOC at July 2020. The Programme Director’s view was based on what he regarded as the lack of deliveries from GDLS-UK to date, and his *“limited confidence”* in key equipment deliveries in the near future. On 2 October 2019, the SRO queried with DLE whether he needed to elevate to the Centre that *“we will not be able to deliver to IOC the 27 AJAX variants due to software assurance and Live Crew Clearance”*; he commented that, unless he was missing something, *“this feels right”*. DLE replied that *“will not”* was the wrong verb; he recommended saying that delivery *“remains challenging and is therefore at risk. However, it is still achievable”*.

6.4.1.7. As discussed below [see [7.8.9.4](#)], the SRO accepted DLE’s assessment without seeking supporting information about the state of the schedule. It was DLE’s view, rather than the significantly more pessimistic view of the Programme Director, which was reported up the chain of command and to the Centre. (The reporting on this issue is typical of the way in which reporting on the programme took place. Contrary or dissenting voices were not made known to the Centre [see [7.8.9. Reporting on delivery confidence to the Centre](#)].) A new DLE came into post in early 2020. The DLE in post in 2019 declined to speak to the Review, so it is not known what the basis was for his more optimistic view.

6.4.1.8. On 10 October 2019, there was a meeting of the Executive Committee of the Army Board. The SRO was not available to attend and a short brief on Ajax was instead presented by Head Integrate (an Army post) as part of an update on the Army’s armoured vehicle programmes. The Board was informed that the risk of failing to achieve IOC was *“growing, but is being treated”*.

6.4.1.9. The language suggested by DLE to describe delivery confidence for IOC was used by the SRO in the next PMRS quarterly report dated 16 October 2019. Overall delivery confidence and delivery confidence for IOC remained at Amber, and FOC confidence at Amber/Green. The narrative text was slightly amended from the previous report in July 2019: *“The delivery of IOC is challenging but remains achievable; the Army seeks to hold to Jul 20 as the IOC but accept risk against the definition. We should have the IOC quantity of vehicles with short-term temporary capability constraints, with reliability unproven. There is also an acceptable risk that not all collective training will have completed in time. Importantly the generation of a STRIKE Battle Group in 2023 and a Brigade in 2025 remain on track.”*

6.4.1.10. The programme was discussed periodically at Performance and Risk Reviews chaired by the Chief of the Defence Staff, and including the Permanent Secretary, Chief of the General Staff and Director General Finance amongst others. Reporting from the PMRS informed this process. The programme was not specifically discussed between July and November 2019; minutes from December 2019 note simply that there were core challenges concerning the turret and Safety Case, but that these were not yet affecting force generation.

6.4.1.11. The Review considers that overall the reporting to Army Headquarters and to the Centre during 2019, which was heavily based on the PMRS reports, gave an overly optimistic view of the programme, particularly in terms of the likelihood of meeting schedule milestones and Army Joint Force commitments [see [7.8.9. Reporting on delivery confidence to the Centre](#)].

6.4.2. Safety and technical concerns

6.4.2.1. The Review was told that the existence of technical issues was to be expected in the demonstration phase of an equipment project. The Review was also told, however, that project team engineers and Dstl advisers were increasingly concerned that, in their view: many issues were not being closed over time; evidence to support technical and safety assertions made by GDLS-UK was lacking; and there was a lack of quality and configuration control.

6.4.2.2. Dstl raised their concerns in 2019 through quarterly and monthly reports (which were provided to DE&S, but not to the SRO or to the Capability Directorate). The reports show that whilst some issues were closed, most were not, and new concerns were added over time. In January 2019, the quarterly report shows a total of 137 open concerns, of which 65 were categorized as Red. In January 2020, there were 144 open concerns, of which 73 were categorised as Red, which included vibration. Dstl define a Red assessment as: *“Issues of severe concern – issue that has been identified*

and unless resolved will lead to a shortfall in system requirements/capability. Based on current information no solution will be provided.”

6.4.2.3. In December 2019 the recently appointed Platform Systems Division Head in Dstl was briefed that the Dstl team had serious reservations about the GDLS-UK case for safety of the vehicles, and that *“They are concerned that delivery pressures may lead to acceptance of a vehicle with an unsound Safety Case”*. The slides used were for the most part the same as those used to brief the previous incumbent in February 2018: the concerns remained the same and had not been addressed to Dstl’s satisfaction. The Dstl team asked the Division Head to consider withdrawal of their work for DE&S. The Division Head decided that Dstl should continue to support DE&S and to continue to highlight their concerns to DE&S and ensure a very thorough time log of all their advice to DE&S was maintained. The Division Head told the Review that he decided that the better approach was to continue to work with, and seek to influence decision-making by, DE&S. He said that Dstl were not the entity with responsibility for ensuring safety, and he expected that safety concerns would be dealt with by those who were responsible for the Safety Cases and assuring that safety requirements were met, in particular DE&S and the Capability Directorate in the Army. The briefing within Dstl and the decision taken by the Division Head were not shared with DE&S.

6.4.2.4. As explained above [see Box A after [6.3.2.6](#)] GDLS-UK and DE&S were responsible for signing the Part 2 Safety Case, which is required to show that the vehicle is ‘Safe by Design’. DCap is responsible for the ‘Safe to Operate’ aspect of all Land Equipment, which includes the maintenance of Part 3 Safety Cases. He carries out this function through the various Heads of Capability, with advice and assurance from the Land Equipment Safety Officer and the Capability Safety team (currently seven personnel). Members of this team advised officers in the Capability Directorate on whether policy was being followed with respect to the Part 3 Safety Case for the vehicles. The Part 3 Safety Case builds on the Part 2 Safety Case. It was required to be signed on behalf of DCap for each variant of the vehicle (and each Capability Drop) before it could enter into service.

6.4.2.5. In 2019, the Part 2 and Part 3 Safety Cases were being put together. The Review heard that members of the Capability Safety team liaised closely with Dstl advisers and shared many of the Dstl team’s concerns about the vehicle and the approach being taken to safety.

6.4.2.6. In September 2019 members of the Capability Safety team prepared an information brief for the Land Equipment Safety Officer, which stated that it was *“intended to highlight that AJAX (all variants) is NOT DEMONSTRABLY SAFE in the clearest terms possible”*. It recommended that the Land Equipment Safety Officer notes various concerns about safety including those expressed by Dstl. The brief did not mention noise and vibration. Areas of concern for the Capability Safety team

were the safety of the complex electronic elements, power, automotive, software, and electromagnetic compatibility systems. The author was particularly concerned that, in his view, DE&S and GDLS-UK were proposing to rely on training and procedural controls to mitigate hazards, rather than making changes to the design. The brief ended by asking *“Do we accept an unsafe vehicle and hope that training mitigates risks that should have been engineered out?”*

6.4.2.7. At the same time, DE&S project team members remained concerned about quality control by GDLS-UK in vehicle production and that this was not being appropriately addressed. As a result, they arranged for the Defence Quality Assurance Field Force to conduct an audit. The audit, which reported in February 2020, referred, amongst other things, to what they regarded as quality issues on the vehicle and to issues with escalation in the DE&S project team which had led to difficulty in holding GDLS-UK to account with respect to delivery against the contract.

6.4.2.8. The safety concerns being expressed by Dstl and Capability Safety team members were discussed at project level, in safety panels and in hazard working groups. The Review heard from senior members of the DE&S project team that they became frustrated that the Dstl advisers were being overly perfectionist in their advice on hazards. They told the Review that Dstl seemed to believe that they held a *“red card”*, but that their role was advisory only. The Project Manager said that Dstl *“give the information, then it’s down to myself as the [Senior Safety Responsible] to take that on balance with other opinions and determine the way forward.”* The contemporaneous documents reflect this view: in a report to DLE in November 2019, the Project Manager stated that there were concerns within the project team that, in relation to hazards, the *“approach and demands of SMEs [Subject Matter Experts: a reference to Dstl] is frustrating the process”* and that a further hazards review would be held *“being clear on what the SME role is and supporting the Safety Managers to reach resolution.”*

6.4.2.9. Eventually, the Part 2 Safety Case for the Capability Drop 1 ARES vehicle was signed by GDLS-UK and the DE&S Senior Safety Responsible on 4 December 2019. The Part 2 Safety Case was by this time 13 months behind schedule, and on its 20th iteration.

6.4.2.10. The Senior Safety Responsible, together with safety and technical experts in the DE&S project team, considered that GDLS-UK had not provided sufficient evidence to support a *“Safe by Design”* statement which a Part 2 Safety Case should ordinarily contain. Nevertheless, they believed that limitations of use and other procedural controls were sufficient to ensure that the vehicle could be used safely. The approach adopted was explained in the signed Part 2 Safety Case as follows:

"GDLS-UK are currently delivering to the user a Drop 1 AJAX capability. The ARES CD1 system is not yet fully evidenced as Safe by Design, in particular there are 22 hazards associated with limitations of use . . . where further evidence is required. There is a programme of work ... to provide this evidence and in the meantime, Limitations of Use are advised to the user to ensure the system is Safe to Operate."

6.4.2.11. The Dstl quarterly report dated 9 January 2020 records that Dstl did not support this limited acceptance of the Safety Case *"due to the lack of technical assurance and underpinning supporting evidence. This was acknowledged by the [DE&S project team]"*. Members of the Capability Safety team continued to be concerned about the approach taken but the Review has not seen evidence that they opposed signing the Part 2 Safety Case. The Review notes in this respect that their role was to advise the Army, which was not a signatory to the Part 2 Safety Case.

6.4.2.12. In the Part 2 Safety Case, one of the hazards that was associated with limitations of use was *"Excessive noise"*. The *"Probable Scenario"* was described as *"During normal use of the platform the user may be exposed to noise which exceeds the MEL"* [HSE Maximum Exposure Limits]. The *"Accident Scenario"* was described as *"Hearing Loss – Repeated or prolonged exposure to noise levels above the MEL"*. Reference was made to the *"Noise exposure calculator"* provided by GDLS-UK which could be used by *"the Duty Holder to set exposure limits which ensure the users remains within the legal limits."* Another hazard identified was vibration. The carriage of ordnance, munitions and explosives was prohibited due to lack of shock and vibration testing. In addition, a probable scenario was described as *"During normal use of the platform users may be exposed to hand/arm or whole body vibration [which] exceeds the HSE Maximum Exposure Levels"*. The accident scenario was described as *"nausea/vomiting/hand-arm vibration syndrome"*. Under *"mitigation"* reference was made to a vibration calculator provided by GDLS-UK which could be used *"by the Duty Holder to set exposure limits which ensure the users remain within the legal limits."*

6.4.2.13. Dstl had expressed concern about vibration in their quarterly reports since 2014. The issue was identified as: *"A potentially serious issue has emerged with respect to the credibility of the intended vibration testing for the variants."* Dstl commented that: *"There are significant question[s] over the ability of the fleet to meet vibration legislative requirements"*. In March 2019, they questioned the validity of the vibration data gathered to date. As at September 2019, Dstl were reporting that *"GDLS UK have proposed a vibration calculator to DE&S. This has been accepted but Dstl are of the opinion that it is not fully validated"*. Dstl also reported that the *"Initial analysis of the noise data from the recent [Detailed Trials Reports] suggest[s] that noise reduction headgear WILL be required if the AJAX fleet is to meet the legislation."*

6.4.2.14. The Senior Safety Responsible who signed off the Part 2 Safety Case for DE&S told the Review that the consensus view amongst the DE&S project team was that, as this was a Capability Drop 1 vehicle which was never intended to be deployed, it was reasonable and safe to proceed incrementally, with procedural controls which could gradually be eased over time. They took into account the fact that vehicles would be used initially by ATDU personnel – who one witness described to the Review as “*expert triallists*” and likened to test pilots – solely for trials and, once in service, by the Household Cavalry Unit for training purposes only. They believed that, in this context, the controls put in place were more than sufficient to mitigate hazards.

6.4.2.15. The Review found that the difficulties and delays associated with signing the Part 2 Safety Case were reported by the project team in late 2019 up to DLE within DE&S, and (in general terms) by the Programme Director to the SRO. Some detail of the specific technical difficulties was reported, but not all. In particular, reports to DLE and the SRO sent at the time did not refer to the concern about noise and vibration, nor Dstl’s specific concern about reliance on the noise and vibration calculators. The brief prepared by the Capability Safety Team in September 2019 for the Land Equipment Safety Officer was not escalated to DCap.

6.4.2.16. The final approach taken in the Part 2 Safety Case (that the vehicle was not evidenced to be Safe by Design but was Safe to Operate with appropriate controls) was, however, escalated and understood by the leadership in DE&S, and by the SRO and Army chain of command. The SRO provided the Chief of the General Staff with a written brief on 17 February 2020 explaining the approach taken. Delays caused by the Safety Case, but not the particular concerns with it, were also reported to the Centre in the PMRS reports in 2019 (which stated that production of acceptable Safety Cases was delaying early vehicles.)

6.4.2.17. Separately, “*Failure to deliver Ajax to the requirement (Off target)*” was also identified as a risk in PMRS reports from 2018 to April 2020. The context provided was “*The programme has a combined demonstration and manufacture phase meaning that AJAX capability has not been proved by trials prior to manufacture.*” Eight uncertainties were listed, including “*GD UK’s ability to deliver a platform that meets noise and vibration legislative requirements*”. No particular prominence was given to this risk, however, which was only one of many identified.

6.4.2.18. At the same time as the Part 2 Safety Case was signed, the first two ARES vehicles were delivered to the ATDU to begin Entry Qualification Trials (“EQT”), the early stage of Reliability Growth Trials (“RGT”). On the first days of rehearsal battlefield missions in early December 2019, in advance of formal EQT commencing, reports emerged of ATDU crews experiencing problems with vibration

on the vehicle. This issue was not escalated at the time above project team level. This is considered in further detail below.

Box E: Why was the Part 2 Safety Case signed and why were trials allowed to commence using procedural controls?

E1. DE&S had responsibility simultaneously for securing delivery of vehicles and for ensuring that they were Safe by Design. With respect to delivery, the view expressed by many who spoke to the Review was that there was “*a massive pressure to move the programme on*”. The Review was told that the pressure came from the chain of command within the Army and DE&S, from the stage of the programme, the billions of pounds that had already been spent, and the knowledge that soldiers in the Army were waiting to receive the vehicle. The contemporaneous documents record that the Army chain of command was frustrated at the delays in signing the Part 2 Safety Case and was impressing on DE&S the urgency of the need to get it signed. At the same time, the Review was told that all leaders made it clear that safety should never be compromised. This necessarily led to tension.

E2. The Review was told that the difficulty for DE&S in signing the Safety Case resulted from a number of factors. It was told by DE&S personnel that: there were differences of view between DE&S, Dstl and GDLS-UK as to whether the evidence was sufficient; as a result of the contract design, vehicles were being brought into service when the validation and verification process was incomplete; moreover, earlier stages of the design and manufacture process had been treated as complete without (in the view of DE&S project team members) sufficient supporting evidence. The Review was told that the DE&S project team, in 2019, felt that they were presented with a *fait accompli* with respect to the state of the evidence required to support a Safe by Design case, and felt that they were unable to insist that GDLS-UK carry out further trials to support their assertions on safety. The Review was also told by DE&S personnel that they considered that it was difficult to hold GDLS-UK to account over noise and vibration concerns as the contract did not specify particular standards to be met: the contract required compliance with legislation⁴⁸, but this was of general application and not straightforward to apply to military armoured vehicles.

⁴⁸ The Control of Noise at Work Regulations 2005, and the Control of Vibration at Work Regulations 2005.

E3. The Review makes no findings as to whether there were, in fact, deficiencies in evidence needed to support the Safe by Design statement, or whether the vehicle complied with legislative requirements, but it accepts that the DE&S project team found itself in a difficult position given the factors set out above; it also considers that pressure of time played an important part in the team considering that it had to sign a Part 2 Safety Case where, on their own analysis, and in the view of their expert advisers Dstl, there was insufficient evidence to show that it was Safe by Design.

E4. At this stage, noise and vibration were just two of the hazards about which Dstl advisers were expressing concern.

6.4.3. Payments

6.4.3.1. From a financial perspective, the Recast Agreement provided significant protection for the MOD. DE&S explained to the Review that payments against the contract price were to be made upon completion of tasks and milestones specified in an annex to the contract. Certain milestones were to be designated as 'critical milestones' and, if GDLS-UK failed to deliver a critical milestone within two quarters after the agreed deadline had been missed, they were not entitled to claim payment for any completed milestones (including non-critical milestones) in that quarter. Under the contract, they could still request part payments for work carried out in respect of incomplete milestones. Decisions as to whether to make such payments were at the sole discretion of DE&S and were referred to as 'discretionary payments' in emails and documents provided to the Review.

6.4.3.2. The Review was told that, in the view of DE&S, the conditions for triggering the withhold provision were met in December 2019. The commercial lead within the DE&S project team strongly advocated for withholding payment. On 3 December the Project Manager referred the issue up to DLE and CoM(L) for a decision, advising that he believed that withholding payment "*would be detrimental to progress on the project.*" It was decided that, in the interests of being collaborative and keeping the project moving, a discretionary part payment of around 42% of what GDLS-UK had requested should be made for completed work.

6.4.3.3. As discussed further below [see [6.5.6](#)], these discretionary payments continued throughout 2020 and became a source of increasing frustration within the DE&S project team and the Army programme team.

6.5. 2020: Prioritising time over performance

6.5.1. January to March 2020: Resetting the schedule

6.5.1.1. On 8 January 2020, the DE&S Project Manager produced a written brief which he sent directly to the SRO and DLE. The brief stated that: GDLS-UK had failed to deliver, in full, eight of 11 critical milestones due between March and December 2019; delivery had fallen significantly behind schedule (under the contract, 27 vehicles should have been received by the end of 2019, but none had been delivered); an Integrated Baseline Review conducted by DE&S in December 2019 listed problems with the way it considered that GDLS-UK was managing its schedule, leading to the conclusion that GDLS-UK's Integrated Project Schedule "*is therefore neither assured nor credible*".

6.5.1.2. This brief was said by DLE to have "*triggered corporate awareness*" within DE&S that delivery of the equipment project was at significant risk. It is important to note that this period was marked by changes of key personnel: the SRO came into post in April 2019; the DE&S Project Manager came into post in July 2019; CoM(L) came into post in December 2019; and DLE came into post in February 2020 (with a transition in January 2020). The previous CoM(L) had actually left his post in August or September 2019 and an acting CoM(L) had covered the intervening three or four months.

6.5.1.3. The brief was discussed at the Programme Board on 13 January 2020. The SRO wrote formally the following day to CoM(L) to ask whether IOC was at risk. On 15 January, CoM(L) briefed the Executive Committee of the Army Board that "*whilst a hard line was being taken, the ability of General Dynamics to deliver was limited;*" that he was concerned that GDLS-UK "*had entered a pattern of overpromising and failure to deliver;*" and that "*it was possible that the UK was not receiving the level of attention that was needed from the US side of General Dynamics.*" He agreed with the observation that engagement with General Dynamics "*at the correct level*" – including CEO GD Corporation – was important.

6.5.1.4. A meeting between the SRO, the incoming DLE and GDLS-UK took place on 21 January 2020. This was the first engagement the new DLE had with the equipment project. As a result of this

meeting, DLE took the view that a milestone for delivery of vehicles in February 2020 agreed in the Command Acquisition Support Plan was likely to be missed. The Command Acquisition Support Plan is an agreement between DE&S and the Army to deliver capability and provide in-service support to allow operation of equipment; the Annexes to the Plan provide a breakdown of what and when capability will be delivered and how it will be funded. The Review found that, in general, the Command Acquisition Support Plan and the associated Customer Review process – which covered all Army capabilities and support being delivered by DE&S – was not sufficiently detailed to be of real assistance in holding DE&S to account with respect to the Armoured Cavalry Programme equipment schedule [see [7.7.1.2](#) below].

6.5.1.5. CEO DE&S was briefed on 28 January 2020; he wrote to the CEO GD Corporation on 31 January 2020 raising concerns about the Armoured Cavalry Programme equipment project; and produced a report for the DE&S Board (which sat on 27 February 2020) alerting them to the missed milestones and what he regarded as the lack of a credible plan for rectification. CEO GD Corporation replied on 12 February 2020, acknowledging that General Dynamics had *“failed to successfully meet all of our commitments”* and offered *“a redoubled effort to set things right”*. On 13 February CoM(L) spoke to DCGS about the Armoured Cavalry Programme equipment project. He stated that he could see *“green shoots of optimism”* and his instinct was to retain the current IOC, albeit with a *“lightly adjusted definition”*. CoM(L) explained to the Review that this was before the COVID-19 pandemic had started, and before difficulties with noise and vibration were known. His optimism arose because he believed a process had begun which would help to reset the relationship with GDLS-UK. DCGS was happy to accept that recommendation and stated that the Chief of the General Staff would also be content.

6.5.1.6. At the instigation of CoM(L), a 3* meeting was set up with GDLS-UK and GDLS for 18 February 2020 to discuss the schedule and determine if a credible plan to IOC could be established. On that day, GDLS-UK presented a plan to CoM(L) which gave an account of the equipment project to date and sought to reassure DE&S that IOC could be met, suggesting that vehicle deliveries were being held up by the Acceptance and Testing Team drawn from the ATDU. Slides presented at the meeting stated that *“GD has presented an ambitious schedule to deliver IOC that reflects a paradigm shift in performance and joint working”*.

6.5.1.7. CoM(L) told the Review that he believed that he had sorted out communications and reset the relationship with GDLS-UK, and his sense was that the new plan would ultimately be successful. The outcome was that the SRO wrote formally to DCGS on 25 February 2020 recommending that the IOC date be kept, with the definition adjusted. DCGS agreed. The SRO separately sought assurance from DLE the following day that the schedule was indeed *“deliverable”*. DLE stated that it would

require risk to be tackled and additional resource allocated, but it was something he could present as “*deliverable*”. The SRO accepted DLE’s view on the basis that DLE was the appropriate expert who had access to the relevant information; the SRO did not seek and was not provided with further evidence or information in support.

6.5.1.8. On 28 February 2020, the SRO and the VDM Team Leader attended a DMPP Sponsor Group review meeting, chaired by the Director General Finance. The Review was told that the SRO had contacted the DMPP team soon after receiving the 8 January brief to request a Sponsor Group meeting, and this was the first available date. The Sponsor Group’s role was to provide both support and challenge to major projects and programmes. The meeting was to prove an important turning point for the programme. The SRO’s intention had been to inform the DMPP Sponsor Group that the proposal was to deliver IOC on the original date (July 2020), with a further adjusted definition, which excluded the turreted AJAX vehicle. The SRO attended the meeting together with the DE&S VDM Team Leader. At the meeting, the SRO told the Sponsor Group that he thought the programme “*was just about there*”. On probing by the Director General Finance and by the Deputy Chief of the Defence Staff for Military Capability, however, the Sponsor Group was not reassured that the SRO had evidence to support that view; that was compounded when the VDM Team Leader agreed that there was no current, risk adjusted schedule jointly agreed with GDLS-UK. The Director General Finance took the view that neither the original nor the Recast definition of IOC could be met by July 2020. The Deputy Chief of the Defence Staff for Military Capability asked when the SRO knew that the programme was slipping. The SRO said that he was first alerted to problems in late 2019; the VDM Team Leader said that he was aware of possible issues in spring/summer 2019.

6.5.1.9. The outcome of the meeting was that DE&S were tasked to produce a risk adjusted schedule, and the SRO was required to submit a Review Note within two weeks. Capacity of the SRO was to be monitored. Up to this point, the SRO had been responsible for three major programmes, in addition to his substantive role as DSp. Following the meeting, his responsibility was reduced to two major programmes in addition to his role as DSp.

6.5.1.10. Both the SRO and the DE&S VDM Team Leader told the Review independently that the meeting of the DMPP Sponsor Group was a difficult one. It prompted the SRO to realise that the equipment project was in a much poorer state than he had previously understood, and the Department to realise that he required greater capacity. The reduction in his portfolio enabled the SRO to allocate more time and greater scrutiny to the programme going forward. It also prompted what was to prove a major exercise by DE&S over the next year, namely an attempt to produce a credible risk adjusted schedule to IOC and to FOC. Work on the schedule to IOC was not completed until August 2020, and work on the schedule to FOC was still on-going in early summer 2021.

6.5.1.11. Subsequently, the Director General Finance wrote to DCGS on 5 March 2020, emphasising that she understood the challenges of delivering such an ambitious programme of work, but that *“timely and transparent programme performance is essential, particularly when it seems likely that a major milestone such as IOC is under significant pressure. Even though the Review meetings aim to identify and clarify such possibilities, to learn that a delay is now a distinct possibility was still quite surprising.”*

Box F: Why were problems with equipment delivery not appreciated and escalated to the DMPP Sponsor Group or Investment Approvals Committee before February 2020?

F1. In summary, the SRO had not fully appreciated the problems with equipment delivery until early 2020 when he was briefed on the missed milestones by the DE&S Project Manager. Until that point, the SRO had relied on assurances provided by the outgoing DLE that the programme was *“challenging”* but IOC remained *“achievable”*, preferring this judgment to that expressed by his own Programme Director [see [7.8.9.4](#)]. The judgment made by the outgoing DLE was more optimistic than the views being expressed to him by members of the DE&S project team. The SRO was unaware of the DE&S project team’s concerns as, at that stage, they were not raising them at Programme Board meetings.

DE&S

F2. It was apparent to the Review that the DE&S project team members who were working day to day on the project took the view from shortly after Recast in early 2019 that there were significant problems with schedule delay and that they were not effectively holding GDLS-UK to account. At the DMPP Sponsor Group meeting on 28 February 2020, the SRO and VDM Team Leader were asked when they were first aware of problems with the schedule. The VDM Team Leader alluded to DE&S being aware of *“possible issues”* with the programme slipping in spring/summer 2019. It was not until early 2020, however, that the SRO was formally briefed by DE&S on missed milestones, and the CEO DE&S was not aware that there were significant problems with meeting the schedule until early 2020.

F3. The Review considers that this non-alignment in sharing information was due in part to the fact that there was an almost complete change of team leadership and senior leadership within DE&S post-Recast. A new VDM Team Leader was engaged in January 2019. In July 2019, a new Project Manager took over. The Review heard that the previous Project Manager had been highly regarded: he had extensive experience and a thorough understanding of the project and his departure resulted in a loss of expertise at a critical time. In late September 2019, a new Demonstration Phase Project Manager was appointed; he was highly experienced but new to the project. All expressed the view that it took time to understand the project, and handovers were perfunctory.

F4. Equally, a new CoM(L) was appointed from December 2019, and a new DLE took up the role in January/February 2020. Their roles included supervision of multiple projects [see [5.3.2.3](#) and [5.3.2.4](#)]. Although DLE received limited handover on the Ajax equipment project specifically, CoM(L) received no handover in relation to any of the programmes within his portfolio.

F5. The Review found that the VDM Team Leader who had been engaged in January 2019 inherited an exceptionally complex project which, although it had only just been reset following Recast, was already in difficulties on multiple fronts. The scale of the task was overwhelming, and the Review does not underestimate the difficulty of that task.

F6. The VDM Team Leader also considered that his task was to deliver on the Recast schedule, and that this could (or should) not be adjusted. That approach was understandable. The Recast process had taken 15 months, it had just been agreed before he came into post, and the contract was only finally amended to reflect that agreement in May 2019. The Review considers that it would have been exceptionally difficult for any incoming VDM Team Leader to go to DE&S leadership or the SRO and suggest, only a matter of months later, that the project was significantly adrift and required a further reset.

F7. The VDM Team Leader told the Review that, in 2019, DLE had attended 2* meetings at which the month-on-month delays should have been obvious and that there were also 3* meetings every three months where delays should also have been evident. The Review found that the VDM Team Leader did take some steps to escalate concerns beyond DLE. The Review saw an email from the VDM

Team Leader to DLE in September 2019 highlighting some risks and asking whether the CEO DE&S should be briefed. The response of DLE at that time was that CoM(L) was briefed, and it was not necessary at that stage to elevate to the CEO DE&S. The VDM Team Leader told the Review that his impression was that DLE in 2019 was not overly interested in the detail of things and that, with hindsight, he regretted not going directly to the CEO DE&S. The DLE incumbent in 2019 declined to speak to the Review. The Review is, therefore, not able to draw firm conclusions as to why he did not appreciate that the project was in significant difficulty in 2019, nor why he felt able to reassure the SRO on delivery prospects in the way that he did.

F8. From the correspondence that the Review has seen, it is possible that DLE's attention in 2019 had been taken up with one of the other major projects that he was overseeing – the Boxer equipment project (under the Mechanised Infantry Programme) – and that he was less focussed on the detail of the Armoured Cavalry Programme equipment project. DLE may also have been somewhat complacent about the scheduling difficulties, telling the VDM Team Leader in an email dated 13 September 2019 that *“people should not panic”* and that the state of the programme was *“normal stuff in a hairy scary project”*. This is also reflected in an email that DLE sent to the CEO DE&S on 25 November 2019, in which he disagreed with the latter's description that the programme was *“struggling”*. DLE preferred to say that it was *“Challenging”* and *“frustrating . . . which is probably par for the course at this stage of a complex acquisition”*.

F9. The more optimistic description of the state of the programme by DLE in 2019 was mirrored by the judgment made by the new DE&S senior leadership who took over in December 2019 and early 2020, who considered that the schedule could be met, even when they had been clearly informed of the programme's failings. The Review notes that in early 2020, when briefed by the Project Manager on missed milestones, the senior leadership in DE&S took a more optimistic view of the deliverability of IOC than those in the DE&S project team.

F10. Generally, the Review found that project team members involved in the day-to-day delivery of the equipment project, in particular those who had been in post for some time, were markedly more pessimistic about the prospects of successful delivery than those in leadership positions. For example, the

Demonstration Phase Project Manager told the Review that by January 2020 he had taken the view, based not on detailed analysis of the schedule but his observations of progress (in his view, GDLS-UK had only demonstrated 15% of the overall requirement and there were 1,200 requirements) combined with his long experience in similar projects, that not only could IOC not be delivered to time, but that the whole project was likely to miss the 2025 FOC date by some years. He felt that 2030 was more realistic, although “*deterministically, if everything went perfectly, you might be able to get it by 2027.*”

F11. By contrast, the incoming CoM(L) in December 2019 took the view that much could be put down to previous management failings, and that with senior management input on both the DE&S and GDLS-UK sides, the project could be turned around and delivery could be assured. The Review considers that that confidence was misplaced. More detailed and open engagement with the project team would have led to a deeper understanding of the problems with the project, which in turn could have led to a more realistic assessment of the prospects of turning it around.

F12. A constant feature of the evidence seen by the Review is that those working at lower levels of the project had a better insight into the real difficulties with the programme and their voices and views were not sufficiently appreciated [see [7.8.5](#) and [7.8.6](#)].

SRO

F13. The Programme Director’s judgment on deliverability, expressed to the SRO in July and September 2019, was based on discussions with members of the DE&S project team, observing meetings with GDLS-UK, and his experience of the history of delay in the equipment project. He was assisted in this respect by his long experience and knowledge of the programme: he had taken up post in 2016. He did not, however, have the detailed information held by DE&S on the schedule.

F14. The Programme Director passed on his concerns to the SRO. The Programme Director informed the Review that the SRO explained to him some time later that “*I’ve been hearing you, but I haven’t been listening*”. In saying this, the SRO was acknowledging that he had not previously appreciated concerns

that had subsequently proved to be well-founded. There are a number of factors that may explain this.

F15. First, the SRO was relatively newly appointed (he took up the role in April 2019). The SRO told the Review that it took him “*nine to 12 months*” to understand the programme sufficiently to “*feel instinctive*” about it.

F16. Second, the SRO had limited capacity, given his multiple other responsibilities: the Review was told that during this period he was focused on the Mechanised Infantry Programme (Boxer), one of two other major programmes (besides Armoured Cavalry) for which he was the SRO. The Review was told that it was difficult for the Programme Director to get sufficient time into the SRO's diary to enable him to look in more detail at the Armoured Cavalry Programme.

F17. Third, the SRO did not ask for more detailed information on the schedule from the Programme Director or DE&S. It was the responsibility of DE&S to ensure the vehicles were delivered on time and to the required standard. The SRO sought, and accepted, the assurances of the DE&S leadership (provided by the outgoing DLE) on deliverability. If the SRO had instead been provided with, or asked for, more detailed information on the schedule from DE&S leadership, it is possible that this would have prompted a more thorough review of the schedule in the summer of 2019 (as eventually happened following the DMPP Sponsor Group meeting in February 2020). Such a review would be likely to have led to an appreciation that the Programme Director's judgment on deliverability was more realistic than that of the DE&S leadership.

F18. Fourth, the SRO assumed that the date for IOC should be treated as fixed, and difficulties with meeting the schedule could be dealt with by adjusting the definition. A lack of clarity had been introduced into the definition of IOC when the Army agreed following Recast to “*accept risk against definition*”. The Investment Approvals Committee had at that point accepted this change to the definition by way of an Information Note (rather than a formal adjustment of approval through a Review Note). As a result, in early 2020, the SRO believed that the definition of IOC could be further adjusted, including by lowering the number of vehicles to be delivered and their capability, without seeking formal reapproval from the Investment Approvals Committee. The SRO sought and obtained the agreement of the Army chain of command to a lowering of the

definition, and thought that this would be sufficient for the Investment Approvals Committee. In fact, the Investment Approvals Committee, in February 2020, took a different view on the need for reapproval.

Box G: Responding to concerns: training

G1. The Review has been asked to consider whether “*senior personnel are given appropriate training on acting upon the information received*”⁴⁹. As a result, the Review invited all those at 1* and above who had been interviewed to submit written responses to three questions:

(1) Have you received any guidance or training about what action to take when someone notifies you of a programme-related risk/issue/problem, whether they inform you that they are unable to resolve the risk/issue/problem at their level or otherwise?

(2) If so, please can you describe the guidance or training that you received, and when you read that guidance or attended the training?

(3) How does this compare with any guidance or training that you may have received about what action to take when notified of a risk/issue/problem in other contexts (e.g. relating to operations or policy)?

G2. Several of those who responded stated that they had not received any specific training, and that judgments around escalating issues were based on their years of experience. This is consistent with the position set out in the Army’s risk policy, which advises that for most people there will be no requirement to receive training on managing (and escalating) risks beyond what is provided as part of career courses: “*Baseline risk management training is provided on career courses as detailed at Annex A, and most Army personnel require no additional training.*”⁵⁰

G3. However, a number of responses – including those from the current SRO and his two predecessors, from DCap, from the Head of Capability Ground Manoeuvre, and from two successive VDM Team Leaders – stated that Module

⁴⁹ Terms of Reference, at paragraph 3.

⁵⁰ “Army Command Standing Order No.1109: Army Risk Policy,” August 2019, at p.5.

2 of the Major Projects Leadership Academy, which was commissioned by the Infrastructure and Projects Authority and is delivered by the University of Oxford's Saïd Business School, covers risk management in detail.⁵¹ Several of them also stated that they had covered risk management as part of other acquisition or project/programme management courses earlier in their careers.

G4. The Review considers that the training received by 1* and 2* personnel is probably not sufficient to ensure that risks and issues are appropriately escalated. As explained elsewhere [see [7.8.10](#)], issues around noise and vibration were not escalated by those at 1* level, when they ought to have been; and issues concerning the programmatic challenges were not escalated by some of those at 1* and 2* levels.

6.5.2. December 2019 to March 2020: Vehicle trials

6.5.2.1. Two ARES Capability Drop 1 vehicles were delivered to the ATDU in preparation for the commencement of EQT, the first stage of RGT. On initial use in December 2019 (rehearsal battlefield missions) the ATDU reported that, using the vibration calculator supplied by GDLS-UK (essentially, a spreadsheet used to calculate vibration and noise exposure levels), they considered that vibration action limit values for crew were being exceeded. Crews also reported experiencing symptoms of excessive vibration.

6.5.2.2. As the vehicle trials were being run as part of the equipment project, the Commanding Officer ATDU liaised as to their conduct with members of the DE&S project team and Army programme team.

Box H: The Duty Holding construct

H1. The Defence Policy for Health, Safety and Environmental Protection *“requires the appointment of Duty Holders where it has been assessed that there is credible and reasonably foreseeable Risk to Life (RtL) from a Defence activity. Where appointed, a MOD Duty Holder is accountable for mitigating the RtL to*

⁵¹ Infrastructure and Projects Authority, “Major Projects Leadership Academy: MPLA Handbook,” February 2015, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/850739/MP_LA_Handbook_for_IPA_Website_2_.pdf

ALARP and to a level that is tolerable for those involved in the activity and anyone affected by it.”⁵²

H2. The “*fundamental elements*” of the MOD’s Duty Holding construct are: that there are three levels of Duty Holder (DDH, ODH, and Senior Duty Holder); that where a Duty Holder is unable to mitigate the risk to a level that is ALARP and tolerable, the risk is elevated to the next level; and that the Senior Duty Holder can elevate risks to the Secretary of State.⁵³ The Duty Holding construct is separate and distinct from the chain of command.

H3. For the purposes of the trials being conducted on the vehicles by the ATDU, the Commanding Officer ATDU, a Lieutenant Colonel, was the DDH, and DCap, a 2* Major General, was the ODH.

6.5.2.3. The Commanding Officer ATDU raised concerns about vibration on the ARES Capability Drop 1 vehicles with the DE&S project team, the Capability Safety team, and the Army programme team. Between 3 December 2019 and 8 January 2020 there were a series of email messages exchanged between the various team members. The language in the Commanding Officer ATDU’s email of 4 December 2019 was particularly striking: “*I think we must push an engineering solution rapidly. We cannot be in the business of a Chernobyl style approach of known hazard exposure and then medical checks. That is not a proactive or defensible position in 2020.*”

6.5.2.4. The DE&S project team also raised the issue with counterparts in GDLS-UK. GDLS-UK did not accept that vibration levels exceeded legal levels on the platform. Faced with that difference of view, it was eventually agreed between the MOD teams that GDLS-UK would instrument the vehicles to capture data and, in the meantime, the trials would continue with procedural controls. The DE&S project team acknowledged that there may need to be a longer-term engineering solution for any vibration or noise problems, but, as the Senior Requirements Manager (an Army role embedded with DE&S) stated: “*The issue of an engineering resolution is a longer term piece of work, that will be informed by the data and reports emerging from RGT.*”

6.5.2.5. Dstl and Capability Safety team members remained concerned about the approach being taken both to noise and vibration issues, and to other safety issues with the vehicle. As explained

⁵² See DSA01.1, at p.11.

⁵³ Ibid.

above, they had raised their concerns about GDLS-UK's noise and vibration calculator before the Part 2 Safety Case was signed in December 2019 and recorded those concerns in their reports to DE&S. On 27 January 2020, prompted by the experiences of the ATDU trials crews, Dstl wrote a formal letter to DE&S project team engineers to warn that, in their view, the GDLS-UK noise and vibration calculator for the ARES vehicle was based on inadequate trials data. They warned "*There is therefore a risk that the GDLS-UK noise and vibration calculators will underestimate the actual levels of noise and vibration; hence UK Armed Forces personnel could be exposed to excessive levels of both during RGTs.*" GDLS-UK have told the Review that these criticisms were based on an incorrect understanding that certain data had not been collected as part of the trials; and that Detailed Test Reports were subsequently up-issued to MOD to address what they regarded as the misplaced concerns of Dstl.

6.5.2.6. There followed a series of communications and meetings in January and February 2020, involving, variously, team members from DE&S, Dstl, the Capability Safety team, the Capability Directorate, and the Programme Office. Meetings were also held with a representative from the Health and Safety Executive. The Commanding Officer ATDU expressed particular concern about the safety of the trials. In addition to raising his concerns with the DE&S project team and the Army programme team, he raised his concerns with the Assistant Head Ground Manoeuvre and Head of Capability Ground Manoeuvre. He did not raise them directly through the Duty Holding construct to the 2* ODH, DCap.

6.5.2.7. The language in the Commanding Officer ATDU's 12 February 2020 email bears a striking similarity to that used in his 4 December 2019 email, indicating that the communications and meetings during the intervening period had not addressed his fundamental concern:

"I worry this is a 'Chernobyl roof' approach to reducing risk of injury and exposure to a hazard with minimal knowledge, understanding or assessment and using time of exposure as the principal mitigation strategy. . . .

As a Duty Holder I am being forced, in the plan as it stands, to undertake an activity where the hazard is unquantified, the impact is not well known, cannot be monitored and there are no thresholds to mandate what is 'too much' exposure."

6.5.2.8. In an email to the Capability Safety team on 13 February, the Land Equipment Safety Officer agreed with their assessment that the Commanding Officer ATDU had articulated well the safety concerns that they and others had been raising, and advised that "*Our focus should now be to reaffirm this further and instruct that the compliance of both policy and legislation is gained through*

the generation of validated evidence.” The Review heard from members of the DE&S project team that the evidence of noise and vibration issues was only anecdotal; that they needed validated evidence to ascertain whether the noise and vibration levels were excessive and to present to GDLS-UK; and that they needed to conduct the EQT in order to obtain this evidence.

6.5.2.9. At a meeting on 25 February 2020, the Commanding Officer ATDU was reassured by safety and engineering experts in the DE&S project team that it was safe to continue with the trials using procedural controls and with instrumentation of the vehicles. Slides for that meeting refer to the concern that the data used to inform the noise and vibration calculator were not verified. The slides record in response that *“GD’s calculator has been developed on two years’ worth of accumulated data, using recordings from instrumentation to measure vibration in the various crew positions”* and noted that GDLS-UK had committed to measure vibration during trials using instrumentation that they would instal on the two ARES vehicles. The Commanding Officer ATDU was presented with a detailed draft Safety Advice Letter setting out controls on the way the EQT would be conducted. On 26 February 2020 he confirmed he was content stating that: *“We’ve reviewed the draft [Safety Advice Letter] for EQT training and have no concerns.”* The final Safety Advice Letter, which outlined the principal hazards identified in the trials Safety Case (which was separate from the tripartite Safety Case structure described above [see Box A after [6.3.2.6](#)], as the trials vehicles had not been accepted into Army ownership) and how these were to be mitigated, was issued on 6 March 2020. It stated that suitable hearing protection was needed to prevent personnel from exceeding *“the Exposure Limit Value”*, and that ATDU was to conduct a risk assessment on the noise and vibration exposure to crews during EQT and introduce controls to reduce the risk to ALARP.

6.5.2.10. EQT trials began on 9 March 2020, subject to procedural controls but without instrumentation. They were then paused just two weeks later, on 23 March 2020, when the first lockdown due to the COVID-19 pandemic was imposed.

6.5.2.11. The Review found that personnel up to Programme Director level in the Army programme team, up to 1* level in the Capability Directorate and the DE&S project team, and up to the Land Equipment Safety Officer in the Capability Safety team, were alert both to the potential problem posed by noise and vibration to the immediate safe conduct of the trials and to the risk that longer-term design and engineering changes to the vehicle could be required. The Review found, however, that at this stage, i.e. March 2020, escalation of the full nature of these concerns stopped at 1* level. The Review considers it likely that some passing conversations were held about vibration in the trials with the SRO, DCap and DLE, but the Review received no evidence that this was raised formally or in writing either for action or information at 2* level or above within the Army or DE&S.

6.5.2.12. DCap visited the ATDU on 4 March 2020. The Commanding Officer ATDU told the Review that he believed he would have raised his concerns about the trials at this meeting but could not be certain; DCap did not recollect the issue being raised. There is no reference to this issue in DCap's notes of the meeting, nor in the exchange of emails between the Commanding Officer ATDU and DCap the following day. The Commanding Officer ATDU had confirmed on 26 February that he was content that the procedures set out in the Safety Advice Letter provided a safe system of work under which to conduct the trials. The Review concludes that it is likely that the Commanding Officer ATDU's concerns were not raised at this point, or at least not in a way that made DCap understand that this was a potentially serious issue.

6.5.3. March 2020 to September 2020: Work on the schedule

6.5.3.1. As explained above, the DMPP Sponsor Group meeting in late February 2020 prompted the SRO to become more closely involved in the detail of the equipment project. On 1 March 2020, he emailed Head Integrate: *"My macro observation is we seem to be finding out too late to be able to make any significant difference. . . . I am increasing[ly] of the view we are not failing fast in these projects and there are indicators that we should be responding to. Equally we seem incapable of winning fast either. The challenge is how do we get upstream of these issues. . . . I am left with an overwhelming sense something needs to alter. Have a think about what we might be doing differently."*

6.5.3.2. On 11 March 2020, the SRO wrote to the CEO DE&S seeking his personal support in assuring a revised equipment delivery schedule required to inform a Review Note resetting the programme. CEO DE&S replied stating that he had already engaged with CEO GD Corporation and CoM(L) had engaged at 3* level with GDLS.

6.5.3.3. There followed a period of intense work on the schedule at DE&S. This coincided with lockdowns due to the COVID-19 pandemic. The Review acknowledges the difficult circumstances in which everyone involved in the programme was working as a result.

6.5.3.4. DLE became closely involved with monitoring the schedule (breaking down previous milestones into 'inch pebbles' to track progress). CoM(L) led review meetings with GDLS and GDLS-UK (known as "3* reviews"). CEO DE&S engaged further with the CEO GD Corporation. A new VDM Team Leader was appointed from April 2020 and a new appointee to the project team was tasked with assuring a new risk adjusted schedule.

6.5.3.5. An Information Note was submitted to the Investment Approvals Committee by the SRO on 28 April 2020, confirming that the IOC date of 31 July 2020 would be missed, and proposing an In-

Service Date of 13 non-turreted vehicles (ARES and other variants), with IOC declared subsequently to include the remaining 12 turreted (AJAX) vehicles. As the schedule was not yet assured, dates were promised in a Review Note no later than 31 August 2020, noting that timings might be impacted by the COVID-19 pandemic. A draft Accounting Officer Assessment was prepared and submitted to the Permanent Secretary on 19 May 2020 in similar terms to the Information Note. A Review Note was not produced until 29 September 2020.

6.5.3.6. 3* review meetings were held with GDLS-UK in March, April and May 2020. The SRO was not invited to these meetings, although the Programme Director did attend them and was able to report back to the SRO. In advance of these meetings, various detailed briefs and materials were prepared by the DE&S project team for the VDM Team Leader, DLE and CoM(L). These set out the DE&S project team's views on failings in the project, including what they regarded as: failures by GDLS-UK to meet and manage the schedule; "*a litany of concerns regarding poor vehicle production build quality*"; failure to deliver adequate contracted deliverables required to accompany the vehicles (Interactive Electronic Technical Publications and End Item Data Packs); significant slippage of verification and validation of requirements (with 93% of the demonstration phase budget spent but only 19% of requirements accepted); and the absence of a thought-out plan for completion of design to Capability Drop 3 (the K45 Critical Milestone), which meant that there was no proper assessment of the likelihood of meeting that key milestone, which was critical to meet deployment plans for 2023 and 2025 and to meet FOC. A number of specific technical issues were also raised. The alleged failings by GDLS-UK raised by the DE&S project team were disputed by GDLS-UK.

6.5.3.7. By 20 April 2020 the Programme Director was reporting to the SRO that out of 116 deliverables due by 10 April 2020, 71 were "*off track*" (with 30 reported as "*late*" and 41 "*overdue*"). Concerns remained about the verification and validation progress and quality. On 15 May 2020, the Defence Quality Assurance Field Force escalated its concerns that GDLS-UK was failing to deliver contracted deliverables to "*amber alert*".

6.5.3.8. During the summer, DE&S continued to work on producing a new risk adjusted schedule and on delivery of vehicles and supporting artefacts required for IOC. There were no 3* review meetings held in July or August 2020. The next 3* review meeting took place on 8 September 2020. The Record of Decisions for that meeting indicates that the focus remained on getting to IOC: there is a record that CoM(L)'s intent was to drive for a limited Capability Drop 1 live crew clearance (which was on the critical path to accepting the turreted AJAX variant into service, and hence to declaring IOC) as soon as possible, to allow for a declaration of IOC in December 2020.

6.5.3.9. After much work, a risk adjusted schedule produced by the DE&S project team had vehicles ready for IOC in December 2021. Although project team members felt this date was realistic, CEO DE&S and CoM(L) challenged this to be moved to March 2021. CEO DE&S explained that it was part of his job to introduce challenge in order to meet the customer's needs, and to offer support to enable that to happen; keeping to time was hugely important strategically for the Army for operational reasons. On the other hand, project team members told the Review that they felt demoralised by the instruction to bring the schedule for IOC forward, which they believed risked reintroducing unsubstantiated optimism into the schedule, and also meant that the project team was put under immense pressure once again to deliver IOC to a time target. They were also concerned that the project team would be diverted from work on the remainder of the programme to FOC as a result. In the event, further work on the schedule assured delivery of vehicles to meet an IOC date by June 2021 (at 50% probability).

6.5.3.10. During this period the Field Army was kept informed about schedule problems through the Capability Integration Working Group, which was co-chaired by the Programme Director and a representative of the Field Army, the Business Change Manager. The Review heard that this process worked well, and the Field Army felt that it was kept properly informed and up to date about issues which affected it by the Programme Director. The Business Change Manager also liaised with the Household Cavalry Regiment and the Capability Directorate, and the Review heard that there was a good flow of information between them. The Field Army and Household Cavalry Regiment took a pragmatic and adaptable stance in relation to the programme, understanding that delays and constraints on capability could be expected as the programme progressed. In all, the Review did not hear that there were significant problems with information flows or escalation of issues within the other DLODs: the underlying problems, and escalation issues, arose in relation to the equipment project.

Box I: Communications within DE&S and 3* Review meetings

11. The Review heard that the DE&S project team had been raising their concerns about matters such as technical and quality issues, delays, and GDLS-UK behaviours with the DE&S leadership over the years, but in a way which had not been effective as it did not result in the DE&S leadership having a proper appreciation of the state of the equipment project and the deliverability of the schedule: the DE&S project team's communications were ad hoc, largely raised in meetings, slides, emails and conversations, and were frequently not followed up in any systematic way. Project team members were demoralised and felt that GDLS-UK were not being effectively held to account.

12. A new appointee, with an Army background, acting in a project management role within DE&S from March 2020 asked project team members to set out the main issues formally in writing. The model used was 'IRTB': a format of written brief using the headings "*Issues*", "*Recommendation (or Response)*", "*Time*" and "*Background*". The production of such briefs on scheduling and other issues from March 2020 was important in that it enabled more senior leaders in DE&S to understand the issues better, a pre-requisite for further escalation and for holding GDLS-UK effectively to account. (The Review also notes that it was an IRTB brief produced by the existing Project Manager in January 2020 which enabled both the SRO and DE&S leadership properly to appreciate the severity of delays in the schedule [see [6.5.1](#)]).

13. The Review heard that the new DLE worked extremely hard independently and with the project team to understand the issues in detail. Project issues were tracked, actions closed and there was improved communication back to the project team to explain decision-making. The Review was told that the project team valued this new input and approach. The Review considered that better communication of issues by project team members and listening by leadership improved team morale and led to better outcomes in terms of progressing the project.

14. The Review also heard, however, that there continued to be non-alignment between, on the one hand, the DE&S project team and the Army programme team, where key members were by this point working very closely together, and leadership within DE&S at 3* level on the other. There is evidence in the documentation produced for the 3* meetings that CoM(L) took a more optimistic view of progress on the project and the performance of GDLS-UK than the DE&S project team and Army programme team. The Record of Decisions following the 3* review meeting in May 2020 states: "*CoM(L) and [President of GDLS] expressed that the 3* review is progressing well. All parties have achieved a lot and need to continue to resolve those issues and push to deliver for those key milestones approaching.*" CoM(L) told the Review that this referred to the fact that progress was being made in collaborative working and against some milestones. By contrast, a slide produced by the Army programme team for the 3* review meeting in June 2020 set out a history of delays in delivery, highlighted continued delays, and included the bullets: "*Is this project out of control? Have we spiralled to a point that is now unrecoverable? . . . Einstein's definition of*

insanity. What are we going to do differently?" These contrasting views were reflected in the conflicting perceptions of the project at this time, as expressed to the Review by a number of witnesses.

15. The Review considers that whilst the 3* review meetings assisted in bringing more collaborative working between DE&S and GDLS-UK they also had downsides. They required a huge amount of work from the team to brief senior leadership. CoM(L) required all slides for meetings to be agreed in advance between GDLS-UK and the DE&S project team; that was intended to encourage collaborative working and to work towards a "*single version of the truth*" which was considered essential by DE&S leadership if the project was to be put back on track. Team members told the Review that the slides did not accurately reflect their views, and they were not able sufficiently to present their views at the 3* meetings. CoM(L) disputed this, telling the Review that he asked at each meeting whether there were disagreements on the slides and gave ample opportunity to those present to raise issues. The Review was told by a number of different witnesses that, on at least two separate occasions, two individual senior members of the project team felt their voices were not being listened to when they tried to raise concerns. More senior leaders did not recall or did not agree with the description of those incidents.

16. The Review was also told that DE&S team members considered that personnel from GDLS-UK were able to put forward their views on issues at the 2* and 3* levels in a way which got ahead of the team's view. This was described as "*getting into the OODA loop*".⁵⁴ This led to a belief that some senior leadership trusted GDLS-UK more than their own team. Senior leaders did not agree that this was in fact the case, but the perception was damaging to team morale.

6.5.4. June to November 2020: Escalation of safety concerns

6.5.4.1. While the trials were paused in May and June 2020, members of the Dstl team and the Capability Safety team continued to communicate and to express their concern that the vehicle was not proven to be safe, and that this was not being sufficiently addressed. They were very concerned

⁵⁴ The term 'OODA loop' was coined by US Air Force Colonel John Boyd in the 1970s and refers to a planning and decision-making cycle based around Observe – Orient – Decide – Act.

at the prospect that a Part 3 Safety Case stating that the vehicle was Safe to Operate would be signed by the Army and DE&S. Signature of the Part 3 Safety Case would enable the vehicle to be put into service with the Household Cavalry Unit, where it would be used for training purposes by soldiers with different levels of experience. Up until this point, the vehicle had been used only in trials by soldiers with considerable experience of armoured vehicles.

6.5.4.2. At the end of April 2020, Capability Safety team members updated the brief written in September 2019 for the Land Equipment Safety Officer. Once again it highlighted their view that *“there is mounting evidence to support the claim that AJAX (all variants) is NOT DEMONSTRABLY SAFE in the clearest terms possible.”* The brief referred to reports of excessive noise and vibration causing nausea, dizziness, and hand-arm vibration, together with a number of other safety issues and apparent non-compliance with Defence standards and regulations. It raised the concern that the Safety Case relied on training and procedural controls to mitigate risks which, in their view, were unknown because of lack of supporting data and evidence to demonstrate safety. The finalised brief was not sent to the Land Equipment Safety Officer until 13 May 2020.

6.5.4.3. Also in April 2020, because they were concerned about not gaining traction on these issues, Capability Safety team members decided to approach the Land Safety Systems Regulator (“LSSR”). The LSSR is one of four regulators within the Defence Land Safety Regulator, which itself forms part of the Defence Safety Authority. A LSSR team member discussed the matter with them, reviewed documents provided, and wrote a report signed off by the Assistant Team Leader. It was titled *“Serious Safety Concerns with Ajax”*. It described the project as being in crisis, with serious safety issues individually rendering safety risks non-ALARP, and collectively indicating a systemic failure with senior management. Eleven safety issues were listed. Vibration was first on the list. The report referred to vibration symptoms reported to have been experienced by ATDU crews in the trials, stating that this was *“so severe and relentless the crew were debilitated”*. The other substantive safety issues raised (which included concerns about power, system software, electromagnetic compatibility, and configuration control) were very similar to, but expanded on, those raised in the Land Equipment Safety Officer brief. The LSSR report recommended that *“urgent action”* was required and there should be *“an immediate: a. Review with all interested parties to bring this project back on track. To ensure suitable oversight, authority and independence a 1* as chair, b. LSSR or QSEP safety audit, c. Immediate stop to project until results of review and audit known.”*

6.5.4.4. On 6 May 2020 the report was sent to the Deputy (and Acting) Team Leader of the Defence Land Safety Regulator, the Land Equipment Safety Officer, the VDM Team Leader and a senior engineer within DE&S. The VDM Team Leader responded the same day stating: *“you have my attention . . . Safety is a non-negotiable requirement so anyone with concerns must be able to raise*

them and in that regard I very much welcome the attached report and you sending it to me". The VDM Team Leader's response went on to express the view that the concerns in the report needed to be *"better evidenced"* and the apparent lack of engagement with DE&S personnel as part of the information gathering for the report was *"a cause for concern"*. With respect to *"Vibration"*, he asked *"What measurements have been taken to demonstrate/evidence the vibration within the vehicle and how long does it take to reach the exposure limit?"* At this time, DE&S understood that GDLS-UK had completed around 10,000km of track testing without reported injury.

6.5.4.5. The VDM Team Leader informed the SRO and DLE of the report and they were sent a copy. Within 24 hours the Acting Team Leader of the Defence Land Safety Regulator had withdrawn the report. In an email to the VDM Team Leader and others he apologised, saying the report had not been through any quality control procedure, had not been seen by him or more senior members of the Defence Safety Authority, and contained unsubstantiated and insufficient evidence to support the issues raised. He also commented that the DE&S project team had not been given the opportunity to discuss any of the issues before it was released.

6.5.4.6. Subsequently, the VDM Team Leader informed the SRO and DLE that the report had been withdrawn. It is likely, given its quick withdrawal, that neither the SRO nor the DLE read the report. The VDM Team Leader also stated that there would be *"no complacency"* and the issues would be followed up. The report and the Land Equipment Safety Officer brief were followed up with a series of meetings (some conducted remotely as a result of lockdown). These meetings discussed the concerns raised in the report and the brief, and whether the Part 3 Safety Case should be signed. On 14 May 2020, the Land Equipment Safety Officer emailed the Assistant Head Ground Manoeuvre in the Capability Directorate attaching the Land Equipment Safety Officer brief and the LSSR report. He stated that, focusing on noise and vibration as a *"specific area of concern out of a myriad of concerns identified, I am noting an ever-increasing amount of evidence being generated that identifies a non-compliance to the Control of Vibration at Work Act and limited activity to rectify this in the short and long term."* He went on to explain that there was lack of confidence in the noise and vibration calculator, and that whilst the calculator showed personnel operating the vehicles to be within exposure limits, *"we have found personnel exhibiting vibration related illnesses."*

6.5.4.7. On 19 May 2020, the Land Equipment Safety Officer emailed CoM(L)'s Chief of Staff stating that there remained a number of areas of concern leading him to advise DCap and the Head of Capability Ground Manoeuvre (although they told the Review that they do not recall receiving that advice) that it was not sufficiently demonstrated that the Capability Drop 1 ARES platform was Safe to Operate. Compliance with vibration legislative requirements was one of the multiple issues raised by the Land Equipment Safety Officer. On 21 May 2020 there was a meeting involving personnel from

DE&S (including the VDM Team Leader), the Capability Safety team, Dstl, and the Capability Directorate. No formal Record of Decisions or minutes were recorded but an email from a Dstl expert the following day stated that the aim of the meeting was to go through all the current safety concerns including (amongst others) compliance with noise and vibration legislation, and that this discussion was led by the Land Equipment Safety Officer. He advised that it was essential to have in place control measures in addition to health monitoring/surveillance for Capability Drop 1 vehicles, and that further work would be required for Capability Drop 3 vehicles. The Dstl expert stated in the email that she had been asked if the risks would be acceptable for Capability Drop 1 vehicles with suitable controls in place, but had been unable to answer because without reasonable estimate of exposure it was “*difficult to know if the controls would be sufficient*” and she did not have knowledge of what control measures were in place.

6.5.4.8. On 22 May 2020, the SO1 in the Ground Manoeuvre area within the Capability Directorate updated the SRO on the meeting with the Capability Safety team. An email records that he updated the SRO on a list of hazards; vibration is listed as one which would not impact on sign-off for the Part 3 Safety Case, and noise as one requiring further resolution. DLE sent CoM(L) a detailed update on the programme on 26 May 2020 which informed him of the need for a review with the Defence Safety Authority and a hazard review before the Part 3 Safety Case could be signed. On 2 June 2020 a meeting was held between the LSSR Acting Team Leader and the Senior Safety Responsible in the DE&S team.

6.5.4.9. On 3 June 2020 there was a 2* safety meeting attended by the SRO and DLE, together with Head Integrate, and personnel from the DE&S project team, the Army programme team, the Capability Directorate, and the Land Equipment Safety Officer. The agenda for this meeting was twofold: to discuss critical issues requiring resolution to enable delivery of Capability Drop 1 vehicles, and to discuss concerns with Capability Drop 3 vehicles. The first item was broken down into sub-items which included “*Tech Safety concerns: noise, power and electricity, independent safety auditor report, speedo[meter]*”. The Record of Decisions records 12 items being discussed, including limitations of use, investigation into the measurement mechanism for noise and vibration hazards, and timing and duration of noise trials.

6.5.4.10. The Review received conflicting evidence as to whether there was discussion of reports of vibration- and noise-related harms during the conduct of the trials at this meeting. The Land Equipment Safety Officer told the Review that his recollection was that there was discussion of this. Neither the SRO nor DLE recalled the meeting well, but they were sure that harm and injuries in the trials had not been mentioned. Their recollection was that there was a discussion of the approach to mitigating hazards to enable a Part 3 Safety Case to be signed. The Review does not doubt the good

faith of the witnesses in giving their recollections of the meeting. What appears clear to the Review is that the issue of noise and vibration was one of a large number of safety issues and hazards being discussed, and that all of these were being addressed in the context of hazard mitigation for the purposes of progressing to a position where the Part 3 Safety Case could be signed, to enable vehicles to be delivered and enter into service with the Household Cavalry Regiment. The trials at this time were paused due to COVID-19 restrictions. The Review considers it likely that whilst the noise and vibration hazards were discussed, together with the other hazards, there was no discussion of reports of noise- and vibration-related harms and injuries during the early part of the trials.

6.5.4.11. After the meeting of 2 June 2020, the LSSR agreed to follow up their report with a re-issued report. On 8 June 2020, as a result of direction from the Deputy Director General of the Defence Safety Authority, further work was temporarily paused by the LSSR while the issues were discussed by the project team. The LSSR report was not in the event re-issued.

Box J: Withdrawal of the LSSR report

J1. The Review heard from all those directly involved in the issue and withdrawal of the LSSR report. The fact that Dstl and Capability Safety team members felt that they were not being heard by DE&S, and that going to the LSSR was necessary to force attention, demonstrates that the existing processes were not working as they should. The Regulatory team in LSSR took the view that they had a responsibility to protect people and therefore to do what they could to raise the issues. The Report was produced on an ad hoc basis, outside the routine audit process, to get the attention of leadership in DE&S.

J2. The Review was satisfied that the report was withdrawn in good faith because of a genuine concern by the Acting Team Leader of the Defence Land Safety Regulator that a proper process had not been followed and that conclusions had been reached and criticisms made without sufficient evidence. In addition, there was a concern that the report had strayed outside the remit of the LSSR. The Review was also satisfied that the subsequent failure to produce a follow-up report was not because of pressure from leadership in the Army or DE&S, but resulted initially from a misunderstanding within the Defence Safety Authority, and then from a belief by the LSSR that it had achieved its purpose of ensuring that the various parties involved in the Armoured Cavalry Programme were properly communicating about safety concerns.

J3. Nevertheless, the Review also considers that senior personnel in the Defence Safety Authority were influenced to some extent by the fact that the Armoured Cavalry Programme was high profile and politically sensitive, and they were cautious in their response as a result. The intense pressure to maintain momentum in the programme also meant that DE&S and the Army were particularly concerned that the project should not be stopped in order to investigate and, if necessary, implement engineering changes on the Capability Drop 1 vehicles. Such a stop was seen as unrealistic and unnecessary, given that it was not anticipated that the Capability Drop 1 vehicles would be deployed, and it was expected that any engineering changes would be made in advance of signing the Safety Case for the Capability Drop 3 vehicles, which was the first version which was intended to be deployed. DE&S and the Army also genuinely believed that the best way to understand the vehicle and progress any technical issues, given disagreements with GDLS-UK about the nature and even existence of those issues, was to get it into the hands of the Army. That required a Part 3 Safety Case to be signed.

J4. The swift withdrawal of the report also meant that its content was not fully discussed, or its significance appreciated, at 1* and 2* level. The Head of Capability Ground Manoeuvre did not see the LSSR report until after it had been withdrawn. The Assistant Head Ground Manoeuvre who signed the Part 3 Safety Case in July 2020 said that he did not see it before signing (although it had been sent to his predecessor in post on 14 May 2020). Both the SRO and DLE told the Review that they did not recall giving detailed consideration to the LSSR report, because it was immediately withdrawn by the Regulator. In particular, they did not appreciate that vibration reportedly experienced by crews on the trials was a significant issue; this is confirmed by DLE's update to CoM(L) of 26 May 2020 which details a number of the safety concerns raised in the report together with other issues, but does not refer to vibration. The Review has no doubt that the number of hazards and issues being dealt with during this period, and their complexity, obscured the importance of noise and vibration, which was seen as just another issue amongst many.

J5. The fact that the LSSR report was withdrawn and not re-issued also meant that it was not further escalated up the DE&S and Army chains of command, nor to Ministers.

6.5.4.12. EQT trials at ATDU re-started on 22 June 2020 and ended on 7 August 2020. The potential noise and vibration hazard was managed through limitations of use and procedural controls. Notwithstanding this, crews at ATDU reported further concerns with vibration and harms consistent with vibration exposure during June and July 2020. On 13 July 2020, the VDM Team Leader briefed DLE and CoM(L) on the Ajax project ahead of meetings with the CEO DE&S and Executive Committee of the Army Board members. The brief referred, amongst other issues, to an “*emerging issue on trials*” and stated that crews operating ARES vehicles had reported perceived increase in vibration levels at speeds above 40kph on metalled roads, that GDLS-UK had contracted to re-instrument vehicles, and that further investigation was required to determine the root cause.

6.5.4.13. The Part 3 Safety Case was signed by the Assistant Head Ground Manoeuvre in the Capability Directorate on behalf of the Army, and by the VDM Project Manager and Senior Safety Responsible on behalf of DE&S, on 16 July 2020. The Assistant Head Ground Manoeuvre had only been in post since late June or early July 2020, and his predecessor (to whom the Land Equipment Safety Officer brief and withdrawn LSSR report had been sent) was only in post for around three months (March 2020 to June 2020) before being promoted out. The Review considers that this ‘churn’ in the Assistant Head Ground Manoeuvre post at such a critical point meant that he was very reliant on assurances by others that the Part 3 Safety Case would allow the vehicles to be operated safely.

6.5.4.14. The Safety Case stated that some areas of design work were on-going and some Safe by Design claims were not yet fully evidenced or assured. In these cases hazards were dealt with by limitations of use, withholding capabilities, removing systems and by procedural controls. The Review was told that, although the Safety Case was signed on behalf of DCap, he was not briefed in any detail on it and that, given the various assurances that the residual risks were ALARP and tolerable within delegated responsibilities, there was no requirement to do so. The Review was told that DCap would not ordinarily be involved in technical detail, and it was believed that the limitations of use and safety notices were sufficient to ensure that the vehicles would be used safely. Further, although limitations restricted use of the vehicle, the view was taken that the vehicle remained useful for conversion training purposes. Vehicles were delivered to the Household Cavalry Regiment in July 2020. Conversion training began on 21 September 2020 subject to limitations of use and procedural controls, including a speed limitation of 20km/h. The Review was told that no noise- or vibration-related injuries were reported by members of the Household Cavalry Regiment.

6.5.4.15. The Institute of Naval Medicine, who had been tasked by DE&S with the assistance of Dstl, carried out tests on noise and vibration levels in two ARES vehicles used by ATDU on 11 and 13

August 2020. The trials were stopped two thirds of the way through due to concern about injury to crews.

6.5.4.16. A “Quick Look” Report dated 20 August 2020 on crew experience in the tests was produced by DE&S project team members at the request of the Commanding Officer ATDU, in advance of the Institute of Naval Medicine producing its report. The Quick Look Report stated that crews were suffering short-term ear damage after only hours in the vehicle, and that crew suffered vibration related injuries, including “*whole body shaking, spine feeling as though it is coming out of body, feeling as all senses being attacked*”. It also stated that Peltor headsets used by GDLS-UK and adopted by ATDU crews for the purpose of these trials instead of their normal headsets exceeded noise exposure limits “*in minutes*”. Notwithstanding its content, when he sent the report to the VDM Team Leader on 21 August 2020, the author emphasised that no conclusions could be reached pending receipt of the analysed trial data and interpretation by the Institute for Naval Medicine. He commented that there may be an electronic noise issue, a vehicle noise issue, a serious vibration issue at certain speeds, and vibration-related equipment issues. It was agreed that the report should be shared informally with GDLS-UK, and that further action should wait for the results and report from the Institute for Naval Medicine, expected within two weeks. The VDM Team Leader did not escalate the report to 2* level; he told the Review that this was because the report was not written by a subject matter expert, it was provisional, and he wanted first to see the results and report from the Institute for Naval Medicine. Dstl also referred to reports of harms said to have been experienced by crew in the trials conducted by the Institute of Naval Medicine in their monthly report dated 4 September 2020.

6.5.4.17. The preliminary report issued by the Institute of Naval Medicine on 10 September 2020 stated that vibration and noise legislative exposure action limits were being exceeded in worst case scenarios after short durations but stated that the data was provisional and subject to further analysis. On 14 September 2020, medical centre staff at the ATDU raised formal concerns about potential noise and vibration injury to personnel. The Field Army Environmental Monitoring Team carried out noise trials on four ARES vehicles on 16 October 2020 and from 2 to 6 November 2020. That testing found that the noise under the headset limited vehicle operation in some cases to as little as five minutes.

6.5.4.18. The noise findings led the SRO immediately to ban dynamic use of the vehicle. The Minister for Defence Procurement was informed of this on 9 November 2020. DLE briefed CoM(L) on noise and vibration on 10 November 2020, and the Minister directly on 13 November 2020. Thereafter the Minister was provided with regular updates on noise and vibration issues.

6.5.4.19. On 20 November 2020 a report was produced by the Field Army Environmental Monitoring Team confirming its findings on noise. A final report was produced by the Institute of Naval Medicine on 27 November 2020; it concluded that “*the exposure to noise and vibration exposure of crew inside the Ares vehicles is likely to exceed the exposure action values for noise and vibration*”.

6.5.4.20. The Review has set out above (and addresses further below) the response of the various entities within MOD to the issue of noise and vibration, and the information and reports it received on this topic, in order to consider whether this issue was escalated appropriately. GDLS-UK maintain that the root cause of reported concerns of noise and vibration is not the vehicles’ performance and that there is evidence and independent testing to support that view. The Review makes no findings on these matters.

Box K: To what extent were noise and vibration concerns escalated before November 2020?

K1. The Report by David King published in December 2021 examines in detail health and safety issues arising from noise and vibration on the vehicle and makes recommendations concerning safety processes. The Review has not sought to duplicate that work. The Review has concentrated on escalation of issues and why concerns about noise and vibration were not properly understood and escalated at an earlier date.

K2. Concerns that levels of noise and vibration on the vehicles could be excessive and reports of harms experienced by ATDU crews potentially linked to noise and vibration were repeatedly raised from late 2019 to summer 2020 by, variously, ATDU, Dstl, LSSR, the Capability Safety team and some members of the DE&S project team.

K3. The Review found that the DE&S project team was fully informed about these issues up to 1* level. The Army programme team up to Programme Director level, and the Capability Directorate up to 1* level, whilst not in receipt of all information, were also aware of and understood the concerns. Relevant senior leaders in the programme (the SRO, DLE and CoM(L)) were informed in late spring and summer of 2020 that there was a noise and vibration hazard concern and that steps were being taken to instrument the vehicles in the ATDU trials to gain better understanding of the issue. At the same time, DCap was informed that there were some reports of vibration on the vehicles from crews in the ATDU

trials. The Review found, however, that none of these leaders understood that noise or vibration posed a significant risk to the programme over and above other safety hazards identified, or that crews may potentially have been harmed in trials as a result of noise and vibration, until autumn 2020. The reasons for this and lessons that can be drawn are set out in [7.8.10. Escalation: noise and vibration](#). The evidence the Review heard on escalation of this issue within the Programme Office, DE&S and DCap is summarised below.

Reporting and response below 2 level*

K4. The VDM Team Leader, who reported to DLE on the equipment project, briefed DLE and CoM(L) that there was a potential noise and vibration hazard on the vehicle and that this was being addressed, including through instrumentation, in summer 2020. He told the Review that he did not escalate the noise and vibration issue as a measured and defined issue, or as one which was causing harm or injury to crews, within DE&S or to the SRO, prior to his receipt, on return from leave on 28 September 2020, of an email from the Programme Director dated 24 September 2020 which communicated that there was evidence of noise induced hearing loss by crew members (and which led to a pause of the trials, ordered by the SRO). On 28 September 2020 he provided DLE with a copy of the Institute for Naval Medicine's preliminary report.

K5. The VDM Team Leader told the Review that prior to September 2020 the evidence on noise and vibration was not clear: reports of harms were anecdotal; the expert institutes carrying out instrumentation tests had not yet reported; the noise issue was unclear because of the complex interaction between ambient noise, electronic noise and headsets; GDLS-UK did not agree that there was an issue and maintained that GDLS-UK crews had experienced no adverse effects from noise or vibration. He told the Review that there were a large number of technical issues with the vehicle, issues with the electronic publications required to support the vehicle, and an on-going debate with GDLS-UK about delivery and acceptance of vehicles, which were the major issues he was dealing with. He accepted that, with hindsight, noise and vibration turned out to be the most significant safety and programmatic issue. At the time, however, he considered that understanding of the noise and vibration issue was not sufficiently mature to burden people with another concern which was not clearly evidenced. Senior

leaders had limited time, and he had to use his judgment to decide which issues to raise, when, and in what detail. He also told the Review that he looked to see if injuries had been centrally reported but could not find anything to say they had been.

K6. The Army Programme Director kept the SRO informed informally about the trials and told him that vehicles were being instrumented to test for noise and vibration. He similarly considered that noise and vibration were simply two of many technical issues being dealt with on the programme and did not stand out as being of greater concern, or a greater risk, than others. The Programme team was under-resourced and the Programme Director was not full time. He was also responsible for all the DLODs so that the number of issues he was dealing with on the programme at any one time was considerable. The trials were being run by DE&S and ATDU, which sat in the Capability Directorate. The immediate safety issues in the trials were considered and dealt with by safety experts in those two organisations and through the Duty Holding construct.

K7. The Commanding Officer ATDU, who sat within DCap's line management chain and also reported to him through the Duty Holding construct, raised his concerns about noise and vibration, legislative compliance and risk and harms to crews with the Capability Directorate, to the Assistant Head Ground Manoeuvre (although he was not part of his formal line management chain) and to Head of Capability Ground Manoeuvre, and he expected that the Head of Capability Ground Manoeuvre would raise it with DCap if necessary.

K8. He explained that he understood that part of the process when formally elevating concerns through the Duty Holding construct is that the ODH has to put in additional controls over those that the DDH can implement. Whilst he had concerns about the approach being taken, except in November 2020 – when he suggested, together with other suggested courses of action, that a waiver be granted to allow vehicles to pass through Government Acceptance Testing without a 'dynamic test' – he did not identify additional controls which were outside his remit as DDH and which DCap, as ODH, could have implemented to mitigate risk. Prior to June 2021 he accepted (whilst periodically voicing his significant concerns) that the controls implemented were sufficient to allow him to continue to hold the risk as DDH.

K9. The Commanding Officer ATDU also raised his concerns with members of the DE&S project team and the Army programme team and expected that they would raise the issues through their chains of command. He told the Review that it would not have been appropriate for him as a Lieutenant Colonel to go outside his chain of command into other organisations.

K10. The Review found that the Commanding Officer ATDU tried a number of ways to escalate issues, seeking to draw together stakeholders to solve the problem (DE&S, Dstl, Army Programme, Capability Directorate, and the Capability Safety Team). He did not, however, elevate the risk through the Duty Holding Construct to DCap before June 2021 [see [6.6.2.3](#) below].

K11. The 1* Head of Capability Ground Manoeuvre sat above the Commanding Officer ATDU in the line management chain within the Capability Directorate. He was aware of difficulties with the trials in relation to noise and vibration, and difficulties signing off the Part 3 Safety Case (which was to be signed by the Assistant Head Ground Manoeuvre on behalf of DCap). He had spoken to DCap briefly about the issue of vibration in the ATDU trials during regular general update meetings but did not raise it in writing as an issue requiring action from DCap. He believed that the trials were being safely conducted through limitations of use and procedural controls and that, if they were not safe, this would have been raised with DCap by the Commanding Officer ATDU directly through the Duty Holding construct, or identified through advice or assurance activity by the Land Equipment Safety Officer. He explained to the Review that he did not sit within the Duty Holding construct. He also explained that he expected that the Land Equipment Safety Officer would advise DCap on compliance with safety legislation and regulations. He also pointed out that the EQT trials were being conducted under a Safety Advice Letter issued by DE&S and not under a Part 3 Safety Case (which would have been the responsibility of DCap).

K12. The Land Equipment Safety Officer reported to DCap. He advised DCap on safety legislation compliance with respect to all Army equipment, but he explained that that did not include advising DCap under the Duty Holding construct. He expected the Commanding Officer ATDU as DDH to stop any activity where he considered that the residual risk was unacceptable or uncontrolled, or raise it directly with DCap as ODH. He explained that there was limited and anecdotal information on harms in the trials, that there was insufficient

information to say that legislation was not being complied with, that it was necessary to gather evidence to establish if there was an issue, and that he believed in the meantime that the risk was ALARP because they were investigating the validity of the calculator to determine compliance. He expected the Army programme team would report any concerns to the SRO and similarly that concerns would be reported up through DE&S. In his capacity as the Army Competent Adviser and Inspector for Noise and Vibration, the Land Equipment Safety Officer told the Review that he would have advised the Executive Committee of the Army Board via the Army Inspector (and DCap) if he believed there was non-compliance with applicable safety legislation. There is no record that he did so.

2 awareness*

K13. The SRO told the Review that he recalls being told by the programme team that risk of exposure to excessive noise and vibration in the trials had been identified and was being mitigated through procedural controls. He understood in June 2020 that a number of hazards were being mitigated to enable signing of the Part 3 Safety Case. However, he told the Review that he did not understand at that stage that noise and vibration were significant safety hazards, and that he did not understand that soldiers had potentially been harmed or injured by noise or vibration until 24 September 2020, when he was advised by the Programme Director that the RGT should be postponed because of noise concerns raised by the Commanding Officer ATDU. He agreed to that postponement. The issue of noise and vibration was discussed at the Programme Board on 22 October 2020. The Review saw no written brief to the SRO on noise and vibration prior to slides prepared for that Programme Board, which gave an update on excessive noise. The SRO was not copied in on the communications between the Commanding Officer ATDU and others sent in the period December 2019 to September 2020, nor was he sent a copy of the Quick Look Report dated 20 August 2020, the preliminary report from the Institute of Naval Medicine dated 10 September 2020 or any of the Dstl reports.

K14. DLE told the Review that he was aware of the intention to conduct noise and vibration trials in around June 2020, but that he did not appreciate that crew had potentially been harmed. Noise and vibration were two of many technical issues being addressed at the time, and (in the absence of reports of harm) he

did not understand them to be the most significant or pressing. The Quick Look Report and preliminary Institute of Naval Medicine report from August and September 2020 were not forwarded to him and he was not briefed on their findings at the time. He told the Review that he was not informed that crews in the ATDU trials had potentially suffered injury until November 2020. The Review did not see any written briefs to senior leadership in DE&S on noise and vibration prior to autumn 2020, despite many briefs having been provided to DLE by the project team on a range of issues, including on safety issues. Noise and vibration, and the trials, were not highlighted as issues or discussed in the regular 3* review meetings. Both CoM(L) and CEO DE&S told the Review that they did not know that there was a significant issue with noise and vibration, or that there had potentially been harm to crews, until November 2020.

K15. DCap told the Review that he was aware that vibration was a potential issue with the vehicle in September 2019 when he first came into post. That was unsurprising to him as, in his experience, all tracked armoured vehicles have a tendency both to be noisy and to vibrate. The issue of noise and vibration was not, however, formally raised with him as ODH by the DDH (the Commanding Officer ATDU), through the Duty Holding construct before June 2021. The many emails sent at team level by ATDU, DE&S, Dstl and Capability Safety on the issue of noise and vibration in the trials were not copied or forwarded to DCap. DCap told the Review that he visited ATDU in March, May and June 2020, and discussed many issues, but noise and vibration were not raised with him on those visits. The Commanding Officer ATDU told the Review that he thinks he must have told DCap about his concerns about the Ajax trials in June 2020. That is possible, but it is clear that if he did so, it was not in detail and was merely part of a conversation about a number of other matters. The Review saw no written communications which recorded the trials being raised with DCap and if it was raised, DCap did not appreciate that it was a matter of significance which required his intervention.

K16. The issue was not raised with DCap by the Land Equipment Safety Officer. The Head of Capability Ground Manoeuvre told the Review that he raised noise and vibration issues at two of the weekly update meetings that DCap had with his 1*s: in May 2020 and in July 2020. DCap did recall occasional conversations with the Head of Capability Ground Manoeuvre and being told “*for information*” that there was vibration on the Ajax vehicles and crew were

experiencing “*tingly feet*” which went away after 15 to 60 minutes, and that tests and trials were being done. DCap could not recall exactly when this was reported to him; he told the Review that when he was informed about this impact, it was not on the basis that he should do anything about it, but on that of “*leave it with me, we’re on it*”. DCap was not copied in on the LSSR report or Land Equipment Safety Officer brief from May 2020, nor later reports such as the DE&S Quick Look Report in August 2020 and the Institute of Naval Medicine’s preliminary report in September 2020. It was only in November 2020 that he became aware that crews had reportedly been injured by noise and vibration in the ATDU trials.

6.5.5. March 2020 to October 2020: Reporting to the Investment Approvals Committee and Ministers

6.5.5.1. Reporting during the period March to September 2020 reflected the more optimistic view being taken by senior leadership of the programme and deliverability, rather than the more pessimistic views of the DE&S project team and Army programme team. The PMRS report submitted on 6 April 2020 stated that delivery confidence had been reduced to Amber/Red as “*delays to equipment delivery mean we can no longer deliver IOC on time in July 2020*”. It also noted that there was “*a technical and safety issue which is causing delay*” and that equipment project schedule delay was the SRO’s number one issue. A new Minister for Defence Procurement came into post in February 2020 and was actively interested in the progress of the programme. A Ministerial submission dated 20 May 2020, which was approved by the SRO and seen by DLE, assured the Minister that vehicles were being delivered imminently, and that, whilst there was a forecast schedule slip to IOC (and the schedule to IOC was subject to a detailed review), the programme was on course to deliver its key user requirements and FOC by 2025. The Review considers that, whilst given in good faith, this latter reassurance concerning 2025 was not properly substantiated: at this point the schedule was still not assured, so no firm dates could be given. Moreover, the submission made no mention of the project team’s view, as reported to DLE, that there remained a “*litany*” of technical issues, that there was a huge backlog in validation and verification work, or the fact that multiple concessions and extensive limitations of use had been agreed.

6.5.5.2. On 29 September 2020 a Review Note was submitted to the Investment Approvals Committee by the SRO. Although dated the end of September, the Review heard that it was drafted in July and August 2020, before going through a process of clearance, including by the DE&S Endorsement Committee in early August, and approval by the Army Investment Committee. The

Review Note proposed an In-Service Date of January 2021, when 13 non-turreted vehicles and training systems would be delivered, and a date for IOC of June 2021, to be declared on delivery of a further 12 AJAX vehicles. Both dates were given as 50% probability. The 90% In-Service Date was also June 2021, and for IOC it was September 2021.

6.5.5.3. The Review Note highlighted achievements of the programme. It referred to “a breakthrough in unlocking technical and safety issues”. It stated that “*Achievement of [Key User Requirements] is on track and will be delivered incrementally. A total of 48 of 72 Battlefield Missions have already been completed and 17000km driven successfully.*” The Review Note focused only on IOC and did not address delivery to FOC; work was said to have been started on this and a submission envisaged in the second quarter of 2021. Nevertheless, the SRO stated that “*I am confident that the Army will be able to meet its [Joint Force 2025] commitments.*” That was a reference to the Army’s planned deployments using Ajax vehicles in 2023 and 2025.

6.5.5.4. The content of the Review Note was reflected in the Accounting Officer Assessment submitted to the Permanent Secretary on the same date, and in turn in his letter to the Public Accounts Committee dated 14 October 2020 which informed the Committee of the resetting of dates to IOC. It was also carried through into evidence on the programme given by the Minister, DCGS and CEO DE&S to the House of Commons Defence Committee on 20 October 2020. At that hearing, DCGS told the Committee that Ajax was coming into service with the Household Cavalry Regiment “as we speak”, and CoM(L) spoke of being on “*the cusp of rolling out the fleet of vehicles to the British Army*”.

Box L: Reporting to the Centre in 2020

L1. Whilst the Review has no doubt that the Ministerial submission, Review Note and Accounting Officer Assessments produced between May and September 2020 were drafted carefully and in good faith, it considers that the overall effect of these documents was to paint an overly positive picture of the state of the programme and the vehicle to the Investment Approvals Committee, Permanent Secretary and Ministers. Equally, the evidence given to the House of Commons Defence Committee in October 2020 was carefully considered in advance, discussed with Ministers, and given in good faith, and no individual statement was factually incorrect, but the Review considers that the overall impression given to Parliament was more positive than the reality of the programme at that point in time.

L2. As set out above, there remained at this time a “*litany*” of disputed technical and safety issues with the Capability Drop 1 vehicle which were being managed through limitations of use and safety notices. As a result, the use that could be made of the vehicle was very limited. The DE&S project team had significant concerns that there was no assured schedule to Capability Drop 3, which was required to meet proposed deployment in 2023. Other project team members told us that it was widely believed that the 2025 date for FOC was unachievable. Finally, crews of vehicles in ATDU trials had by this point reported a large number of harms and injuries potentially caused by noise and vibration, and initial reports in August and September 2020 from specific noise and vibration trials, whilst not yet definitive, indicated that exposure levels could be exceeding legislative limits within short time frames.

L3. There are a number of reasons why reporting did not adequately reflect the true state of the programme. The individual team member in DE&S who began the drafting process told the Review that he understood that the purpose of the Review Note was to reassure the Investment Approvals Committee of the new schedule. There was clearly a desire by senior leadership to present their achievements to the Investment Approvals Committee and in that sense to be upbeat. There was also a genuine judgment call on the amount of information which needed to be provided.

L4. At a pragmatic level, the length of time taken to produce the Review Note, and the staffing process it went through internally within the Army and DE&S before being submitted to the Investment Approvals Committee, meant that events had moved on by the time it went to the Investment Approvals Committee. That was particularly true with respect to noise and vibration issues. As explained more fully above, senior leadership understanding of those issues was crystallising in September 2020. The Review observes that this time lag in the process by which Review Notes and Information Notes go to, and are approved by, the Investment Approvals Committee, meant that the Investment Approvals Committee was frequently considering out of date information.

L5. The Review considers that the cumulative effect of these various factors meant that, once again, the Investment Approvals Committee and Ministers were presented with an overly optimistic picture of the state of the programme.

Box M: The Integrated Review

M1. The Integrated Review, which was launched in February 2020⁵⁵ and reported in early 2021, was the “*comprehensive articulation of the UK’s national security and international policy*”.⁵⁶

M2. The evidence seen and heard by the Review suggests that a factor behind the imperative to get the vehicle into the hands of the Army was the Integrated Review. As one senior Army officer told the Review, getting a vehicle into the hands of the Army would show that Ajax does exist and that it was “*not just a concept*”, and this would be likely to enhance the status of the Army and its ability to deliver complex programmes at a time when it was competing against the other Front-Line Commands for significant investment in capability.

M3. The Review did not find, however, that the increasingly bad news with the Armoured Cavalry Programme was actively suppressed because of the Integrated Review. This was not borne out by the evidence seen by the Review. Rather, from the evidence seen, the Review concludes that sensitivity about the Integrated Review played a part in the overly optimistic accounts that were being sent to the Centre.

M4. From the Army’s perspective, the Armoured Cavalry Programme was at the centre of the Army’s Integrated Review proposition. There was no real expectation that the programme would be deleted because “*the money was largely committed*” under the contract with GDLS-UK, and so savings to the Defence budget would not be material. The Permanent Secretary during the period to March 2021 told the Review that “*nobody thought that Ajax was something that should be canned under any circumstances. The Army has a need for this capability and there wasn’t an alternative one – to the best of my knowledge. The platform it was replacing was distinctly antiquated.*”

M5. It is clear, however, that there was great sensitivity about the Integrated Review. This may have been due to the perception that third parties, and particularly Parliamentarians, may make public comments about the

⁵⁵ Press release, 26 February 2020. <https://www.gov.uk/government/news/pm-outlines-new-review-to-define-britains-place-in-the-world>

⁵⁶ 16 March 2021, <https://www.gov.uk/government/collections/the-integrated-review-2021>

appropriateness of continuing with the Armoured Cavalry Programme, or that failures in the delivery of Ajax would damage the reputation of the Army, when in general it was competing with the other Services for limited resources.

M6. The sensitivity towards the Integrated Review was acknowledged by the Programme Director in some of his communications to the SRO, and we consider that this is likely to have reflected the SRO's own thinking about the Integrated Review, and encouraged the SRO's optimistic description of the programme in the PMRS reports and in submissions to the Minister.

M7. On 3 September 2019, the Programme Director suggested to the SRO that given his assessment that IOC in July 2020 was highly likely to be missed (his 10% chance), the SRO could signal a potential issue to the Centre by means of an Information Note, which he said stops short of a Review Note "*with all the adverse publicity at a sensitive time*". The Programme Director told the Review that this was a reference to the upcoming Integrated Review.

M8. In March 2020, the Programme Director put forward a variety of options for the programme once it was accepted that IOC in July 2020 would be missed. One option was for there to be a Full Reset of the programme – another Recast. He recognised that this could have negative effects, and noted to the SRO that this could have an "*Unintended consequence at a delicate time in the Centre with the Integrated Review*".

M9. A further example of sensitivity about the Integrated Review was a memorandum sent from DLE to the SRO on 21 December 2020, dealing with a payment to GDLS-UK for the 4th quarter of calendar year 2020, in which he wrote: "*Further communication of the information contained within this note must be considered in the context of the Integrated Review and should be treated with caution.*"

6.5.6. July to December 2020: Discretionary payments

6.5.6.1. The Review was told that, following the decision to authorise a discretionary payment to GDLS-UK of around 42% in December 2019, DE&S leadership approved further discretionary

payments (of around 40-45% each quarter) throughout 2020. DE&S senior leaders told the Review that their focus during 2020 remained on incentivising GDLS-UK to achieve timely and early delivery, and that triggering the withhold provision would likely have resulted in more severe delays than were projected at that stage (i.e. before the extent of the impact of noise and vibration on the schedule was known). They also told the Review that discretionary part-payments were appropriate and necessary to minimise the impact of COVID-19 lockdowns on GDLS-UK, which had been designated a 'Critical Supplier', and on the supply chain.

6.5.6.2. The Review accepts that, having not triggered the withhold provision in December 2019, it would have been unthinkable for DE&S to have sought to trigger it at the end of the next quarter, when the Government had just imposed a national lockdown and companies across the UK were beginning to furlough staff. Nevertheless, as the problems and delays to the programme continued to mount, these discretionary part-payments became a source of increasing frustration within the DE&S project team, and also within the Army programme team during the second half of 2020.

6.5.6.3. Whilst DE&S leadership increasingly recognised the importance of explaining to the SRO the rationale for making these discretionary payments, they were clear that (even though this was Army money that they were spending) the decision as to whether and how much to pay was for DE&S alone to make. An email of 18 September 2020 from Head Integrate to DLE expressing support for the approach of part payment but querying the size of the payments and requesting "*a breakdown of how the % costs are constructed both for visibility and for the SRO/Army [Director Resources] to concur,*" prompted CoM(L) to respond "*I am content and for completeness, I am not seeking any 'concurrence' from HQ Army; this is a matter for DE&S.*"

6.5.6.4. The Permanent Secretary during the period to March 2021 told the Review that he would have expected discretionary payments to have been brought to the attention of the Director General Finance and, if necessary, the Permanent Secretary, in advance of their payment. This was not done. The Minister for Defence Procurement between February 2020 and September 2022 also told the Review that he would have expected discretionary payments to have been cleared by both CEO DE&S and the Permanent Secretary. The Permanent Secretary told the Review that he felt this should have been brought to Ministers' attention. Although the Secretary of State was told during a briefing on the Land Industrial Strategy in June 2020 that DE&S had withheld some monies from GDLS-UK, it appears that he was not made aware that the view had been taken that there was a right to trigger the withhold provision but the decision taken was not to do so. As discussed below [see [7.6.19](#)], the Review considers that as a minimum DE&S and/or the SRO should, in these circumstances, have discussed the rationale for making discretionary payments with the Director General Finance and

Permanent Secretary, in particular given that they would ultimately have to explain these decisions to the Public Accounts Committee.

6.6. 2021: Technical challenge and schedule realism

6.6.1. Understanding the technical challenge and looking beyond IOC

6.6.1.1. A 3* review meeting was held on 13 November 2020 at which noise and vibration was one of the issues discussed. The issue was discussed as a “*headset*” problem, rather than a major engineering issue or programmatic risk, and it was reported that GDLS-UK did not agree that there was any noise or vibration problem with the vehicles. The issue of headsets and their interaction with vehicles concerning noise was highly contentious and a matter of dispute with GDLS-UK. Headsets were government furnished equipment, i.e. supplied by MOD not GDLS-UK, although the company was responsible for integrating them with the vehicles’ communication systems. The slides for the meeting indicate that, at this point, the In-Service Date for the vehicles was still considered on track to be delivered before January 2021. The Record of Decisions states that there was a joint commitment to resuming Ajax fleet activity and Government Acceptance testing as quickly as possible. Government Acceptance testing (which required the Acceptance and Testing Team drawn from ATDU to operate vehicles in order to check compliance) did in fact resume on 30 November 2020.

6.6.1.2. There followed extensive work on noise attenuation and headsets, and work continued to progress towards IOC. The view continued to be taken that, with appropriate mitigations, IOC could be declared. At this stage, more focus was also given to the next stage of the programme, and progression to delivery of Capability Drop 3 vehicles. DE&S and the Army were agreed that at Capability Drop 3 no new limitations of use would be accepted, existing limitations of use would have to be mitigated, no new design concessions would be agreed, and no performance limitations due to lack of verification evidence or accreditation would be accepted. DLE wrote to the Vice President of GDLS-UK emphasising this on 14 December 2020.

6.6.1.3. On 24 November 2020, a submission from the Defence Portfolio and Approvals Secretariat to the Minister for Defence Procurement recommended approval of the Review Note and the revised In-Service and IOC dates. The submission noted that noise and vibration had been “*identified in trials in early November*” and that trials were paused. The submission said that, if the impact and resolution became more significant, a formal schedule risk analysis update would be run for inclusion in the FOC

Review Note planned for the second quarter of 2021, and an early indication would be communicated via the Defence Portfolio and Approvals Secretariat if IOC was likely to be affected.

6.6.1.4. Whilst the Minister was provided thereafter with detailed information about noise and vibration, he was not told that the IOC date could not be met or warned that there was a significant likelihood that it would not be met. Reporting on IOC continued to be positive. In the PMRS report for January 2021, the noise and vibration issue is referred to as *“a technical issue with a potential safety implication for crews, which [had] led to all training on AJAX vehicles being suspended in November. The safety of our personnel remains paramount”*; overall delivery confidence is rated as Amber/Red but IOC for June 2021 is rated as Green and FOC in 2025 as Amber/Green. The SRO explained to the Review that he described the issue in that way because the link between the vehicle and the noise issues experienced by crews remained unclear. In February 2021, the Deputy Chief of the Defence Staff for Military Capability reflected this reporting in evidence to the Public Accounts Committee. He stated that work to build vehicles was *“progressing extremely well. We expect to hit key milestones this year”*.

6.6.1.5. At the same time, the team view of deliverability was more pessimistic. On 4 February 2021, the Programme Director was warning the SRO that *“no one (beyond GD) actually believes that we can achieve the FOC within the current timelines”*. By 15 February 2021, he was warning that a further programme reset would be required, that the risk adjusted schedule indicated that FOC would be two years late, and that the Army was facing accepting Capability Drop 3 vehicles with only 25% of requirements demonstrated as compliant.

6.6.1.6. The Infrastructure and Projects Authority conducted a Gateway Review between 22 and 26 March 2021, having been requested by the SRO to investigate his growing concerns with the programme, and produced a report on 1 April 2021. They gave a delivery confidence rating of Red. They stated that *“Successful delivery of the programme to time, cost and quality appears to be unachievable. There are major issues which, at this stage, do not appear to be manageable or resolvable within the current Business Case approval. The programme needs to be re-baselined. The Delivery Confidence Assessment is rated Red because consistent and compelling evidence was found that the programme will not deliver the planned number of Ajax (family) armoured fighting vehicles to the British Army at the required/contracted operational capability and price in time to support planned operational deployments in 2023-24 and the Full Operating Capability (FOC) in 2025.”* The Gateway Review made a series of recommendations concerning governance, resources, assurance, and contractual incentives.

6.6.1.7. In the PMRS report dated 7 April 2021, the overall delivery confidence was amended by the SRO to Red. The SRO stated, however, that the programme was still driving to an IOC of 30 June 2021.

6.6.1.8. The Gateway Review triggered a new wave of assurance activity and engagement at senior levels. On 23 April 2021 a programme review was held by the DMPP Sponsor Group: the first since February 2020; and further meetings were held in June and July 2021. Further work by senior leadership was done on project delivery. On 4 May 2021, CEO DE&S discussed the programme with CEO GD Corporation. On 7 May 2021 a further 3* review meeting was held. On 30 June 2021, a 4* review with GDLS-UK was held involving CEO DE&S, CoM(L), the SRO, DLE, the CEO GD Corporation and senior GDLS-UK personnel. At this meeting an action plan was agreed to ensure delivery of IOC, with further work to assure deployment of Capability Drop 3 vehicles in 2023.

6.6.1.9. There was detailed reporting to Ministerial level. On 12 April 2021 the Minister for Defence Procurement was briefed on the Gateway Review's Red rating; he was also informed that the programme remained committed to declaring an IOC by the end of June 2021. On 6 May 2021, the Permanent Secretary visited GDLS-UK's factory. On 4 June 2021, CEO DE&S and the SRO briefed the Defence Board. On 7 June 2021, the Secretary of State and the Permanent Secretary were briefed in person by the SRO together with the Minister for Defence Procurement, CEO DE&S, CoM(L) and the VDM Team Leader.

6.6.1.10. Sequenced engagements by the Secretary of State, the Chief of the General Staff and the Minister for Defence Procurement with GDLS-UK took place between 28 June and 1 July 2021.

6.6.2. The trials all stop

6.6.2.1. In March 2021 ATDU trials activity on the vehicles was recommenced with an updated Safety Advice Letter and headset protection for the crews. Notwithstanding this, the Commanding Officer ATDU became increasingly concerned about the safety of his crews. In April 2021 there were further reports of harms and injuries. On 13 April 2021, the Commanding Officer ATDU sent an email to the Assistant Head Ground Manoeuvre, the Head of Capability Ground Manoeuvre in the Capability Directorate, and to the Programme Director, raising his concern about the approach to safety using human controls rather than design and engineering changes to deal with hazards. He stated that project milestones and targets such as IOC and deployment in 2023 were placing unnecessary pressures on the safety and viability of the vehicle and were warping perceptions of cumulative risk. He asked for the correspondence to be treated as a serious concern and logged at programme and project level. The correspondence was logged and there followed a meeting with the SRO.

6.6.2.2. On 27 May 2021, a time-limited independent review by the Head of Engineering Assurance (Land) expressed the view that the noise and vibration calculator was based on incomplete data; criticised the Safety Case for failing to detail the actual operating capability of the platforms; and criticised the safety and environmental assurance capacity and capability.

6.6.2.3. The Commanding Officer ATDU prepared an IRTB dated 16 June 2021, which was commented on by Assistant Head Ground Manoeuvre, together with a spreadsheet listing harms and injuries reported during the trials, and on 23 June 2021 sent the documents to DCap's Military Assistant and to Head of Capability Ground Manoeuvre and Assistant Head Ground Manoeuvre. The brief – which appears to have been in draft at this stage – stated that he was no longer content to underwrite the risk of trials involving extended periods of driving. The covering email stated that “*As the [Duty Holder] for Ajax Trials I am no longer content to underwrite the risk to soldiers in Ajax high mobility (lots of driving) trials. This follows detailed analysis of the last year (June 20 – June 21) where there have been 167 incidents of pain/harm/injury ... All of these incidents occurred despite the fact we had an ALARP solution and controls that demonstrated we were in the ‘safe to operate’ areas of both noise and vibration. I therefore judge the likelihood (probable) and impact (severe) exceeds my delegated authority as a [Commanding Officer] and must be held by D Cap.*” At this time, DCap was abroad in the United States, and Commanding Officer ATDU suggested that a call be set up for 25 June 2021.

6.6.2.4. On 24 June 2021 a draft report on the further testing conducted by Millbrook Proving Ground Ltd stated that vibration levels were exceeded in all crew positions on the vehicle in very short timescales. GDLS-UK disputed these findings. On 25 June 2021, the SRO demanded that all use of the vehicles should be stopped. An All Stop safety notice was issued by DE&S the same day.

6.6.2.5. On 8 July 2021, the first of a series of Ministerial Oversight Group meetings was held. The Group was chaired by the Minister for Defence Procurement, and included the Permanent Secretary, Vice Chief of the Defence Staff, Deputy Chief of the Defence Staff for Military Capability, Director General Finance, CEO DE&S, the Chief Operating Officer, DCGS, the Head of Defence Portfolio and Approvals Secretariat and the SRO. The Group was not involved in any decisions relating to delivery of the Armoured Cavalry Programme; its Terms of Reference were to: (1) oversee all workstreams involved in resolving issues with the Ajax programme; (2) bring to bear all departmental resources in supporting the SRO and project team to enable resolution; (3) monitor progress against the Infrastructure and Projects Authority's recommendations; and (4) ensure co-ordinated and effective communications including with external stakeholders.

6.6.2.6. The Review stopped its evidence gathering process at this date, as it was clear to the Review that by this time all of the problems in the programme – schedule, technical, safety – were now fully known throughout the programme, and escalated to the highest levels.

6.6.2.7. The Review is aware that since mid-2021 further extensive work has been carried out on the equipment project, including further technical tests and root cause analysis of noise and vibration issues. This Report and the chronology set out above necessarily provide a snapshot of the position in the period 2017 to 2021, As explained above, the Review considers that it was primarily this period which gave rise to concerns about timely and appropriate escalation of problems, which was the issue the Review was asked to consider in its Terms of Reference.

7. Lessons learned

7.1. Introduction

7.1.1. In this section, the Review will describe a number of features of the Armoured Cavalry Programme from which it considers that general lessons can be learned, and will set out and explain a number of recommendations which derive from those lessons.

7.1.2. The section addresses briefly the consequences of the original Acquisition Strategy, it then comments on the various entities and personnel involved with the Armoured Cavalry Programme (DE&S, Dstl, Army, the SRO), after that it deals with issues of '[Holding to account and assurance](#)' and '[Information flows: culture and leadership](#)' within the Armoured Cavalry Programme, and concludes with an analysis of the focus on [Keeping to Time: Immovability of IOC](#).

7.2. Acquisition strategy

7.2.1. It was not within the Review's remit to look at the original procurement and consider whether or not it was appropriately carried out, and no findings are made about it. What can be said, however, is that a number of the subsequent problems with the running of the programme appear to have their origins in the initial procurement and contract design. In particular, there is evidence that difficulties were caused or exacerbated by the concurrent demonstration and manufacture phases (an overlap which was extended as a result of Recast and time slippage in the demonstration phase), the contractual incentives (which favoured manufacture over verification and validation of design), and moving production to the United Kingdom at a site with no previous experience of manufacturing Armoured Vehicles. These issues have been picked up and reported upon elsewhere.

7.2.2. The Review considers that problems with the programme were exacerbated by DE&S and the Army deviating from the programme's approvals. The Investment Approvals Committee, Ministers, and HM Treasury approved an acquisition strategy based on a modified off-the-shelf solution. In his evidence to the Public Accounts Committee in March 2022, the Permanent Secretary, while indicating that the large number of requirements had been identified early in the programme (*"those 1,200 user requirements, in large part, were there in the 2010 decision, confirmed in 2014"*), acknowledged that had meant that the Ajax vehicles could not be described as off-the-shelf: *"I think a particular lesson from Ajax is that the GD product was based on the existing ASCOD platform, and we have then set a long range of requirements to make what is effectively a bespoke vehicle."* Although the Review

has not looked into how this apparent deviation from the approvals came about, the fact that it was not identified – which deprived the DMPP Sponsor Group of an opportunity to conduct a 'deep dive' into what this meant for the programme dates – is concerning. Accordingly, a recommendation is made by the Review which should avoid, or at least minimise the risk of, this problem reoccurring.

Recommendation 1. Information to the Centre: At an early stage following Full Business Case approval, Director General Commercial to confirm to the DMPP Sponsor Group that the commercial approach that DE&S are pursuing is consistent with what the Investment Approvals Committee, Ministers and HM Treasury have approved.

7.3. DE&S

7.3.1. All of the DE&S personnel (current and former) who spoke to the Review were very keen for the Armoured Cavalry Programme to succeed. They saw the Ajax vehicles as being a “gamechanger” for the Army, and they were proud of their part in seeking to deliver the vehicles to the Army. They were clearly frustrated with the problems experienced by the programme, and were distressed at the reports of harm and injury sustained by servicepeople who were using the vehicles.

7.3.2. The Review saw and heard of a number of positive aspects about the way in which DE&S operated. Nevertheless, there were a number of concerns identified by the Review which could quite easily be repeated in other areas of DE&S’ work, in particular within the Land Domain, if they are not acknowledged and appreciated.

7.3.3. Shortly before his departure from DE&S, the CEO who was in post from May 2018 to July 2022 wrote for the internal DE&S magazine, “Desider”, of the organisation’s many achievements. With respect to the Armoured Cavalry Programme, he stated that:

“Ajax has some much publicised and significant difficulties, but these issues can be overcome with the right focus and energy. Mistakes have been made here and, with hindsight, there are certain things that we should have done differently. Sometimes, we (DE&S, Industry and the Customer) overreach ourselves in our ability to do things quickly and we compound this with an even more optimistic recovery programme in response to the need for pace. We must learn from this. Always proceed with a sense of urgency but applying a dose of cold, hard

pragmatism in assessing technical complexity underpinned by a robust and resourced schedule. Binding all this together is trust and collaboration with our Customers and defence suppliers.”

The Review agrees with this particular lesson learned by the former CEO, and agrees with the way forward described by him in this article.

7.3.4. The Review was also informed that the Board of DE&S has established a Programme Review Committee. It has identified the eight performance themes which projects need to address, based on the most commonly cited reasons or themes for projects suffering adverse delivery, cost or quality performance:

1. Realistic approach to cost and schedule estimation.
2. Clarity of roles and accountabilities.
3. Working as One Team.
4. Slimming down assurance and approvals.
5. Commercial and project management skills.
6. Annuality of funding and over-programming.
7. Systems Integration Capability.
8. Transferring equipment and capability to customer.

The Review considers that these are sensible themes for DE&S to consider, and some of the concerns identified by the Board mirror the Review’s own findings with respect to DE&S’ involvement with the Armoured Cavalry Programme.

7.3.5. The Review identified that the reporting system for the Armoured Cavalry Programme within DE&S had not worked effectively, and that transition management of key personnel had a deleterious effect on DE&S’ ability to deliver the equipment project within the overall programme.

7.3.6. The CEO in post until July 2022 explained to the Review that he was aware of the progress of the Armoured Cavalry Programme’s equipment project through formal monthly performance reviews. Those performance reviews would consist of a data-fed traffic light system, led by the 1* for the project. On 24 November 2019, the CEO wrote that he “*didn’t know the programme was struggling – no indication of this given at Performance Reviews*”.

7.3.7. The CEO also received information about the progress of the project from his 3* (CoM(L)) and 2* (DLE). There was, however, almost simultaneous turnover in these roles. The CoM(L)

departed in the summer of 2019 and was only replaced in December 2019. The incoming CoM(L) told the Review that he had received no hand-over for any programme. The DLE left in February 2020, but before his departure he had been focussing heavily on another programme, the Mechanised Infantry Programme (Boxer). This may have led him to underestimate the scheduling problems being experienced by the Armoured Cavalry Programme [see Box F after [6.5.1.11](#)].

7.3.8. Churn within the programme was also evidenced by the departure of the Project Manager shortly after Recast in July 2019. Many witnesses told the Review that this was a real error, as so much knowledge about the programme and the relationship with GDLS-UK (which had been built up during Recast and before) had been lost. There was also a change of Demonstration Phase Project Manager just two months later. The VDM Team Leader was also replaced in early 2020. One witness told the Review that within the overall Armoured Cavalry Programme, there has been a *“chronic lack of continuity of leadership. Little, if any, transition management has historically been considered. This applies to all critical roles within the programme . . .”*.

7.3.9. The Review recommends to the current CEO DE&S that a greater focus be applied to transition management, and suggests that a repeat of what took place with new appointments in the Land Domain in 2019/2020 be avoided in future. The CEO DE&S in post until July 2022 told the Review that the changes of personnel at DE&S in 2019 and 2020 strengthened the senior management team and management of the project, in particular by bringing in senior personnel with extensive experience of project management in other domains (Air and Maritime) and in industry. The Review understands and accepts that this may have been an important factor in personnel decisions. Nevertheless, consideration should always be given to the effect that multiple changes of personnel within a short period of time may have on continuity within a given project. For more senior personnel at DE&S (DG (Land) and DLE), the Review does not make an explicit recommendation as they are unlikely to be dedicated to a complex project even though (as with the Armoured Cavalry Programme) they may spend a considerable proportion of their time on one project. More junior, but key, personnel on any project should remain in post for lengthy periods, and their change-over should be staggered so as to avoid a loss of critical knowledge of a project. A formal recommendation to this effect is set out under the heading SRO [see Recommendation 9 after [7.6.30](#)].

7.3.10. The Review received evidence that, despite the undoubted hard work and diligence of the team, some people felt that DE&S were ineffective at holding GDLS-UK to account. That was so in particular during the period prior to early 2020. In a letter to the SRO dated 13 March 2020, the CEO DE&S identified a *“conspiracy of optimism”* of which DE&S were a part. The failure to achieve the projected IOC date could not, in his view, *“be entirely placed at the door of the project team”*, but he did consider that *“there should have been more push-back and less reliance on what turns out to be*

a deterministic schedule". This assessment was shared by the Army's Programme Director who told the SRO in January 2020 that *"there is precious little holding to account within DE&S and in to GD"*.

7.3.11. CoM(L) told the Review that in order to address this he sought to introduce collaborative arrangements with GDLS-UK. He said that, in his view, the DE&S Land Environment area was *"not tough enough on industry, of which GD is an example. I don't want a transactional arrangement. I want collaborative arrangements and at the heart of them you can be firm in both directions. That was the atmosphere that I was looking to engender."* Nevertheless, according to a recently appointed DE&S Board member (who was the former CEO of the Infrastructure and Projects Authority), who carried out a review of the schedule in July 2021, in spite of CoM(L)'s efforts, true collaborative working had not yet been achieved. In his view, *"conflicting priorities of the parties have created an environment where true collaborative working is not in place and lack of trust is prevalent due to current programme failings and significant internal and external pressure between DE&S and GD's view of the critical milestones."*

7.3.12. The July 2021 review also formed the opinion that work on aligning the schedule had resulted in some closing of the gap between DE&S and GDLS-UK, but that *"this has been at the expense of moving DE&S views of FOC to the left, rather than moving GD's to the right. This has the effect of compressing activities and results in further overlap in development, testing and manufacturing phases. This significantly increases risk to the programme."*

7.3.13. The Review found that DE&S did not like 'assurance': they did not like people auditing them and telling them about their work. DE&S were said to be reticent about sharing information about the Part 2 Safety Case with the Army (the Capability Safety team). To get around this, the Capability Safety team built relationships informally with Dstl.

7.3.14. The Review considered that DE&S were not forthcoming in sharing information with the SRO. The SRO was not invited to participate in all of the initial 2* and 3* reviews with GDLS-UK. There was a sense of 'hands off', or 'misappreciation' of the role of the SRO. One senior person at DE&S described the SRO as follows:

"He's the sort of client, the sort of customer. . . . The SRO was very much an individual who delegated . . . who worked closely with DE&S, but DE&S did all the heavy lifting. Its purpose was to manage the programme, or certainly the project, on behalf of the SRO. The SRO was much more in the space of taking the view across the DLODs, integrating that capability into the Field Army, because their organisation is very much a headquarters organisation, not a

project delivery organisation. . . . it was not my expectation that we [should] be briefing the SRO for this – or an SRO for any other programme – on a daily basis, on every single element that was going on, because that’s what we as an organisation are responsible for delivering.”

7.3.15. The shortcomings within DE&S identified by the Review are probably explained by the lack of experience and expertise in delivering equipment to the Army. As the Director General Finance told the Review, DE&S Land Domain and the Army are:

“the least mature of the [Front-Line Commands] in delivering new equipment because they haven’t had to do it for quite some time, and when they did do it was Afghanistan and we called them Urgent Operational Requirements. So there’s a different way of doing it and they’re not used to it. Whereas the Navy and Air Force are relatively mature clients of DE&S. I do think from my very bird’s eye view, the Land Domain in DE&S has been less capable because it hasn’t been the exciting place to be because there hasn’t really been an Equipment Programme. I really do think . . . through conversations and impressions and meetings – the relationship between the Army and DE&S is definitely the least mature of the Front Line Commands. I think this is a real factor in all this.”

7.3.16. The Review heard that there had been a very significant improvement in the relationship between DE&S and the SRO more recently and in particular since the appointment of a new full-time SRO, a civil servant with significant experience in project management, in October 2021.

7.3.17. The Review also considers that DE&S senior leadership were at times not good at listening to, and taking on board, the concerns of more junior team members, and did not consistently promote a challenge culture. In particular, the Review was told that the project and programme teams’ perception was that CoM(L) was overly willing, at 3* review meetings, to accept GDLS-UK’s assurances, and that he would question the teams’ own assessment and performance in front of GDLS-UK in a way that they felt was undermining. For his part, CoM(L) told the Review that he considered that the teams had become too transactional and confrontational, that the DE&S project team had been underperforming and needed challenge, and that the programme could only move forward with more collaborative working with GDLS-UK.

7.3.18. The Review acknowledges that DE&S as an organisation have done much work to identify their shortcomings with respect to the Armoured Cavalry Programme, and have already taken steps to improve their way of working (see, e.g. the eight themes at [7.3.4](#) above). This is commended. There

are, however, a number of specific recommendations set out later in this chapter [see Recommendations 2, 6-7, 9, 13 & 16-23] which apply to DE&S, and it is hoped that they will also be actioned for future major programmes worked on by DE&S.

7.3.19. In light of the issues with raising safety concerns discussed above and the programmatic pressures, DLE suggested to the Review that in future the Part 2 Safety Case for new platforms should be signed at 2* level. He explained that this would bring the approach more into line with that in the Air domain. The Review believes this suggestion warrants careful consideration but it has not sought to make recommendations in the technical area of safety processes.

7.4. Dstl

7.4.1. The Review heard evidence from the Platform Systems Division Head and some members of the Dstl team. They were all experienced and qualified technical and scientific advisers. There was also significant continuity of personnel in the Dstl team advising DE&S, so that they also had experience over time in dealing with issues in the project.

7.4.2. The Dstl team identified a large number of technical and safety issues with the vehicles over a long period of time. With respect to noise and vibration, the evidence seen by the Review indicates that Dstl identified concerns from as early as 2014. Their warnings that, if unresolved, noise and vibration could cause problems for the trials and the programme proved prescient. On several occasions, Dstl staff sought to raise these concerns, as well as other technical and safety concerns, but they did not land with sufficient force that they were taken on board.

7.4.3. Various witnesses to the Review have sought to explain why Dstl's advice was not always well received, or taken on board. One said that "*The problem with Dstl is nobody does it properly . . . Dstl are extremely difficult to work with sometimes*"; they have "*a habit of telling you that everything isn't good enough because it's not to their standard*". Another said that Dstl were some of the most "*pernickety*" people. "*With Dstl it's really difficult to stop them being overly pernickety.*"

7.4.4. Another said that "*originally, [Dstl] seemed to feel they had a red card, which was a new thing to me because they're not... they've always been an advisory role, in terms of they give the information, then it's down to ... the [Senior Safety Responsible] to take that on balance with other opinions and determine the way forward*". One witness said that: "*The problem I had with them was kind of, 'Well, ok, so what evidence are you really looking for? What design changes would you do in*

this circumstance?’ And in most cases, it was either completely impractical or they didn’t have an answer.”

7.4.5. Another told the Review that Dstl’s advice didn’t take account of the contractual framework within which the DE&S project team were working, and that this made it harder to do anything with that advice: *“Dstl are the archetypal boy who cried wolf people. Everything is a problem for them. So, the software is no good – that’s a problem. [Electromagnetic compatibility] – that’s a problem. This is a problem, that’s a problem. Everything’s a problem. They make comments without reference to the contract. So I don’t mind if they go, ‘In accordance with this standard, they’ve failed to meet the following requirement.’ Great. I can do something with that because I can hold a contractor to account: ‘It says in the contract you’re supposed to do this, you haven’t done it.”*

7.4.6. Another said that Dstl people are very clever but their communications need a *“bit of translation”*. And in some of the meetings, *“they could be a bit annoying because they could be a bit dogmatic and bloody-minded”*. An example given to the Review was of Dstl raising concerns that certain engine management software required validation. DE&S personnel considered that the steps being advised by Dstl were disproportionate to any risk and lacked pragmatism.

7.4.7. This reflected a broader criticism of Dstl: that they had a narrow approach to safety. One person told the Review that Dstl *“just wouldn’t let go of some of those things and move on and think about how you actually move, go forward, and without stopping the programme for the next five years. . . . But there were, there are other means of demonstrating that they are safe.”* In other words, Dstl were seeking assurance for matters where the DE&S project team considered there was already industry real-world experience. Dstl were *“very narrow in their assessment . . . and how it fits into the bigger picture of the vehicle safety arguments sometimes.”* Dstl expressed concerns about the vehicles’ software, but it was explained that *“there’s a handbrake so if something does go wrong, you’ve got an extra level of control. There’s other elements of the system that might give us the ability to manage that risk.”*

7.4.8. Dstl were also criticised for failing to appreciate that the result of Recast was that only limited evidence was required for the earlier capability drops, as these were not the final deployable vehicle. DE&S witnesses suggested that Dstl were at times assessing safety against what was expected from the final vehicle.

7.4.9. The CEO DE&S in post during the period covered by the Review said that, in his view, the volume of advice, and a lack of prioritisation based on risk to life, overwhelmed the project team. The Review agrees that there was a large volume of advice; this was, however, a function of the number

of technical issues which were being addressed. Dstl also assigned RAG ratings to the issues raised in their regular reports, which gave an indication of seriousness. The Review agrees, however, that where a large number of issues are raised, prioritisation is important. In these circumstances, the DE&S project team and Dstl experts should work together so that the views of Dstl, as technical experts, on priority are clearly set out and understood [see Recommendation 2 after [7.4.15](#) below].

7.4.10. For their part, Dstl witnesses told us that they felt that, whilst some DE&S project team members listened and understood their concerns, others higher up in the team did not. The Review heard that the perception was that *“the senior leadership team within [the DE&S project team] were not treating this with the seriousness that it required”*. As a result, members of the Dstl team resorted to writing formal letters (with respect to the Safety Case and noise and vibration) in the hope that the issues would be escalated. The Review heard that the letters written were unusual and not normal practice within a project. When they considered that their letters had been ineffective, they went outside their reporting line to DE&S and worked with the Capability Safety team to raise matters with the LSSR. The fact that the Dstl team ended up going outside DE&S to raise concerns about the safety of the vehicles clearly indicated to the Review that the relationship between DE&S and Dstl was not functioning as it should have been.

7.4.11. It was Dstl’s function to provide independent scientific and technical advice. It was DE&S’ function to understand that advice and how it should be applied in the commercial and contractual context (Dstl were often unsighted on commercial or contractual matters). The Review has not sought to make findings on the technical issues that Dstl advised on. It may be that their advice was on occasion abstract or perfectionist, did not readily align with the contract, or was otherwise difficult to implement, and it is clear to the Review that the process of making judgment calls as to the appropriate compromise between ‘perfection’ and pragmatism clearly gave rise to frustration on both sides. Nevertheless, as the Dstl Platform Systems Head of Division told the Review, when advising on complex systems which are intended for use by humans in trials and in service, scientific advisers should be diligent and raise points of detail, in particular when they concern safety. The Review agrees.

7.4.12. With respect to noise and vibration, the advice given by Dstl in their reports and letters to DE&S was largely clear and practical. It also highlighted noise and vibration as a particular safety concern by writing letters and not simply by relying on the reports (which listed many concerns). Dstl were clearly prescient about potential safety problems. From the evidence seen by the Review, it appears that their warnings were in important respects vindicated: crews from the trials did report harms and injuries potentially caused by noise and vibration and extensive further work was ultimately undertaken in order to establish the true noise and vibration characteristics of the vehicles. The

Review considers that DE&S simply found it difficult or impossible, for commercial and time reasons, to implement Dstl's advice in full.

7.4.13. The Review also considers that DE&S, although it took into account Dstl advice and in important respects responded to it (for example, by instrumenting vehicles), were also sceptical of that advice. A better working relationship and communication with Dstl could have led to better decision-making and outcomes with respect to the concerns expressed by Dstl.

7.4.14. It also seemed to the Review that Dstl were not provided with sufficient information as to how DE&S were acting on its advice, or why it was being rejected. Dstl personnel explained to the Review that from their perspective a real problem was that *"Dstl are not properly in [DE&S'] OODA loop. We are firmly treated as a contractor. . . . It would help if we understand more about how it's been acted on"*, and for DE&S to then accept more challenge from Dstl as to what they are doing. The Review was also told that Dstl felt frustrated that they were not used more as a resource in meetings with GDLS-UK management.

7.4.15. To benefit more from Dstl's undoubted technical expertise, it would be sensible for Dstl to be treated less like a contractor to DE&S and more as a collaborator with them, working on solutions and not just identifying problems.

Recommendation 2. Dstl: DE&S and Dstl to work towards a more collaborative approach. Discussions should take place between DE&S and Dstl as to how Dstl can provide more effective input into DE&S's work, and how relationships and communications can be improved. This could include Dstl being provided with an explanation from DE&S as to how their advice is being acted on or not and the reasons therefor; and a greater opportunity for Dstl to provide suitable solutions for DE&S in overcoming technical difficulties. This could also include Dstl explaining to DE&S the order of priority of its concerns, where appropriate.

7.4.16. Furthermore, it seems to the Review that there needs to be a formal escalation route for Dstl to use within the MOD if their advice is not being heeded by DE&S.

Recommendation 3. Dstl: Establishment of a formal and recognised escalation route to SRO/3* Command Acquisition Support Plan owner/3*

Chief Scientific Advisor/DE&S Board where DE&S ignoring/not acting on Dstl advice on a project/programme in a way which Dstl considers is seriously wrong as to technical/safety/design matters.

7.4.17. Dstl were bound by their contractual relationship with DE&S as to who could see their advice. As a result, the SRO was not sent their quarterly reports as a matter of course. This was a clear flaw in the process, as it meant that the SRO did not have sufficient familiarity with the most significant technical and safety problems and therefore had less material with which to intervene and hold DE&S to account.

7.4.18. The Review appreciates that Dstl is contracted by DE&S to provide advice, and strictly speaking DE&S can set parameters as to whom Dstl can speak to and who can see their advice. However, Dstl sit within the MOD's wider family as an executive agency of the MOD and, where they are providing advice to a programme, there is no obvious reason why Dstl's advice cannot be shared with others involved with the programme. The SRO should also be informed, as part of the initial induction to the role, that they can access and engage with Dstl directly.

Recommendation 4. Dstl: Dstl's regular reports on each equipment project on which they are advising to be provided as a matter of course to the SRO.

7.4.19. Although safety experts from the Capability Safety team attended meetings at which Dstl subject-matter experts were also present, the Review also heard evidence that in the post-Recast period DE&S were reticent about allowing Dstl to communicate directly with the Army (the Capability Safety team, the Capability Directorate generally, and the programme team) outside these fora. Although DE&S witnesses explained that this was essential to enable them to balance Dstl advice with other sources of information, this was criticised by the Capability Safety team, who told the Review: *"bearing in mind we're supposed to be the Intelligent Customer, . . . why were Dstl never allowed to communicate to us? It was always straight through to DE&S, and then whatever DE&S felt they should be telling the customer we would get that directly from them. I could not understand that one."*

7.4.20. There is no obvious reason why Dstl should be prevented or discouraged from communicating with others who are working on the same programme.

Recommendation 5. Dstl: Collaborative working and direct communication between Dstl and the Front-Line Command Customer on equipment projects to be encouraged and supported.

7.5. Army

7.5.1. The Review considers that some decisions by Army Headquarters contributed to problems with the programme. Other reports have emphasised the problems which flowed from the Army's decision to specify key user requirements in such a way as to turn the acquisition strategy from modified off-the-shelf to bespoke [see [4.2.3.1](#)].

7.5.2. The emphasis on 'keeping to time' (including the dilution of capacity at IOC in order to meet time) was largely driven by Army Headquarters and was a source of problems with the delivery of the programme [see [7.9. Keeping to Time: Immovability of IOC](#)]. The Review considers that it is important for Army Headquarters to think through and assess the possible consequences of an emphasis on 'keeping to time' if this is proposed for other major programmes, using the Armoured Cavalry Programme as a vivid example of where 'keeping to time' can have deleterious effects.

7.5.3. The role of the SRO, the Army's main responsible officer for the programme, is considered at [7.6](#) below. The Review found that the programme team working to the SRO was significantly under-resourced, and this necessarily had an important impact on its ability to understand and respond to all the issues across the programme. The Review received no evidence to suggest that information flows within the programme team itself were impaired. In addition, the Review saw how the Programme Director developed good working relationships with some team members in DE&S, and with personnel from the Field Army, Capability Directorate, ATDU and Dstl. That facilitated the flow of information and sharing and understanding of concerns. The Programme Director was in post for a considerable length of time, from 2016 to 2021 (having volunteered to stay in post longer than was usual) and the Review considers that this was clearly beneficial for the programme.

7.5.4. The Review considers that there was good communication from the programme team to Army Headquarters. It did not receive any evidence that there were blocks to communication between the SRO and the DCGS (or on to the Chief of the General Staff). The SRO and the DCGS met regularly and frequently discussed the Armoured Cavalry Programme. The information exchanged at this level, and to the Executive Committee of the Army Board, however, was limited to information which the SRO himself had, and his own views on deliverability (and to a lesser extent the views of

senior leaders within DE&S). For reasons explained elsewhere, these were over-optimistic on the schedule and, prior to autumn 2020, missed the significance of the noise and vibration issue.

7.5.5. The Capability Directorate within the Army had responsibility for a number of areas key to programme delivery [see [5.3.1.1](#)]. Problems with the trials of the vehicles being conducted by ATDU (which sat within the Capability Directorate) were not formally escalated via the Duty Holding chain and informal escalations via the line management chain were not passed on to DCap [see [6.5.2](#) and [6.5.4](#)]. That was in part due to a ‘can do’ culture in the Army that prioritised shielding senior leaders from problems that could be dealt with at a lower level over raising concerns for guidance [see [7.8. Information flows: culture and leadership](#)]. As set out in more detail below [see [7.8.10. Escalation: noise and vibration](#)], the Review also received evidence that there was lack of clarity in the Capability Directorate over the escalation of safety concerns raised via informal routes outside the Duty Holding construct.

7.5.6. Other evidence about Army culture which had an impact on the successful management of the programme is referred to below [see [7.8. Information flows: culture and leadership](#)].

7.6. The SRO

7.6.1. From the Army’s perspective, the SRO role is critical, as it provides them with a single point of contact for the programme, and provides them with an individual who is ultimately responsible for the programme as a whole. This accountability and responsibility sits uncomfortably, however, with the Defence Acquisition Operating Model under which the CEO of the Delivery Agent (DE&S in this case) is accountable to the Public Accounts Committee for the delivery of their projects. Indeed, in correspondence between the CEO DE&S and the SRO in 2020, the CEO described “*An irony of the slightly confused accountabilities that exist is that it is likely to be me and [the Deputy Chief of the Defence Staff for Military Capability] that will be held to account at the various parliamentary committees scheduled.*”

7.6.2. Furthermore, although the SRO has direct responsibility and accountability for the Armoured Cavalry Programme, the Review found that for the equipment DLOD – the delivery of the vehicles – the SRO’s ability to influence, let alone control, events was very limited. The problem was structural rather than personal. The funding for all human resource (expertise) for the equipment project was provided to DE&S and not formally channelled through the SRO. Furthermore, the two SROs during the period with which the Review is concerned had limited time to devote to the

equipment DLOD given their extensive other responsibilities; they had few (if any) levers of influence; and their involvement and input were not really welcomed by the delivery agent DE&S, as DE&S believed it was solely their responsibility to deliver the equipment. The SRO during the period 2019-2021 explained that, in reality, he only had the “*power of personality*” or needing to escalate, all the way to the Defence Board if necessary, on each occasion where DE&S formed a different view to the SRO. He told the Review that this created relationship tensions, and ultimately inhibited collaborative behaviour.

7.6.3. The Review saw evidence that significant concerns and issues were discussed and decided within the DE&S chain of command without input from the SRO. DE&S did not involve the SRO in some key senior meetings and dealings with GDLS-UK which involved commercial aspects of the contract, although he did attend meetings involving the CEO DE&S. The Review also noted that, for example, an important exchange of letters between the CEO DE&S and CEO GD Corporation in January and March 2020 [see [6.6.1.5](#)] was copied to the Chief of the General Staff and CoM(L) but not to the SRO.

7.6.4. There was also no requirement on the part of DE&S to provide the SRO with all relevant information on the equipment project, including information relating to scheduling and to safety and technical challenges. Several people told the Review that information was not always forthcoming from DE&S. One person described DE&S as not wanting to share their “*toy set*”.

7.6.5. The SRO during the period up to April 2019 told the Review that DE&S did not, in his view

“...take the issue of SROs seriously. It did not feel as if there was consultation or they were in any way seeking to ensure that the Army was content with the way that was going to be pursued. . . We had to forcibly at times seek consultation or seek them to take into account the Army’s perspectives. It didn’t feel that there was a view that everything needed to come back to the SRO and the SRO had to make the final decision. It felt like other people in DE&S were making decisions and then telling the Army what they were doing.”

And that

“the natural instinct inside DE&S was to go up the DE&S chain to . . . make their decisions. It was not coming across to the Army to say, ‘This is our professional view on how we approach this – do you agree with it?’”

7.6.6. This reluctance to share information reduced the SRO's effectiveness in holding DE&S to account and in working with DE&S to move the programme forward.

7.6.7. The DCGS from August 2019 until August 2022 told the Review that the role of the SRO and the limitations of the role was "*misappreciated*" within the Army. He was expecting the SRO to run the programme and to highlight issues to him: "*Ultimately, he was responsible and accountable for delivering the programme*", which would include the equipment. However, the SRO's levers were "*Unbelievably limited*". DCGS thought that MOD had "*got this construct fundamentally wrong.*" They were "*fighting for information the whole time, they did not have full visibility. . . . The cultural understanding of the fundamental responsibilities of an SRO was lacking.*"

7.6.8. The Review considered whether a lesson to be learned from the Armoured Cavalry Programme was for the project team at DE&S to report directly to the SRO on major programmes, but have vertical line management within DE&S who would be responsible for performance reporting, resource allocation and technical support only. This could only be done effectively if the SRO was embedded in DE&S, and would run the risk of reducing the focus that the SRO needs to have with the other (and frequently important) DLODs. Furthermore, given their role as a contracting party, DE&S will need to play a role facing off with the manufacturer. This is appropriate, given that DE&S have far greater commercial experience and knowledge of industry than the SRO would be expected to have.

7.6.9. The Review concluded that DE&S ought to be able to have the greatest impact in their delivery role if senior management (DG (Land) and DLE) maintain the reporting line from the project team, and that the SRO should not have direct hands-on responsibility for the delivery of the equipment for a programme. The Review does consider, however, that the SRO should have a greater role to play in providing challenge to and holding to account DE&S. To do this effectively, the SRO requires access to all relevant information about the programme that DE&S have.

7.6.10. The Review cannot specify precisely what information should be routinely or proactively shared with the SRO, as much will depend on the nature of the programme and the stage which the programme has reached. The Review would generally expect this information to include regularly updated and digestible information about the schedule, key payment or contract issues, and key safety or technical problems. In the present case, it is clear that milestones were being missed and discretionary payments were being made without full information being provided to the SRO. As explained in the Chronology, the DE&S Project Manager's brief on missed milestones dated 8 January 2020 came as a surprise to the SRO [see [6.5.1](#)]. It should not have done. Further, and importantly, the SRO should feel able to ask, and DE&S should be willing to provide, information about any aspect

of the equipment project which is of interest or concern to him; as the Chair of the DE&S Board told the Review, the SRO should be able to “*go anywhere*”. This did not happen.

7.6.11. Witnesses to the Review did not raise any significant concerns about other DLODs within the Programme, or the provision of information from other DLODs to the SRO. As a matter of principle, applicable to other major programmes, the Review recommends that the SRO should be provided with all relevant information in respect of all DLODs (for example, Infrastructure, Training, and Logistics).

7.6.12. The Review heard that communication and information flows with the Field Army were well managed, and this needs to be encouraged for all major programmes.

7.6.13. The Review considers that the mechanism for enforcing the provision of information should be through the Programme Board. There can then be escalation to the DMPP Sponsor Group where the SRO feels that any Delivery Agent or Enabling Organisation is not living up to expectations.

7.6.14. The threshold for disclosure from the DLODs should be based on a duty to be candid: that is, there should be full and frank disclosure to the SRO of positive and negative information relating to the programme.

Recommendation 6. DLODS: Each of the DLOD leads for a major programme to be required to provide ‘full, frank and timely disclosure’ to the SRO of all information that is relevant to the DLOD that they are delivering; the SRO should use the Programme Board to ensure that the information is provided and should raise with the DMPP Sponsor Group if it is considered that any Delivery Agent or Enabling Organisation is not meeting the requirement.

7.6.15. With respect to technical and safety concerns, the Review understands that the SRO did not have access, or easy access, to relevant information. Dstl were contracted by DE&S to provide technical advice and support and reported to DE&S. They did not write directly to, or copy in, the SRO. The Review heard evidence that Dstl were told by personnel at DE&S that they should not communicate directly with the Army programme team. DE&S did not routinely report Dstl’s concerns to the SRO. This meant that he was not sighted on all of their concerns or the extent of their technical and safety concerns about the equipment. The Review acknowledges that it would not be appropriate

for the SRO to be copied in on all technical advice given to DE&S by their advisers. Nevertheless, the Review considers that the SRO should be sighted on key technical concerns, and there should be a mechanism which allows for this: a recommendation to this effect is made above [see Recommendation 4 after [7.4.18](#)].

7.6.16. With respect to payments, the SRO did not make decisions as to whether, and if so what, the manufacturer should get paid. An SRO is not provided – in their Letter of Appointment – with a financial delegation for contractual payment decisions as this is formally given to the Delivery Agent. As CoM(L) set out in an email to DLE on 18 September 2020 with respect to the making of discretionary payments to GDLS-UK: *“I am not seeking any ‘concurrence’ from HQ Army; this is a matter for DE&S”*. This is consistent with the post-Levene delegated operating model, under which DE&S have sole responsibility for commercial matters, including any payments in relation to the equipment projects that it is delivering.

7.6.17. It was explained to the Review that if the SRO had been sufficiently concerned about discretionary payments, he could have engaged with the Director General Finance (either directly or in conjunction with the Army’s Director Resources) to take greater control. This had happened in December 2017, when the then SRO gave a direction that during the Recast negotiations discretionary payments should not be paid without prior authority from Director Resources. However, the SRO did not make any further such direction, and it was appropriate for him not to do so. DE&S have greater commercial expertise and ought to be better placed to make the right calls.

7.6.18. The Review does not consider that the SRO should have specifically invited the Director General Finance, the Permanent Secretary or the Minister to intervene in payment decisions for 2019 or 2020. This is in contrast to the position in July 2021 when the Secretary of State instructed DE&S that no further payments should be made without his authorisation and on condition that contractual milestones were achieved. The Review acknowledges that direct intervention by the Secretary of State in July 2021 reflected the critical state of the equipment project at that stage and that it would not be and should not be an ordinary mechanism for control of payments.

7.6.19. Nevertheless, the Review considers that, where DE&S had formed the view that the contract allowed the withholding of payment to GDLS-UK, DE&S and/or the SRO should have informed the Director General Finance and/or the Permanent Secretary formally that they were intending to make discretionary part payments in order to incentivise early delivery and to try to guard against more significant delays, before payment decisions were actually made. This was not done. The Review accepts that there was no explicit requirement for senior leaders in DE&S to do so as such payments were provided for in the contract (and thus did not fall within the categories, identified

within their letters of authority/delegation, where they were obliged to refer the matter [see [5.5.3.2.3](#)]) and that the SRO had no formal role in relation to payments. However, notwithstanding any contractual underpinning, these discretionary part payments were controversial (the commercial lead within the DE&S project team during the period until mid-2020 and the Programme Director within the Army's programme team were opposed to them being made, and Members of Parliament subsequently expressed concern about the amounts paid to GDLS-UK given the amount of work still outstanding to deliver the programme). Informing the Department that DE&S were proposing to make the payments would have enabled the Director General Finance and/or the Permanent Secretary to ask further questions, provide challenge to the rationale for the payments, and decide whether or not to intervene and/or whether the matter should be raised with Ministers.

7.6.20. As a general matter, it is clear that the SRO does need to be fully informed and consulted in advance about proposed payment decisions where discretion is being exercised by DE&S and, in any event, where critical milestones have been missed and the contract provides the Department with the right to cease making payments. Whilst the Review accepts that such decisions require a commercial judgment which DE&S will be best placed to make, consultation with the SRO may provide a helpful and different perspective.

7.6.21. The Review recommends that this be formalised in every major programme:

Recommendation 7. Payment decisions: Where the decision to make payment to a manufacturer is at the discretion of DE&S, and not required by the contract, the views of DE&S as to the appropriateness of any proposed payment should be discussed beforehand with the SRO, and the SRO's views should be taken into account by DE&S before a final decision is made. Where the SRO and DE&S cannot agree, or where discretionary payments are likely to be controversial, the views of the MOD's Director General Finance must be obtained.

7.6.22. The size of the team working for the SRO on Ajax – four full-time-equivalent personnel -- appeared to the Review to be far too small for the size of the task that the SRO had: overseeing for the Army a multi-billion-pound programme, with all of the complexities of developing a vehicle from scratch alongside the other DLODs. The Review received evidence that the Programme Director sought additional resource on a number of occasions and raised the issue with the Infrastructure and Projects Authority Gateway review team, which recommended in its Gateway Review report dated 1

April 2019 that “*The SRO should provide additional resources to the Army HQ Programme Team in order to manage the scale and complexity of work to achieve IOC.*” This was stated to be “*critical*”, meaning it was of “*the greatest importance that the programme should take action immediately*”. Although the PMRS returns for 2020 indicate that some effort was made to augment the programme team, they also show that these increases were cancelled out by gaps (typically at least 30%). Resource was not increased.

7.6.23. The Review heard that the SRO had no real budget for expanding the size or expertise of his team. The Review was told that no SRO funding delegation exists for HR recruitment across either the programme or even within the Portfolio Office. In practice, this meant that any request for resource from the SRO for the Armoured Cavalry Programme would involve reallocation from another programme or from elsewhere in the Army, in circumstances where there was a lack of resource across the Army. As a result, the SRO during the period 2019-2021 explained to the Review that he suffered from “*learned helplessness*” around resources (that is, getting on with the resources that you have), and a chronic lack of capacity was normalised. The Review was told by one senior Army officer that the Army tended to pride itself “*making do with what we’ve got and not necessarily asking for help. It’s a very Army culture*”. The Review considers that this approach runs counter to good project delivery which requires programmes to be properly resourced.

7.6.24. As noted above [see [5.4.1.1](#)], the Army’s programme team has now been significantly expanded, to 29 full-time equivalent staff. The Review cannot say what level of resources should be allocated to an SRO working on a major programme, like the Armoured Cavalry Programme. There does need to be, however, a process for the scale of the task to be understood and appropriately supported.

7.6.25. The Review considers that the SRO for a complex programme ought to be able to make a formal request to Army HQ for provision of further resource, if necessary from outside the Programmes Directorate so that it is not simply made up from allocating personnel from another programme. There may be sound reasons for refusing this request, but to ensure that proper scrutiny is applied to Army HQ’s rationale, written reasons should be provided to the Defence Portfolio and Approvals Secretariat and the Permanent Secretary. The Review believes strongly that the process of writing out reasons makes for better decision making. It certainly makes it more transparent, allowing for scrutiny to be applied.

Recommendation 8. SRO resources: Army HQ to consider making available to the SRO resource to pay for additional (contracted) support/advice where

the SRO judges this necessary to reduce risk on complex programmes. Where a request for additional resource is made, and Army HQ refuse, a written explanation of the reasons for that decision be provided to the DMPP Sponsor Group.

7.6.26. On the Armoured Cavalry Programme, until October 2021, the SROs were 2* military personnel (Major Generals) who held the post of DSp, a very significant role in itself (see [5.3.1.2.1](#)). There was a steep learning curve to such a complex programme. This was even more pronounced given the other commitments that the SRO had. In addition to being DSp, he was SRO concurrently for four (subsequently reduced to three and then two) major programmes. The Review was told that any one of these functions amounted to a full-time role. It was not until October 2021 that a dedicated, full-time SRO was appointed.

7.6.27. In April 2019, when the incoming SRO was appointed, of the three programmes for which he was SRO, one programme was graded Red and required recovering; a second (the Mechanised Infantry Programme, (Boxer)) required development of a multi-billion Full Business Case for approval; and the Armoured Cavalry Programme had just been recast. The SRO explained that it took him around 9-12 months to become instinctive about the Armoured Cavalry Programme. It seems to the Review that there was a lack of portfolio-level leadership oversight in the decisions to attribute so many demanding roles to the DSp at the same time.

7.6.28. The Review understands that the lesson about 'bandwidth' for the SRO has already been taken on board by the Department: the October 2021 letter of appointment states that this is to be a full-time role. Accordingly, no recommendation in this regard is made.

7.6.29. The Review saw the paperwork surrounding the handover in April 2019. This seems to have been done well. The incoming SRO attended a Programme Board meeting before he took up his role, and an Infrastructure and Projects Authority review called for by the outgoing SRO, which made a series of recommendations with respect to the programme, was held just before his arrival in post.

7.6.30. It seems to the Review that to get the most out of an SRO, there needs to be a minimum period of tenure, and a structured handover preceded by an Infrastructure and Projects Authority review. The Review makes a recommendation that applies to the SRO, but also other key personnel, as follows:

Recommendation 9. Key personnel: SRO, Programme Director, other personnel designated as such on a particular project/programme by stakeholders should (unless competency or conduct issues arise) remain in post for a minimum period of 5 years and/or linked to key milestones/dates, and change-over should be staggered insofar as possible to avoid losing key personnel at the same time. Where key personnel leave, there needs to be a structured hand-over (overseen by the SRO or their delegate; and where the personnel are engaged by DE&S, overseen by DLE or their delegate), with up-to-date analysis of programme concerns provided. Where the SRO leaves and the Infrastructure and Projects Authority have not reviewed the programme recently, this should be preceded by an Infrastructure and Projects Authority review which will inform the incoming SRO of underlying programme concerns.

7.6.31. The Review received evidence of the use made by the SRO of a 'critical friend'. The individual was a member of the Staff Corps, which consists of Group B reservist officers who operate at predominantly chief executive, director, and senior technical or operation manager level in large commercial enterprises or organisations and provide the Army with a reach-back into UK industry.

7.6.32. The 'critical friend' on the Armoured Cavalry Programme told the Review that he provided support and advice to the SRO and Army programme team on the engineering safety side by reaching back into his own experience and into industry. His role had primarily been to help the SRO and the programme team to ask the right questions. He would typically sit in meetings and then have conversations with the SRO and Programme Director during which he would provide commentary on what had been said and comparators from industry.

7.6.33. The SRO and the Programme Director told the Review that they found the individual's advice and support very useful. The Programme Director told the Review that the individual helped them think through issues around the Safety Case, where there were different approaches being adopted by Dstl and DE&S, and he advised that they should aim to get the vehicle into the hands of the users.

7.6.34. The Review considers that the SRO of major programmes should be encouraged to seek out and use the 'critical friend' facility.

Recommendation 10. Use of ‘critical friend’ facility: On the establishment of a Category A programme, the Department should appoint a ‘critical friend’ to support/mentor/challenge the SRO on a regular basis.

7.7. Holding to account and assurance

7.7.1. Holding to account: Command Acquisition Support Plans and Programme Boards

7.7.1.1. In theory, the SRO could seek to hold DE&S to account through the Command Acquisition Support Plan mechanism and the regular associated Customer Review meetings, as well as via the Programme Board.

7.7.1.2. The Command Acquisition Support Plan included various milestones that DE&S were expected to achieve for their wide variety of programmes, in return for payment. These were generally set at a pretty high level, as the Armoured Cavalry Programme is only one of a number of Army programmes within Annex A (describing the programme of work to be carried out within DE&S’ Land Environment Operating Centre) to the Command Acquisition Support Plan: e.g.” *Delivery of a turreted AJAX variant to the Army in order to maintain the integrity of the IOC*”. In terms of impact, this was lessened by the fact that the figures were aggregated across the various programmes. The Review does not consider that more detailed milestones need to be included within the Command Acquisition Support Plan mechanism. However, it is essential that the SRO is provided with all relevant information, including about contractual milestones, so that they can hold DE&S to account [see [1217.6](#) above].

7.7.1.3. The SRO could seek to hold DE&S to account through the forum of the Programme Board. It was very difficult for the Review to assess whether the previous SROs did this effectively as the paperwork relating to the various Programme Board meetings that were held was thin. The SRO during the period 2019-2021 attributed this deficiency to resource problems; the Review has described the shortage of personnel referred to above and recognises that this necessarily placed constraints on the Programme Office. Whilst slide packs were produced, there were no routine papers produced for the Programme Board. The meetings were recorded in ‘Records of Decisions’ which included a very brief summary of the issue and an associated action, with some Records running to just a single page. There is no attempt to capture the discussion of the issue. Many of the Records of Decisions do not record who attended the meeting. It seemed from the slide packs and Records of Decisions that the topics for discussion were chosen on an *ad hoc* basis.

7.7.1.4. The lack of detailed paperwork makes it more difficult for anyone carrying out a scrutiny or assurance function to understand easily how well the Programme Board is being used, what topics are being discussed, or the reasoning for decisions being made. It also makes it more difficult for those working in the programme to recall and understand previous decisions, and check that there has been appropriate follow-up. For example, the first mention of noise and vibration issues being discussed at the Programme Board was in October 2020, when it is clear that concerns about noise and vibration, including potential impact on soldiers trialling the vehicles, had been percolating for some time. Some witnesses to the Review suggested that it was likely that some issues relating to noise and vibration were discussed earlier than October 2020. Without fuller record keeping, neither the Review nor others could verify or recall what was discussed. A lack of detailed papers to support the discussion is also likely to make decision-making at the Programme Board less rigorous, as the SRO does not always have available to them materials from which they can hold to account the owners of the various DLODs.

7.7.1.5. The Review recommends that measures should be introduced to make better use of the Programme Boards, and to make sure that discussions and decisions at the Programme Board are properly recorded:

Recommendation 11. Programme Board: Written reporting for the Programme Board on a [monthly/quarterly] basis (to align with the Programme Board meeting) produced by the SRO's programme team, made up of a short report from each person with responsibility for a DLOD and an overview document from the Programme Director.

Recommendation 12. Programme Board: Full minutes of the meeting, including detail of the essential points discussed (including any contrary views) as well as a record of any decision taken, to be produced.

7.7.2. Assurance

7.7.2.1. On many occasions, the scrutiny applied to the Armoured Cavalry Programme by those not working on it was perceptive and often prescient: see e.g. the Red Team review of the schedule to IOC conducted by DE&S in early 2019 [see [6.3.3.6](#)]; and the DMPP Sponsor Group meeting on 28

February 2020 [see [6.5.1.8](#)]. Those external to the programme seemed to get to the bottom of the key issues.

7.7.2.2. The Infrastructure and Projects Authority Gateway Reviews were successful in identifying key problems with the programme. That may in part have been because they discussed issues directly with team members who had a better feel and knowledge for what was actually happening and where the real risks were to the programme than their seniors, or perhaps were prepared to speak more frankly about those risks. They could also, standing back and using their expertise, see the wood for the trees in a way which those involved day to day in the programme could not. It was the Infrastructure and Projects Authority (in March 2021), and not the SRO, that first rated delivery confidence on the programme as Red. It was unfortunate that there was no Gateway Review during 2020, which might have assisted to identify problems at an earlier stage. The fact that the Infrastructure and Projects Authority did not conduct a Gateway Review in 2020 was probably the result of the COVID-19 pandemic.

7.7.2.3. The reports produced by the external reviews also made some very sensible recommendations for moving the programme forwards. There was, however, limited and selective follow-through on those recommendations by those running the programme and no follow-up by those conducting the scrutiny reports to see if the recommendations were being enacted. As a result, no party (whether internal or external to the programme) sought to understand why recommendations had not been implemented, and no challenge was made to the failure to implement these recommendations.

7.7.2.4. In particular, when an increase in resourcing/staffing was identified by the Gateway Review in April 2019 this seems to have been barely acted upon [see [6.3.3.8](#)]. This may well be because it was understood that no further resource (in particular, the suitably qualified and experienced personnel needed to accelerate work on the Safety Cases) was available. The lack of resourcing/staffing may well have impacted on the effectiveness of (i) the SRO holding DE&S to account; and (ii) DE&S working effectively with GDLS-UK on the technical and safety issues with the vehicles.

7.7.2.5. There was a failure of the Defence Portfolio and Approvals Secretariat to follow up on the Recast Information Note, where the Outletter stated that Deputy Chief of the Defence Staff for Military Capability “*would like to keep a close eye on Performance against the re-cast programme. Accordingly, a DMPP Programme Review will be scheduled by [the Defence Portfolio and Approvals Secretariat] to take place prior to the end of August 2019*”. Had this been done, there would have been a real opportunity to test the performance of the programme and whether the milestones towards

IOC were realistically going to be met. The Review considers that it is likely that this would have led to earlier identification that milestones were being missed, and to earlier intervention and support. To address these omissions, a general recommendation is made:

Recommendation 13. Assurance follow up: A mechanism for monitoring recommendations made by assurance/scrutiny reviews to be established (led by lead scrutineer, or in their absence by a Defence Portfolio and Approvals Secretariat nominee), and SRO to be challenged as to whether recommendations have been followed through and, if not, why. The SRO should also report back to the Investment Approvals Committee on progress against recommendations.

7.7.3. Assurance: Information and Review Notes

7.7.3.1. A Review Note is required to be submitted to the Investment Approvals Committee where formal approvals are adjusted as to performance, cost or time. An Information Note is just that, for information only. The Review did not receive any evidence that any particular threshold had to be met before an Information Note should be submitted: this was a matter of discretion for the SRO. The Review considered that the scrutiny conducted by the Investment Approvals Committee in response to Information Notes and Review Notes in 2018 and 2020 was not effective.

7.7.3.2. Witnesses to the Review had mixed views on whether, at the end of Recast, a Review Note should have been submitted to the Investment Approvals Committee. Senior leaders told the Review that it was acceptable for there to be an Information Note rather than a Review Note at this point, and this was the view of the Defence Portfolio and Approvals Secretariat at the time. Some senior personnel, however, including the Director General Finance, also expressed the view that with hindsight there should have been a Review Note. The choice not to submit a Review Note meant that an important opportunity for more detailed scrutiny by the Investment Approvals Committee of the arrangements being entered into was missed.

7.7.3.3. The Review considers that a major contractual renegotiation of this kind, which fundamentally alters the way equipment is to be delivered under a Category A contract, should ordinarily trigger a Review Note, even if technically it does not result in a change to performance/cost/time approvals. This is something which the Defence Portfolio and Approvals Secretariat should consider going forward, although no formal recommendation is made in this regard.

7.7.3.4. The Review considers that it would have assisted the Investment Approvals Committee if more information which addressed the negatives as well as the positives of Recast, as well as the on-going concerns and problems in the programme, had been provided by the SRO. Had that been done, it is possible that this would have triggered greater scrutiny by the Investment Approvals Committee, DMPP Sponsor Group, and potentially Ministers, and the problems latent in the Recast Agreement could have been exposed and considered at a much earlier date.

7.7.3.5. The recently appointed SRO decided in 2019 not to submit an Information Note or Review Note to the Investment Approvals Committee, despite being invited to consider doing so by the Programme Director, and despite the decision to adjust the definition of IOC [see [6.4.1.3](#) and [6.5](#)]. The Review does not consider that this was because the SRO wished to avoid scrutiny, although some witnesses told the Review that SROs are naturally reluctant to seek reapprovals unless all attempts to fix a programme have been exhausted. As a result, Information Notes and Review Notes are frequently only submitted by SROs if considered essential, and they are therefore not a form of assurance which is useful for regular monitoring of programmes. The Review was also told that Information Notes, and to a much greater extent, Review Notes can take a great deal of time and resource to prepare which is distracting and can exacerbate problems when a programme is already under pressure by redirecting resource away from programme management.

7.7.3.6. The scrutiny by the Investment Approvals Committee when an Information or Review Note was received on the Armoured Cavalry Programme appears to have been heavily reliant on a review of the underlying paperwork that had been submitted for that process, rather than direct conversation with the various stakeholders and more junior staff. The Review considers that steps should be taken to improve the Information and Review Note process, including direct contact with a range of staff (and, in particular, junior staff) by those scrutinising the Notes and advising the Investment Approvals Committee on their content.

7.7.3.7. The Review considers that the Investment Approvals Committee's scrutiny was also made less effective because the Information Notes and Review Notes seen by the Review recorded positive achievements without sufficient balancing detail on problems with the programme [see [6.3.3](#), [6.5.5.3](#) and Box L after [6.5.5.4](#)].

7.7.3.8. The Review also considers that the Investment Approvals Committee was impeded in its function in the case of the Armoured Cavalry Programme because the paperwork took a long time to prepare for submission, and the scrutiny process itself took some time. As a result, decisions of the Investment Approvals Committee were based on significantly out of date information. The effect of

this was that for the Review Note in 2020, the Investment Approvals Committee was not aware of the noise and vibration problems that were in the process of investigation, and had the potential to impact on the programme's performance and schedule.

7.7.3.9. To address these defects in the Information and Review Note process, there should be guidance to SROs (which will need to be shared with those involved in drafting the relevant Notes) that the SRO must consider themselves to be under a duty to be candid when preparing such Notes, so that sufficient detail of problems is given together with achievements, and that the SRO should continue to monitor progress in the programme with this duty in mind while the Investment Approvals Committee is considering the Note. Any significant event in the programme which calls into question information provided in the Information or Review Note should be drawn to the Investment Approvals Committee's attention.

Recommendation 14. DMPP/Scrutiny: SROs must consider themselves under a duty to be candid to the Investment Approvals Committee. Information Notes and Review Notes should give a balanced view of the programme and provide sufficient detail of problems (as well as achievements). The SRO must alert the Investment Approvals Committee promptly to any event that calls into question information provided in the Information Note or Review Note.

7.7.4. Assurance: DMPP Sponsor Group

7.7.4.1. The Review considered that direct questioning of and challenge to the SRO about the programme by experienced senior personnel in the DMPP Sponsor Group was a useful process. It enabled assessments about deliverability to be probed, and the need for additional assistance or resource to be identified and implemented (e.g. in the case of the Armoured Cavalry Programme, the number of programmes assigned to the SRO was reduced, in order to free up his capacity). In the case of the Armoured Cavalry Programme, however, there was no meeting of the DMPP Sponsor Group prior to February 2020, and no follow-up meeting until a further meeting was triggered when the Infrastructure and Projects Authority Gateway Review gave the programme a Red rating in March 2021.

7.7.4.2. The Review understands that the oversight by DMPP Sponsor Group (which provides support and challenge to the SRO) is a 'by-exception' process, and that routine in-person updates

are not requested. The process by which a programme such as the Armoured Cavalry Programme would be called before the DMPP Sponsor Group was *ad hoc*, and could be triggered by a request from the SRO, or instigated by the Defence Portfolio and Approvals Secretariat if they had reason for concern.

7.7.4.3. The former trigger (request from the SRO) is somewhat problematic given that within the Army culture (as described by various persons to the Review) there is a reluctance to escalate a problem in circumstances where a potential solution has not yet been found. As a result, reliance on an SRO (with an Army background) proactively going to the DMPP early for information only, or to seek support, is not reliable.

7.7.4.4. The latter trigger (Defence Portfolio and Approvals Secretariat instigation) did not appear to be formalised in any way, and the extent to which the Defence Portfolio and Approvals Secretariat acted proactively turned on the approach adopted by the individual in charge (there was a change to a more pro-active approach when a new Head of the DMPP team within the Defence Portfolio and Approvals Secretariat was appointed in March 2020).

7.7.4.5. A better system would be to have more frequent in person updates, thereby introducing a more proactive oversight mechanism. The updates would also allow for consideration by the DMPP Sponsor Group of the current situation with a programme. The PMRS process involves the writing of reports for the previous quarter, and is therefore a record and analysis of somewhat historic data (e.g. the PMRS for the third quarter of 2019/20 was submitted on 15 January 2020). The Review considers it may be helpful for meetings of the DMPP Sponsor Group for major programmes to occur on a more regular and structured basis.

Recommendation 15. DMPP/Scrutiny: More frequent (the period or trigger to be considered by the DMPP), formal, in-person update by the SRO to the DMPP Sponsor Group, thereby introducing a more proactive oversight mechanism.

7.8. Information flows: culture and leadership

7.8.1. Summary

7.8.1.1. The evidence obtained by the Review demonstrates that in a variety of contexts information did not flow appropriately to those who needed to know, or would have benefitted from knowing, that information. Optimistic and positive messages were often conveyed to the Centre, with the effect that the real level of risk to the programme was not fully appreciated. The Review saw no evidence, however, that information was deliberately withheld as a result of the impending Integrated Review, although sensitivity about the Integrated Review may have led to more optimistic or positive messages being conveyed to the Centre [see Box M after [6.5.5.4](#)].

7.8.1.2. The Review did not receive evidence that any specific information was not communicated due to problems with ‘psychological safety’: described as “*a sense of confidence that the team will not embarrass, reject or punish someone for speaking up*”.⁵⁷ Nevertheless, it does appear to the Review that an absence of psychological safety did impact negatively on a number of individuals working on the programme, and for some it influenced the way in which information was reported.

7.8.1.3. The Review heard that the Department attaches great importance to creating the necessary conditions for escalation of information. A number of those interviewed by the Review acknowledged that with respect to safety issues these conditions had not previously existed within DE&S and the Army to the same extent as in the Royal Air Force where this culture was “*very strongly ingrained*.”

7.8.1.4. The Review identified a number of occasions in which information was shared outside of the chain of command because of a perception that those in senior positions were not listening or acting on the information that had been shared with them.

7.8.1.5. The Review received evidence from a number of different persons expressing concern that the rationale for decision-making was not cascaded downwards, with the effect that they were kept in the dark as to what had happened with the information that they had shared. This reinforced the perception that they were not being listened to. It is likely that this contributed to a reduction in morale among lower ranking staff, and probably led to inefficiencies within the organisations where they were employed. It also explained why in some cases information was shared outside of the chain of

⁵⁷ Edmondson, A. “Psychological Safety and Learning Behavior in Work Teams,” *Administrative Science Quarterly*, 44(2) (1999), pp.350–383. <https://doi.org/10.2307/2666999>.

command. A clear example of this was the exchange of information between the Capability Safety and the Dstl teams, and their approach to the LSSR. In the case of the Capability Safety team this bypassed the chain of command within their team and the Capability Directorate, and in the case of Dstl this bypassed the normal reporting line into DE&S.

7.8.1.6. In a number of areas, the Review saw evidence that individuals failed to appreciate the importance of providing information for ‘situational awareness’: that is, making senior personnel aware of information for its own sake. This was especially the case with concerns about noise and vibration. Situational awareness is valuable in that (i) it adds to the collection of information that senior personnel have and which can inform their decision-making or advice; (ii) it gives them advance warning if they are challenged on that situation by third parties; and (iii) it allows senior personnel to bring their expertise to a problem and can lead, in certain circumstances, to earlier and appropriate interventions.

7.8.1.7. The Review also received evidence of the ‘glossing effect’: that is, where information is escalated up the chain of command it takes on a different and often diluted interpretation as individuals use their own language to describe the information in question.

7.8.2. Psychological safety

7.8.2.1. It was reported to the Review that senior personnel at DE&S acted in various 3* review meetings as if they believed GDLS-UK more than the project team, and the effect of this was that some junior members of the project team did not regard the review meetings as a psychologically safe environment in which to raise concerns.

7.8.2.2. Another member of the DE&S project team told the Review that they expressed their view orally that the schedule for the equipment programme was wholly unrealistic, and did not put it down in writing because they were concerned it would not land well with leadership and could be “*career limiting*”.

7.8.2.3. The Review also heard that the Commanding Officer ATDU did not feel supported when raising concerns about noise and vibration in the trials. This did not stop him raising those concerns (and so the Review does not consider there to have been a problem with psychological safety), but the Review considers that it may have been a factor which contributed to his agreement to continue with the trials at various points in 2020 and 2021.

7.8.2.4. The Programme Director also explained that at times he felt he was a “*lone voice*” raising concerns about the equipment project and the Review could see from his communications that he adapted the way he expressed his views to avoid being perceived as overly negative.

7.8.3. Going outside the chain of command

7.8.3.1. On a number of occasions, the evidence demonstrates that individuals skipped links in their chain of command, or went outside their reporting line or chain of command entirely to a different entity within the MOD, to report information or opinion. These individuals did not consider themselves to be ‘whistle-blowers’⁵⁸. But the effect of what they were doing was to express concern to those who they perceived as having a ‘need to know’ and may not otherwise have got the message, or who they believed could more effectively escalate and gain traction with the relevant seniors. The leaking of the Infrastructure and Projects Authority’s Gateway 4 report to the media may also have been a misguided attempt to ensure the Department faced up to bad news about the state of the programme.

7.8.3.2. This bypassing of the chain of command can be seen starkly in the Army Capability Safety team and Dstl team communications to the LSSR [see [6.5.4.3](#)]. The teams were explicitly using the Regulator as a means to attract attention; a communication at the time between team members remarked that it is “*amazing how many people react when you step outside the normal chain and stir things up*” and that the LSSR report, although rescinded had “*certainly put the cat amongst the pigeons*”.

7.8.3.3. It is also reflected in the reporting by the LSSR itself, where no attempt was made to make senior personnel aware of the report that was being prepared and sent out, even though it was known to contain provocative material [see [7.8.4](#)].

7.8.3.4. A team member at DE&S described how on some occasions in 2020 they copied in their second reporting officer (DLE) on their emails to the 1* VDM Team Leader as they were not convinced that their line manager would “*go into bat*” with GDLS-UK. The Review was told that “*I could give him stuff but I’m not sure that it would get action. So, I’d cc*” DLE.

⁵⁸ The MOD has a “Raising a concern” policy. This is currently set out in Joint Service Publication 492, “Defence Ethics, Propriety and Standards” (March 2023). The Review was told that the policy does not only apply to suspected wrongdoing (albeit that term is used throughout the policy) and is intended to be the principal route for reporting a wide range of concerns. Further, the Review was told that MOD personnel have used the Confidential Hotline to raise concerns in relation to at least one equipment project.

7.8.3.5. A member of the project team at DE&S described how the Programme Director would ask them to give him their thoughts about matters that would be useful for the SRO to put in correspondence that he was sending out. That way, the views of the DE&S team could influence decision-making.

7.8.3.6. Similarly, a member of the project team at DE&S described how during 2020 a small group of DE&S project team members would speak to the Programme Director and share their concerns about the project with him together with supporting information (e.g. about the contractual obligations that GDLS-UK owed on the ARES vehicle) that might be used by the SRO. The hope was that by drawing concerns and information to the attention of the SRO in this way they would find an alternative route to getting their voices heard by DE&S leadership and result in more effective holding to account of GDLS-UK. It was apparent that the project team members felt that this was outside the normal reporting mechanisms and not fully approved of by DE&S leadership. They said that this was “*a very difficult thing ... it’s kind of like we’re sort of not supporting our seniors by providing information to the Programme Director. But we felt it was morally ok. Because we knew we had to do something to get the programme “sorted”*”.

7.8.3.7. In the examples seen by the Review, going outside the chain of command, or skipping a link in the chain of command, seemed to be quite effective in getting the particular message across. The Review did not consider that this process was used by individuals because of a lack of ‘psychological safety’, but because they felt that the response to their concerns from their ordinary reporting line or chain of command was inadequate. However, this process cannot be relied upon as a way of achieving a positive result in every programme, as too much depends on the audacity of the individuals involved. As one witness told the Review, going outside the chain of command could be ‘career limiting’. Furthermore, going outside the chain of command can be undermining of the hierarchical structure and the trust and confidence that there needs to be for normal working relations to function.

7.8.3.8. It seems to the Review, therefore, that formal mechanisms should be put in place which address the blockages that lead to individuals going outside of their chain of command to convey important information. The Review considers that personnel should be given the opportunity, anonymously or otherwise, to convey their concerns to a nominated person at 1* level or above who sits outside of the programme. Ideally, this would be a single person for the entire programme, so that they could take an overview of issues raised across the different MOD entities involved in programme delivery. That individual will have responsibility for listening to and, where appropriate, acting on the raised concern. This could include dealing directly with persons higher up in the line management or chain of command. The Review does not wish to prescribe who that person is, although it is

appreciated that the relevant person could sit within the Defence Portfolio and Approvals Secretariat or the Directorate of Acquisition and Project Delivery, where it is likely that they will have some knowledge already of the programme in question and will also have considerable experience of liaising with senior officers and officials of similar programmes. Consideration should also be given to whether this process should be integrated with the MOD's Raising a Concern policy [see [7.8.3.1](#) above].

Recommendation 16. What to do when hitting a “brick wall”: Where personnel working anywhere on a programme feel that they have hit a ‘brick wall’ with their line management/chain of command in raising a concern about the programme, they should have the option of raising that concern with an individual of [1* status or above] who is external to the programme. That individual will have responsibility for listening to and, where appropriate, acting on the raised concern. This could include dealing directly with persons higher up in the line management or chain of command.

7.8.3.9. In addition, it is less likely that individuals will communicate outside of their chain of command if they understand what has been done with the information that they have provided to their line report, what has been done to act on their concerns, or the reasons why no action has been taken. There may be good reasons for not following through on the information that has been provided, but if this is not communicated then it may be interpreted that the information was simply ignored or not appreciated. Furthermore, learning of the reasons may encourage greater dialogue within the reporting chain.

Recommendation 17. Information flow down the hierarchy: Record to be made of key decisions and dissemination of the record and reasons therefor down the hierarchy to the relevant team (whether project, programme or safety reps, including reviews at the 1*, 2* and 3* level, and meetings with industry).

7.8.4. Provocative words and actions

7.8.4.1. Similarly, the Review received evidence that individuals would use provocative words and/or actions to ensure that they were properly heard.

7.8.4.2. The authors of the LSSR report intended for their work to have an impact. One of them acknowledged that it was a 'provocative' act, but said that he considered it was what the Regulator was supposed to do when a serious safety issue with a vehicle apparently causing injury to soldiers was drawn to their attention. The 'provocative' act was, in fact, partially successful. It did not lead to a pause in the programme as the authors had recommended, but it did lead to an increased focus being placed on safety issues by different stakeholders, including consideration by some senior personnel involved with the programme. As the 1* VDM Team Leader stated in his email in response to the report: "*You have my attention*".

7.8.4.3. Similarly, the Commanding Officer ATDU explained that he would use 'provocative' phrases to grab the attention of his readership. He told the Review that "*There's a sense of like you've got to create a shock factor for someone to be interested. . . . I think throughout my time I was trying to find anchors that would bring this to life for people. So the Chernobyl thing was probably because I was watching the series at the time. The Haddon-Cave⁵⁹ thing was for me, . . . because people were raising red flags all over the place, but no-one put the picture together. And the Army is still yet to have its Haddon-Cave moment. And if it isn't out of Ajax, I don't know what it's going to be, but it's going to be bad. It's the real issue.*"

7.8.4.4. In the Commanding Officer ATDU's case, the language that he used did succeed in grabbing the attention of his readership, and led to a search for a reasoned response to his concerns. However, it seems to the Review that this is not a sensible way for information to flow, as it requires a certain degree of audacity to act in that way (and not all personnel will be willing or capable of so acting) and it may not achieve the right result. It could, in fact, lead to a negative response with the recipient focussing on the tone of what is being said rather than the message, or dismissing a serious concern because the person raising it has a reputation for being provocative.

⁵⁹ Charles Haddon-Cave QC, "The Nimrod Review: An independent review into the broader issues surrounding the loss of the RAF Nimrod MR2 Aircraft XV230 in Afghanistan in 2006," HC 1025, 28 October 2009, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/229037/1025.pdf

7.8.5. Hearing other voices

7.8.5.1. Some members of the DE&S project team told the Review that they felt that to get their message across it was often useful to have the Army representative express their view. Thus, they worked with the Programme Director to produce a slide expressing the view of the SRO and the Army for the 3* reviews with GDLS-UK. The Army's voice amplified the message that the DE&S project team wished to deliver. One DE&S project team member explained that having the Programme Director attend some of the 3* meetings, was *"very useful"* because he could ask questions that others wouldn't ask: *"having Army press a point could jar a memory or could force a discussion."*

7.8.6. Voices from the shopfloor

7.8.6.1. Evidence presented to the Review showed that those working on the ground, 'on the shopfloor' or 'at the coalface', frequently had a better understanding and feel for what was really happening with the programme (whether that be with respect to the schedule, or safety concerns such as noise and vibration) than DE&S senior leadership or the SRO. Their voices did not always appear to be listened to, however, and their concerns were not escalated without *"further evidence"*. One person working with the DE&S project team told the Review that his seniors should *"listen to the guys that are doing the job. . . Listen to the guys that are on the ground, and actually trust us"*.

7.8.6.2. The Review considers that the absence of comprehensive or definitive evidence for a particular position or opinion should not be a reason for non-escalation, especially when it is combined with other data points, and where it comes from individuals with particular experience or expertise, even if without senior rank. This was seen most clearly in the treatment of the expressions of concern about noise and vibration by ATDU crews [see [6.5.2](#)].

7.8.6.3. The Review also saw evidence that the way in which information is utilised may turn on who is present at a particular meeting. The hierarchical nature of the Army and DE&S meant that there were times when the person with the best grasp of the information was not invited to attend. A member of the DE&S project team, for instance, informed the Review that he believes that he should have been in the 3* review meetings given that he had *"pulled all the information together"* and could be used at the meeting as if he was *"a Red Team"*. The Review appreciates that meetings must be conducted in an orderly way, in particular when engaging with industry, but it also agrees that it is important that rank does not exclude participation by those with relevant expertise and knowledge.

7.8.6.4. The Review considers that programmes would benefit from formal mechanisms in which voices from the shopfloor can be obtained and then conveyed. This should increase morale among the workforce, but also ensure that senior personnel are apprised of a variety of opinions and judgments, which may improve their own decision-making.

Recommendation 18. Information to senior personnel at DE&S [1*-4*] and the SRO: PowerPoint and other written briefings to include at least one slide/paragraph reflecting any dissenting/contrarian opinions from personnel serving in the first and second levels below that of the person giving the briefing (and where the person giving the briefing is at 2-3* levels, from personnel serving in the relevant level 4 and above).

7.8.6.5. Morale can also be improved by being careful not to use language that might undermine more junior members of the team. The Review heard reports that the views of a more junior member of staff expressed during a meeting with GDLS-UK and GDLS were rejected by a senior leader in inappropriate terms. This had the effect of making other junior staff members feel undermined.

7.8.7. Thresholds: 'For Action' vs Situational Awareness

7.8.7.1. In a number of work areas, personnel did not escalate concerns unless a certain threshold of risk had been crossed, or until they believed that a risk had materialised and become an issue. This was consistent with some of the guidance documents that were shared with the Review [see [5.5](#)].

7.8.7.2. DCap explained to the Review that he did not expect all information to be raised with him. That is understood and appreciated. Senior personnel do not have the capacity to take on board all information about a programme or project that their subordinates are working on, and there is much positive to be said about encouraging more junior staff to resolve their own problems without raising these with their seniors.

7.8.7.3. In his evidence to the Review, DCap vividly depicted a sideways 'figure of eight' description, where information is held on one side of the figure and only some information penetrated to the other. DCap's reflection as to what happened with noise and vibration was that individuals genuinely thought they or others were resolving the issue satisfactorily and they believed they did not need to raise it with him. As a result, the information did not cut through to the other circle.

7.8.7.4. The Review found that DCap was a receptive leader who encouraged communication. The Review considers that the officers below him were nevertheless keen to deal with problems themselves, rather than take up DCap's time (the 'leave it with me' approach) and that was a significant factor in the failure to escalate the noise and vibration concerns to him in a formal way, so that he could fully appreciate those concerns and consider whether intervention by him was necessary.

7.8.7.5. Similarly, the Review considers that DLE encouraged communication and listened to his team members. Nevertheless, the VDM Team Leader decided to deal with the issues concerning noise and vibration at team level; for him the issue at that stage was only one of many risks rather than an evidenced problem. He explained that *"if I start escalating the risks that I've got on this programme, with the benefit of hindsight, I will escalate every single one. . . . We would be reporting all manner of things, which would be hugely unhelpful for everyone."* He updated DLE and CoM(L) in mid-July 2020 on a range of issues, including a perceived increase in vibration by trials crews above a certain speed and planned instrumentation tests for noise and vibration. He did not go into detail about the experiences and concerns being expressed by crews at this stage. He explained that, at that stage, noise and vibration was only one of many risks and the technical evidence to support the existence of a problem was contested and in the process of being obtained.

7.8.7.6. Another individual involved in the programme who had an Army background described the culture of the Army as one where personnel are trained and adapted to *"overcome situations"*, and where *"you've got to be quite positive"* and *"have a 'can do attitude'"*; military people are *"at heart . . . designed to win"*, the military mindset is *"in the face of adversity . . . to comprehend all the complex information and then work out winning strategies."* According to this individual, what is not welcome is someone being *"a bit negative in a corner'."* He told the Review that this leads to *"self-censorship"* and to people trying to deal with issues at their level or the level below because by elevating it you are giving the more senior person *"a headache"*. This individual told the Review, and this was also reflected in his written communications in the programme, that *"you don't want to come across as being too shrill"* and giving a differing opinion too forcefully *"over and above what normally would be the respectful way of saying things up the chain of command"*.

7.8.7.7. This approach was explained to the Review by the Minister for Defence Procurement during the period from February 2020 to September 2022 who stated that the Armed Forces encourage people to be resilient and to take their own decisions. The Minister stated that in some areas there is a feeling that if you need to elevate something through your chain of command *"you've slightly failed"*. In the Army's normal line of work – on operations – the Minister could see how that approach was to

be welcomed. However, he questioned whether the same approach should apply in complex procurement, where *“the traits you need are a willingness to seek advice, to raise issues, to be questioning, to be an intelligent customer.”*

7.8.7.8. The Review considers that initiative and resolution of issues at lower levels if possible is to be encouraged, but this should not impede the formal presentation of information for awareness. Furthermore, the seeking of guidance on difficult issues, in particular if they relate to safety, should be encouraged.

7.8.7.9. In order to address these concerns the Review considers that guidance documents (and training for personnel working on major programmes) should consistently encourage the formal raising of information for ‘situational awareness’. The Review was particularly impressed by the approach that DLE described to raising information. DLE told the Review that he adopts the approach of dropping *“a pebble not a rock”*, and he said that he did this with CoM(L). That way, he felt, that he had a better chance of shaping the decision-making.

Recommendation 19. Information up the chain of command: All formal guidance documents (and training on those documents) to include a requirement for personnel to escalate concerns for awareness, and not merely for personnel to escalate in circumstances where the individual/risk owner cannot resolve the matter themselves.

7.8.7.10. With respect to emerging, but not conclusively evidenced or confirmed, concerns around safety – where there are ‘seeds of doubt’ about a safety matter – the Review considers it all the more important that this approach is adopted.

Recommendation 20. Raising safety concerns: All personnel working in a programme should escalate safety concerns where there are ‘seeds of doubt’ about a matter, even if not fully evidenced, through relevant reporting lines including as appropriate within Army Programmes, DE&S, Dstl, and within the Duty Holding Construct.

7.8.8. Lack of Clarity

7.8.8.1. A number of witnesses told the Review that clarity of communication was lacking at times. This impacted on the seriousness with which senior personnel took the information that was being provided to them 'up the chain' and made it more difficult for them to hold GDLS-UK to account.

7.8.8.2. A DE&S project team member stated that in his view, the team "*weren't very good at controlling the narrative, articulating it clearly to the seniors.*" This was addressed by the project team "*tracking loads and presenting that data*", that helped gain the buy-in of the seniors.

7.8.8.3. It was apparent that a wide range of approaches were used on the Armoured Cavalry Programme for the communication of facts and opinions and for escalating information: there were PowerPoint presentations, briefing notes, IRTB briefing documents, emails, formal meetings and, of course, casual conversations. The approach that was used turned on the personality, previous experience, or initiative of the team member. For instance, the Programme Director told the Review that he started raising his concerns to the SRO in writing because of a suggestion from a colleague. One of the project team at DE&S used the IRTB approach as this was something he was used to from his military background. Safety issues seem to have been dealt with almost entirely in meetings, without there always being a full or proper record of the reasoning for any decisions reached.

7.8.8.4. Generally, it seemed to the Review that there was an over-reliance on the use of PowerPoint slides presented at a meeting, and that meeting discussions and decision making were frequently not properly recorded. It was often very difficult from the documentation to understand what (if anything) had been decided and why at a particular meeting, and there was often no cascading of decision-making down the hierarchy.

7.8.8.5. The Review recognises the utility of PowerPoint slides as aides to presentation at routine meetings and of email, but found that it was the written briefs on specific significant issues which better engaged senior leadership attention and understanding. They are also more readily understood and disseminated onward without the need for further oral explanation, as is required by slides. Writing briefs provides a useful discipline to make people analyse, summarise and consider evidence. They also provide a useful record of thinking and, where relevant, actual decision-making which can assist corporate memory. Good examples of these were the Project Manager's January 2020 brief; internal DE&S briefs on payments; and the Programme Director's briefings to the SRO on the deliverability of IOC [see [6.5.1.1](#) and [6.4.1.6](#)].

7.8.8.6. A recommended approach could be to use written briefings which are similar to the IRTB to record significant issues. Team members should be aware, however, that the 'recommendation' does not always require a complete solution, or even a specific recommendation, it can simply be that information is provided for situational awareness or for a steer, advice, a second opinion or a sense check where a team member is not sure how to proceed or needs assistance. It is also important that the briefing is written and structured in a way which ensures that the more senior personnel who are reading the briefing engage with the problem, and understand the reasoning that lies behind the recommendation.

Recommendation 21. Information up the chain of command: Consideration should be given where significant issues arise for briefing documents to include issue, evidence, advice sought, timing of advice sought, and (where relevant) statement (with evidence) of concerns being looked at, and state whether it is raised for information only or for action. Formal training to be given on preparing and reading briefing documents.

7.8.9. Reporting on delivery confidence to the Centre

7.8.9.1. A major problem with the programme was unrealistic scheduling. Slippage in the schedule was not adequately escalated within DE&S or by DE&S to the SRO during 2019 [see [6.4.1](#)]. Thereafter, whilst during 2020 work on producing a realistic risk adjusted schedule was escalated and reviewed in detail up to 4* level within DE&S, and by the SRO, there remained optimistic reporting to the Centre of the likelihood of meeting IOC dates, FOC dates, and Army Joint Force commitments for 2023 and 2025.

7.8.9.2. A notable example of optimistic reporting into the centre on schedule is the PMRS report for the second quarter of 2019, which was submitted on 16 October 2019. At that time, the SRO had been informed by his Programme Director that, in his view, the chance of achieving IOC in July 2020 was 10%. This assessment was not reflected in the PMRS report that was submitted to Defence Portfolio and Approvals Secretariat. The PMRS report stated that: "*The Delivery Confidence Assessment (DCA) remains at Amber . . . The delivery of IOC is challenging but remains achievable*".

7.8.9.3. Strictly speaking, it could be said that a 10% chance of something happening is "*achievable*", and so the narrative was not misleading. But that is hardly realistic. Any reasonable reader of the PMRS, looking at the narrative, along with the RAG rating of Amber, would reasonably

expect that there remained a fair chance that the IOC would be met in July 2020. The more positive outlook was also presented to the Executive Committee of the Army Board by Head Integrate on 10 October 2019 [see [6.4.1.8](#)].

7.8.9.4. The SRO explained his narrative as him making a “*judgment call*” as to the prospects of achieving IOC, taking on board a range of factors, including the opinion of the DLE in post in 2019 who had told him that to say that IOC “*will not*” be achieved on schedule would be to use the wrong verb; he recommended saying that delivery “*remains challenging and is therefore at risk. However, it is still achievable*”. The SRO believed that the then DLE would have a good understanding of the project’s progress and prognosis. The Review does not consider that this judgment of the SRO can be criticised, given the advice he was being given by the then DLE who could reasonably be expected to have a better judgment of deliverability of the equipment project than the Programme Director, although it would have been sensible for the SRO to insist on seeing the underlying scheduling information on which the then DLE’s assessment ought to have been based. Objectively, however, the then DLE’s judgment was far too optimistic given all the delays that had affected the programme up to that date and the absence of reason to believe that things would be turned around in the near future.

7.8.9.5. There was nothing to stop the SRO from mentioning the Programme Director’s more pessimistic views in the PMRS, but this was not required. The format was designed for the expression of one person’s view, fitting in with the notion that the SRO was accountable for the delivery of the programme and it is the SRO’s judgment that the reader of the PMRS wishes to understand.

7.8.9.6. The Review considers that this is a flaw with the PMRS process. The PMRS process relies heavily on the judgment of the SRO. It is clear, however, that the SRO’s judgment is not infallible, and yet the PMRS process does not clearly capture dissenting or contrary voices. One of the key lessons from the Review is that dissenting and contrary voices should be encouraged and listened to. The Review considers that a well-informed Centre ought to be aware of those different voices so as to have situational awareness, but also to consider whether interventions were required, including further support to the SRO.

7.8.9.7. Systematic encouragement of those different voices in the reporting system should not undermine the position of the SRO. Indeed, the Review considers that presenting different voices will actually have the effect of encouraging the SRO to be even more confident in their own position in case they need to justify their judgment to the Centre.

7.8.9.8. The Review considers that measures should be taken to mitigate against the ‘glossing’ effect, and to address optimism bias (see further below). This can be done by encouraging the SRO to provide a ‘warts and all’ narrative in reports to the Centre. The Review saw reports where the narrative material tended to emphasise the positive elements of the programme, and the negative elements were either down-played or were buried in the data and tables which lay beneath the narrative. The narrative sets the tone for the PMRS as a whole, and is likely to be the part of the report that gains the most attention. It was evident to the Review that the narrative was used to inform other documents: e.g. submissions to Ministers and communications with the Executive Committee of the Army Board, and so the imbalance in the narrative played through into the latter communications.

7.8.9.9. The same approach should also be adopted for submissions to Ministers. The Minister for Defence Procurement between February 2020 and September 2022 told the Review that “as a Minister it is really, really helpful to hear a wide range of views in order to provide challenge to the system”. The Minister was deprived of this wide range of views when being informed of the progress made with, and prognosis for, the Armoured Cavalry Programme. In addition, there should be an encouragement to provide a ‘warts and all’ narrative to Ministers.

Recommendation 22. Information to the Centre: The PMRS, and submissions to Ministers, to include space for comment/opinion of dissenting or contrarian voices as to concerns/state of the project, from within the programme team. SRO to confirm within the PMRS and submissions that they have sought out these voices. SRO to be encouraged to set out difficulties and issues with the programme in the narrative of the PMRS and Ministerial submissions, along with achievements.

7.8.9.10. The Review considers that there is a further flaw in the PMRS process, which requires the programme team to take management information from other sources and put it into the PMRS format. The Review found evidence of information having been ‘cut and pasted’ and of being copied (including errors) from one quarter’s return to the next. The Review was told that, on receiving the PMRS returns, the DMPP team manually extracts the information that it requires e.g. to feed into the Performance and Risk Review process or for inclusion in the quarterly Government Major Projects Portfolio returns. Such manual processes are time-consuming and inefficient. Whilst it is obviously critical that the MOD’s processes and systems support effective sharing of high-quality management information, it is beyond the Review’s Terms of Reference to specify the technical means by which this should be achieved. In any event, the Review was told that the Department is working to improve

the quality of its management information through greater automation. Accordingly, the Review makes no recommendation in this regard.

7.8.9.11. A number of the submissions to Ministers were also overly optimistic. This was particularly the case with the submission dated 20 May 2020, which was approved by the SRO [see [6.5.5.1](#)]. The submission was written in response to a request from the Secretary of State for information concerning the Armoured Cavalry Programme's Main Gate Business Case, schedule, costs, contract, concept of employment and export potential. The submission drew the Secretary of State's attention to the forecast schedule slip to IOC, but assured him that vehicles were being delivered imminently and that the programme was on course to deliver its key user requirements and FOC by 2025. These assurances were unduly optimistic. The Review considers that the reasonable reader of the submission would not have appreciated the array of difficulties that affected the programme, and would not have appreciated that a risk-adjusted schedule to FOC had not been worked up, so it was simply not possible to predict whether the 2025 date could, let alone would, be met. Moreover, at this time the safety concerns set out in the (withdrawn) May 2020 report from the LSSR were the subject of on-going discussion and had not been resolved. They called into significant doubt whether a Part 3 Safety Case could be signed, an essential pre-requisite to vehicles coming into service. A member of the Capability Directorate's Ground Manoeuvre team brought this "*dissonance*" (as he termed it) to the attention of his chain of command in advance of the submission, but the submission was not amended.

7.8.9.12. The Review considers that the omission of this information was not deliberate. It probably reflected the SRO's general optimism that the various difficulties besetting the programme would be overcome, and that the medium- to long-term prospects for the programme were positive.

7.8.9.13. The optimism bias reflected in the May 2020 submission was also present in the Review Note produced for the Investment Approvals Committee on 29 September 2020, and the report of the same date produced for the Permanent Secretary for the purposes of his Accounting Officer Assessment. This report was then replicated in the Permanent Secretary's Accounting Officer Assessment to the Public Accounts Committee dated 14 October 2020. For example, the SRO stated in the Review Note, that whilst the delivery of a Strike battlegroup in 2023 and Strike Brigade in 2025 to meet Joint Force 2025 commitments needed to be assessed as part of the schedule assurance to Full Operating Capability, "*I remain confident that [Joint Force] 2025 commitments will be met*".

7.8.9.14. It has been generally accepted by very many of those involved in the Armoured Cavalry Programme that 'optimism bias' was a consistent feature of the programme. This infected scheduling projections, as well as belief in the ability of the manufacturer to address technical issues and

demonstrate the relevant safety case. Express mention was made of 'optimism bias' in explanations in the Review Note of 29 September 2020 about the reasons for the delays in achieving IOC. It was also referred to in a diagnostic, lessons learned, document prepared by the 1* VDM Team Leader and 2* DLE at DE&S in October 2020, which referred to: "*Collective Optimism Bias and Denial across the Governance of the enterprise*".

7.8.9.15. There was general optimism in the Armoured Cavalry Programme, which is probably a feature of many (if not all) equipment delivery programmes. There was something else as well: there was a belief that things would be done differently in the future, or they could make up time, despite nothing having substantively changed in approach, i.e. not learning from past failures. The SRO and Programme Director described this vividly in a slide that was presented to a 3* review meeting on 30 June 2020. This set out delays in the history of the project and, having questioned whether it was now "out of control" and "unrecoverable", referred to "*Einstein's definition of insanity. What are we going to do differently?*".

7.8.9.16. It is not easy to counter optimism bias, and in some respects it should not be suppressed. The optimism may be a motivating factor for those working on a programme, and may increase morale. However, for sensible decision-making to be made on a programme, and for reliable reporting, it is necessary to ensure that optimism bias is understood and adequately taken into account. The Review recognises that optimism bias is the subject of project management training. It also recognises that its recommendation below, that reporting to the Centre should include a "tick box" and comments box to address optimism bias, may appear superficial. It is intended, however, to act as a prompt for individuals, when reporting, to think regularly about this issue.

Recommendation 23. Challenging optimism bias: Individuals involved in programmes should routinely be challenged, and challenge themselves, on this bias and how it may be affecting their decision-making and projections. This can be formalised in the information sent to the Centre [PMRS] as well as other information flows through the addition of a tick box and a comments box for the individual to explain how they considered and corrected for optimism bias.

7.8.10. Escalation: noise and vibration

7.8.10.1. It is clear that information about concerns relating to noise and vibration was not conveyed to the Centre until very late in the day. The first that Ministers heard about problems was in November 2020. That delay was because leaders above the 1* level within the Programme Office, the Capability Directorate and DE&S did not themselves appreciate the significance of the issue until then [see Box K after [6.5.4.20](#)]. The reasons for that are multiple, but do not include the particular personalities of any of the 2* leaders working on the programme.

7.8.10.2. The Review found that the SRO, DLE and DCap were all respected and liked leaders and no one the Review spoke to indicated that they had, in principle, any difficulties or concerns about raising issues and safety concerns with them. All three senior leaders clearly understood the importance of safety and there was no evidence that at any point they had dismissed safety concerns.

7.8.10.3. The Review found, however, that the significance and seriousness of noise and vibration as a programmatic risk was missed both by senior leaders and by the DE&S project team and Army programme team. The Review considers that this was mainly because the issue was obscured by the large number of other technical, safety and hazard risk issues being dealt with simultaneously on the programme. Senior leaders were kept informed about these issues, and there were detailed briefings to DLE and the SRO by the project and programme teams, in particular in May and June 2020 after safety concerns were raised by the LSSR and the Capability Safety Team. DLE, the SRO and CoM(L) were also informed, during the summer of 2020, that there was concern about vibration on the vehicle, and that vehicles were being instrumented to determine the true noise and vibration characteristics of the vehicles. But noise and vibration were not singled out for specific separate briefing by the DE&S project teams or the Army programme team, and the 2* leaders did not themselves identify that noise and vibration could be of particular programmatic concern and did not seek additional information on the subject from the teams. This in turn meant that, prior to November 2020, there was no further escalation of noise and vibration as a stand-alone programmatic risk up the chain of command within DE&S or the Army, or to senior officials within MOD or to Ministers.

7.8.10.4. So far as the safety of the trials was concerned, the Review has found that DCap was informed orally that some soldiers were experiencing “*tingly feet*” on the vehicles in May or June 2020. Other than this, the Review found that none of the 2* leaders were informed before Autumn 2020 that crews were reporting a range of harms and injuries potentially linked to noise and vibration. Below the 2* level, there was a genuine belief in the various teams that the trials were being and could be conducted safely using limitations of use and procedural controls. As David King has found, this view was allowed to prevail in the face of increasing evidence to the contrary because there was no

reporting of injuries and harms through a single coherent system.⁶⁰ There was also a strong belief, expressed by many witnesses from the DE&S project team, the Army programme team, and the Capability Directorate, that the safety of the trials was ultimately assured through the Duty Holding construct. This construct did not, however, work well; this is considered further at [7.8.10.9](#) below.

7.8.10.5. The Review considers that the experiences of crews were too readily dismissed, in particular by some members of the DE&S project team, as “*anecdotal*”, and that there was an over-emphasis on requiring formal reports of injury, and on the collection of data on noise and vibration. There was a failure to look at the accumulation of reports of harm falling short of reported injury and to consider whether, in aggregate, they indicated the existence of a real problem. The Review was particularly struck that the DE&S Quick Look Report in August 2020, which described apparent noise and vibration injury to crews in striking terms as well as preliminary data, was not considered sufficient to escalate the matter to 2* level. It accepts that the decision not to escalate was a judgment made in good faith within DE&S, but it also considers that that judgment was wrongly exercised.

7.8.10.6. With respect to the specific issue of the Army's approach to ‘harm’, David King stated in his report that “*From a cultural perspective, the Army did not believe it was potentially causing harm to people, especially from vibration, as it was tacitly expected that soldiers can and should endure such issues.*”⁶¹ The Review notes that some senior Army officers disagreed with David King's finding that the Army expected soldiers to endure harm. The Review also received evidence, however, to support David King's conclusion. One Army officer involved with the AJAX programme informed the Review that “*We've all been in vehicles where we've had tingly feet. David [King] saw it as harm, the Army saw it as normal business. David King's view is that if you've got ringing ears, you've been harmed. Our understanding of harm was misaligned with this.*” It seemed to the Review that this issue turned on judgements about when temporary discomfort becomes harm, which is not clear-cut. The witness went on to add “*I fundamentally disagree that we'd put people in a position where we'd knowingly harm them. You can question our judgment. We may have gone on too long, but at no point did we think we were going on knowingly exposing people to harm.*” This view was echoed by a number of witnesses.

7.8.10.7. The Review did not find that the individuals involved in responding to the concerns of crews considered that soldiers could be expected to put up with harm (falling short of injury) and that this was a reason for failure to escalate. It does consider, however, that within the DE&S project team the judgment not to escalate was influenced by the fact that armoured vehicles are inherently noisy and

⁶⁰ See: Ministry of Defence, “HS&EP Ajax Noise and Vibration Review,” 10 December 2021, at p.20.

⁶¹ Ibid, at p.28.

uncomfortable and that feelings of discomfort (such as nausea or dizziness) could not be taken, without more, as evidence that there was something wrong with the vehicles or related equipment.

7.8.10.8. The Review accepts that soldiers may be expected to tolerate discomfort, but the ATDU crews were very experienced: their complaints of symptoms consistent with experiencing excessive vibration and noise should have been taken as weighing heavily in favour of there being a real problem with the vehicles or related equipment which needed to be escalated. The Review accepts that the picture was clouded by the assertions of GDLS-UK that the vehicles were compliant and that their own crews had not experienced problems. It does not accept, however, that this justified the approach adopted which was that the issue should not be escalated without further proof.

7.8.10.9. The Review found that the Commanding Officer ATDU raised the issue of potential noise and vibration related harm repeatedly and with different entities: see [6.5.2](#), Box K after [6.5.4.20](#), and [6.6.2](#) above. He could have formally elevated the risk to DCap himself, using the Duty Holding process as a mechanism to guarantee senior attention to increasing evidence of harms and injuries relating to noise and vibration, but he did not do so. The Commanding Officer ATDU assumed that his concerns about noise and vibration were being relayed to DCap through his communications with the 1* Head of Capability Ground Manoeuvre and Assistant Head Ground Manoeuvre. Head of Capability Ground Manoeuvre updated DCap on the trials orally in routine updates in May and June 2020 but did not brief or escalate noise and vibration in writing or as an issue for him to action (see K16 in Box K after [6.5.4.20](#) above). Assistant Head Ground Manoeuvre and Head of Capability Ground Manoeuvre both strongly believed that Commanding Officer ATDU would raise the matter through the Duty Holding construct to DCap if he considered that there was a significant safety issue, and they had no sense that he was reticent to do so. The Review understands this, but considers that the Commanding Officer ATDU's repeated messages about the difficulty of complying with ever more stringent procedural controls in order to keep his crews safe, and the ethics of doing so, and his use of emotive and provocative language, should have caused the more senior officers to step in to ensure that the issues and concerns were clearly presented to DCap for him to consider. The Review notes that in mid-June 2021, the Commanding Officer ATDU prepared a spreadsheet of reported harms and injuries to date, and a brief to DCap formally elevating the risk to him as ODH given what he described as "*the constant pattern of pain, harm and incidents of injury*" associated with trials involving extended periods of driving. Assistant Head Ground Manoeuvre assisted by commenting on the draft brief and it was copied to Head of Capability Ground Manoeuvre (see [6.5.2.3](#) above). The Review considers that this step could and should have been taken at a much earlier stage.

7.8.10.10. Calling for a stop to the trials would have had major consequences for the Army's largest and very high-profile programme. The Review found that more senior officers and personnel all

believed that the Commanding Officer ATDU would call out any safety concerns, and even remarked that he was a robust character who they would expect to do just that; the Commanding Officer ATDU himself, however, in part as a result of other command issues, did not feel mentored and supported by his leaders. The Review considers that despite their belief to the contrary, it was not realistic or reasonable to expect a Lieutenant Colonel to shoulder the burden, in substance, of halting a major programme (because, in this case, this would have been the effect of halting the trials) without significant support from more senior officers, including support to elevate the risk through the Duty Holding construct.

7.8.10.11. The Review also considers that there was a reluctance, at 1* level in DE&S and the Capability Directorate, to burden already busy senior leaders in circumstances where there was no particular action that they were being asked to take. By contrast, senior leaders said that they would have welcomed being told about concerns, and absolutely expected to be told about injury, if only for situational awareness, and even if they would not or could not personally have pursued any different course. DCap spoke of a strong preference for being informed of concerns early, while there is an opportunity to fix them. DLE put it that he preferred those reporting to him to “*drop a pebble not a rock*” because it would have given him a better chance of informing and shaping the response at an early stage.

7.8.10.12. The Review also found that a significant reason for the failure to escalate was that there were a number of different entities involved in the trials, with responsibility for the conduct of the trials and their safety dispersed, and individuals in each of the teams considered that others would escalate if it was necessary. Equally, the 2* leaders themselves, each of whom had responsibility for the trials in different respects, believed that one of the other leaders would be aware if there were any significant problems and draw this to their attention.

7.8.10.13. Ultimately, the Review considers that there was a failure by the entities involved with the programme and the trials to take a step back and consider the issue holistically: putting the risk that there were excessive levels of noise and vibration on the vehicles (as identified by Dstl) together with the experience of crews, and asking whether, strategically, it would be better to pause, carry out tests of the vehicles, and determine the true characteristics of the vehicle, rather than press on with trials, training, and manufacture simultaneously in the hope that IOC could be met. The problem was exacerbated because each team operated within their own ‘silo’. The failure of the individuals and individual teams to appreciate the significance of the problem in the round, and their focus on day-to-day management of the trials and the complex task of project delivery, also led them to miss the bigger picture.

7.8.10.14. The Review acknowledges that (as explained above) the teams were dealing with multiple technical and schedule issues at the same time, under time pressure, and with limited resources. They were all working long hours. This contributed to the difficulty of seeing the significance of noise and vibration. The Review also acknowledges that the main period where there was a failure to escalate noise and vibration concerns (March 2020 to Autumn 2020), coincided with the COVID-19 pandemic. This reduced the scope for informal exchanges and conversations across teams which would ordinarily occur, and this may well have contributed to a lack of wider situational awareness which would have assisted the various teams to see the bigger picture.

7.8.10.15. It is possible that, if senior leaders had been better briefed, for information, or if those leaders had appreciated the significance of the information that was provided and probed further, that strategic view could have been reached at an earlier stage in the programme.

7.8.10.16. The David King Report has set out recommendations on safety specific matters and processes, and other than the recommendation about ‘seeds of doubt’ [see Recommendation 20 after [7.8.7.10](#) above] the Review does not seek to duplicate that exercise in this report.

7.9. Keeping to Time: Immovability of IOC

7.9.1. A very clear focus for those working on the programme was that the Armoured Cavalry Programme could not be late, and that the IOC date of July 2020 was “*immovable*”. That message was well understood by the two SROs who worked on the programme during the period with which this Review is concerned, the SRO’s programme team, as well as personnel at DE&S. Whilst the Review acknowledges that there were strategic and programmatic reasons for keeping the IOC date, it clearly drove many of the less than satisfactory behaviours that were seen by the Review.

7.9.2. The Review was told that the focus on this date had a strategic imperative. It was seen as a stepping-stone to achieving the Strike Brigades in 2025 that formed part of the Army’s operating concept. As the SRO in post until April 2019 explained: “*STRIKE in 2025 was a strategic target, set and agreed with the Centre and Ministers. Before that there was a need to deliver a Battlegroup in 2023 – so 2023 was also a key milestone. And to get to 2023 we have to deliver IOC in 2020*”.

7.9.3. The Household Cavalry Regiment, the unit that was going to get the first vehicles to train on, had been promised this July 2020 date for a number of years, had relocated from their former barracks in preparation for the vehicles’ arrival, and it was understood by some within the Army that failing to achieve that date would have “*a devastating effect on morale*”.

7.9.4. From a programmatic perspective, it was seen by some (including the SRO in post until April 2019) that a clear and firm focus on an immovable date would galvanise the team to deliver on time. The SRO explained to the Review that he told the Programme Boards, his own programme team, and DE&S that *“we needed to view the IOC as being like the Olympics and you can’t move the date. So, when we find problems, we need to find ways of solving them, we’re not just going to push things to the right.”* He also explained that *“I think that in big projects that take years to deliver, it’s too easy to say we need a bit more time without trying to find a better way of solving problems. People need to feel the imperative of time – which is why I kept referring to the Olympics.”*

7.9.5. Whilst there were clearly benefits in focussing on the IOC date, the Review also received evidence that it had negative effects. It created *“pressure and a certain culture in the organisation”*, according to the Deputy Chief of the Defence Staff for Military Capability between December 2018 and May 2022. As he explained to the Review, *“In this case my experience tells me that it had tipped over from a very helpful focusing forcing function to a problem because we were no longer being honest about it by the back end of 2018.”* There comes a moment, he said, where *“it’s no longer tenable and becomes damaging.”*

7.9.6. The focus on meeting IOC at July 2020 drove some unhelpful behaviours. It meant that effort was diverted from other things that were downstream in the programme. Thus, rather than resolving disputed technical problems on the vehicles when they first manifested themselves, compromises were made, and resolutions were pushed down the road. This would inevitably put pressure on meeting other targets, such as FOC.

7.9.7. The pressure to meet IOC by July 2020 was also most likely to have influenced what the Review understands was the unorthodox approach taken to the Safety Case process [see [6.4.2](#)] and the decisions at various points to continue the trials even in the face of concerns about noise and vibration.

7.9.8. Furthermore, IOC at July 2020 could only be met by diluting the operating capability of the vehicle that would be put into the hands of the Household Cavalry Regiment. This ran the risk of undermining the vehicles’ reception by the users within the Army. The Programme Director warned about this in a note to the SRO on 3 September 2019, cautioning that a reduction in capability at Capability Drop 1 *“risks overly negative reception amongst [Household Cavalry Regiment] users which could prove challenging to recover from if a poor perception of the capability beds in”*. This should be contrasted with the more standard concern within the Army that delay would impact on soldiers’ morale: as reflected in the Questions and Answers pack prepared for the SRO ahead of a

'fireside chat' with the Household Cavalry Regiment's Command Group on 21 January 2020 which contains an acknowledgment that "*senior levels of the Army are aware of the impact to morale that ongoing delays to equipment and [Training Simulators] delivery is causing*".

7.9.9. As explained above [see [7.5](#)], the Review considers that it is important that where 'keeping to time' is proposed as a significant principle for a particular programme, the possible consequences need to be thought through, and the Armoured Cavalry Programme used as an example of where negative effects may result.

7.9.10. It seems to the Review that the negative effects of the focus on the IOC date were exacerbated by the fact that the July 2020 date was set with a 50% confidence level. In other words, there was just as much chance that that date would be missed as that it would be met.

7.9.11. It would seem to make more sense that if there is to be such a focus on an IOC date, that that date should be set as one where there is a greater chance of achieving it. Otherwise, the planning arrangements that must surround the date have a good chance of being out of kilter.

7.9.12. The former Director General Finance was asked by the Review how useful is the 50% confidence tool? She explained that "*in costing, we use a P50 [i.e. 50% probability] assumption. In a normal distribution of cost, if you have a normal bell curve, a P50 is notionally the most likely. Sometimes the Army will apply that to things that are not costing – which is very different. From a deliverability perspective you'd want a much higher confidence level.*"

7.9.13. It seems to the Review that, at least for complex programmes, full consideration should be given to applying a 70% confidence level for planning purposes for achieving milestone approval dates. To ensure that careful decision-making is applied to this consideration, reasons for not applying the 70% level, but keeping matters at 50% should be explained by the Investment Approvals Committee.

Recommendation 24. Confidence levels: For complex programmes, the Investment Approvals Committee should consider applying a 70% confidence level for planning purposes for achieving milestone approval dates, and to provide an explanation when the 50% confidence level is applied.

Annex A: Recommendations

Recommendation 1. Information to the Centre: At an early stage following Full Business Case approval, Director General Commercial to confirm to the DMPP Sponsor Group that the commercial approach that DE&S are pursuing is consistent with what the Investment Approvals Committee, Ministers and HM Treasury have approved.

Recommendation 2. Dstl: DE&S and Dstl to work towards a more collaborative approach. Discussions should take place between DE&S and Dstl as to how Dstl can provide more effective input into DE&S's work, and how relationships and communications can be improved. This could include Dstl being provided with an explanation from DE&S as to how their advice is being acted on or not and the reasons therefor; and a greater opportunity for Dstl to provide suitable solutions for DE&S in overcoming technical difficulties. This could also include Dstl explaining to DE&S the order of priority of its concerns, where appropriate.

Recommendation 3. Dstl: Establishment of a formal and recognised escalation route to SRO/3* Command Acquisition Support Plan owner/3* Chief Scientific Advisor/DE&S Board where DE&S ignoring/not acting on Dstl advice on a project/programme in a way which Dstl considers is seriously wrong as to technical/safety/design matters.

Recommendation 4. Dstl: Dstl's quarterly reports on each equipment project on which they are advising to be provided as a matter of course to the SRO.

Recommendation 5. Dstl: Collaborative working and direct communication between Dstl and the Front-Line Command Customer on equipment projects to be encouraged and supported.

Recommendation 6. DLODs: Each of the DLOD leads for a major programme to be required to provide 'full, frank and timely disclosure' to the SRO of all information that is relevant to the DLOD that they are delivering; the SRO should use the Programme Board to ensure that the information is provided and should raise with the DMPP Sponsor Group if it is considered that any Delivery Agent or Enabling Organisation is not meeting the requirement.

Recommendation 7. Payment decisions: Where the decision to make payment to a manufacturer is at the discretion of DE&S, and not required by the contract, the views of DE&S as to the appropriateness of any proposed payment should be discussed beforehand with the SRO, and the SRO's views should be taken into account by DE&S before a final decision is made. Where the SRO

and DE&S cannot agree, or where discretionary payments are likely to be controversial, the views of the MOD's Director General Finance must be obtained.

Recommendation 8. SRO resources: Army HQ to consider making available to the SRO resource to pay for additional (contracted) support/advice where the SRO judges this necessary to reduce risk on complex programmes. Where a request for additional resource is made, and Army HQ refuse, a written explanation of the reasons for that decision be provided to the DMPP Sponsor Group.

Recommendation 9. Key personnel: SRO, Programme Director, other personnel designated as such on a particular project/programme by stakeholders should (unless competency or conduct issues arise) remain in post for a minimum period of 5 years and/or linked to key milestones/dates, and change-over should be staggered insofar as possible to avoid losing key personnel at the same time. Where key personnel leave, there needs to be a structured hand-over (overseen by the SRO or their delegate; and where the personnel are engaged by DE&S, overseen by DLE or their delegate), with up-to-date analysis of programme concerns provided. Where the SRO leaves and the Infrastructure and Projects Authority have not reviewed the programme recently, this should be preceded by an Infrastructure and Projects Authority review which will inform the incoming SRO of underlying programme concerns.

Recommendation 10. Use of 'critical friend' facility: On the establishment of a Category A programme, the Department should appoint a 'critical friend' to support/mentor/challenge the SRO on a regular basis.

Recommendation 11. Programme Board: Written reporting for the Programme Board on a [monthly/quarterly] basis (to align with the Programme Board meeting) produced by the SRO's programme team, made up of a short report from each person with responsibility for a DLOD and an overview document from the Programme Director.

Recommendation 12. Programme Board: Full minutes of the meeting, including detail of the essential points discussed (including any contrary views) as well as a record of any decision taken, to be produced.

Recommendation 13. Assurance follow up: A mechanism for monitoring recommendations made by assurance/scrutiny reviews to be established (led by lead scrutineer, or in their absence by Defence Portfolio and Approvals Secretariat nominee), and SRO to be challenged as to whether recommendations have been followed through and, if not, why. The SRO should also report back to the Investment Approvals Committee on progress against recommendations.

Recommendation 14. DMPP/Scrutiny: SROs must consider themselves under a duty to be candid to the Investment Approvals Committee. Information Notes and Review Notes should give a balanced view of the programme and provide sufficient detail of problems (as well as achievements). The SRO must alert the Investment Approvals Committee promptly to any event that calls into question information provided in the Information Note or Review Note.

Recommendation 15. DMPP/Scrutiny: More frequent (the period or trigger to be considered by the DMPP), formal, in-person update by the SRO to the DMPP Sponsor Group, thereby introducing a more proactive oversight mechanism.

Recommendation 16. What to do when hitting a “brick wall”: Where personnel working anywhere on a programme feel that they have hit a ‘brick wall’ with their line management/chain of command in raising a concern about the programme, they should have the option of raising that concern with an individual of [1* status or above] who is external to the programme. That individual will have responsibility for listening to and, where appropriate, acting on the raised concern. This could include dealing directly with persons higher up in the line management or chain of command.

Recommendation 17. Information flow down the hierarchy: Record to be made of key decisions and dissemination of the record and reasons therefor down the hierarchy to the relevant team (whether project, programme or safety reps, including reviews at the 1*, 2* and 3* level, and meetings with industry).

Recommendation 18. Information to senior personnel at DE&S [1*-4*] and the SRO: PowerPoint and other written briefings to include at least one slide/paragraph reflecting any dissenting/contrarian opinions from personnel serving in the first and second levels below that of the person giving the briefing (and where the person giving the briefing is at 2-3* levels, from personnel serving in the relevant level 4 and above).

Recommendation 19. Information up the chain of command: All formal guidance documents (and training on those documents) to include a requirement for personnel to escalate concerns for awareness, and not merely for personnel to escalate in circumstances where the individual/risk owner cannot resolve the matter themselves.

Recommendation 20. Raising safety concerns: All personnel working in a programme should escalate safety concerns where there are ‘seeds of doubt’ about a matter, even if not fully evidenced,

through relevant reporting lines including as appropriate within Army Programmes, DE&S, Dstl, and within the Duty Holding Construct.

Recommendation 21. Information up the chain of command: Consideration should be given where significant issues arise for briefing documents to include issue, evidence, advice sought, timing of advice sought, and (where relevant) statement (with evidence) of concerns being looked at, and state whether it is raised for information only or for action. Formal training to be given on preparing and reading briefing documents.

Recommendation 22. Information to the Centre: The PMRS, and submissions to Ministers, to include space for comment/opinion of dissenting or contrarian voices as to concerns/state of the project, from within the programme team. SRO to confirm within the PMRS and submissions that they have sought out these voices. SRO to be encouraged to set out difficulties and issues with the programme in the narrative of the PMRS and Ministerial submissions, along with achievements.

Recommendation 23. Challenging optimism bias: Individuals involved in programmes should routinely be challenged, and challenge themselves, on this bias and how it may be affecting their decision-making and projections. This can be formalised in the information sent to the Centre [PMRS] as well as other information flows through the addition of a tick box and a comments box for the individual to explain how they considered and corrected for optimism bias.

Recommendation 24. Confidence levels: For complex programmes, the Investment Approvals Committee should consider applying a 70% confidence level for planning purposes for achieving milestone approval dates, and to provide an explanation when the 50% confidence level is applied.

Annex B: Terms of Reference

AJAX: LESSONS LEARNED REVIEW **TERMS OF REFERENCE**

TO: Clive Sheldon QC

Aim

1. In light of the delay to date in delivering the Armoured Cavalry programme (Ajax), you are to conduct an independent focused review into the programme. You should identify lessons and make recommendations to help MOD deliver major programmes more effectively in future, with a particular focus on how MOD shares and elevates issues across the Department and the commands.
2. In order to encourage openness, evidence given during the course of the review will not be used in disciplinary proceedings unless there is evidence of gross misconduct, in which case, individuals will be subject to appropriate sanction.

Scope

3. The review should examine the following areas in light of the experience with the Ajax programme, identifying any lessons that can be applied more broadly across Defence:
 - How should the leadership, culture and governance in MOD (including in the armed forces and relevant arms-length bodies) relating to the delivery of future major programmes be improved to ensure timely and appropriate elevation of problems to the right levels within the Department (including to Ministers) and the commands.
 - You should focus on systemic and process issues as well as individual action and inaction. This should include looking at whether individuals are aware of how to elevate problems – informally and formally – and whether senior personnel are given appropriate training on acting upon the information received.
4. The review should not examine or make findings on the accuracy of any complaints regarding:
 - the existence of noise and vibration problems on armoured fighting vehicles
 - military communication systems used in armoured fighting vehicles.

5. The review should not consider the ongoing delivery of the Ajax programme. It is the responsibility of General Dynamics Land Systems-UK to deliver a vehicle that is fit for purpose and meets the contractual specification.

6. The review should seek to avoid making findings on issues which in due course may fall to be determined by other bodies, e.g. contractual disputes and personal injury claims.

Resources

7. Dedicated secretariat support will be provided for the review. You should familiarise yourself with key documents setting out the MOD's operating model and acquisition processes and evidence that informed major decision points on the programme.

Schedule/Reporting

8. You will report to MOD Ministers through the MOD 2nd Permanent Secretary and provide regular updates on progress. You should advise Ministers of the likely duration of your review within 1 month of starting.

Annex C: Glossary

ALARP	As Low As Reasonably Practicable
Armd Cav	Armoured Cavalry [Programme]
ATDU	Armoured Trials & Development Unit
CADMID	Concept, Assessment, Demonstration, Manufacture, In-Service, and Disposal
CIWG	Capability Integration Working Group / Change Integration Working Group
CoM(L)	[DE&S] Chief of Materiel (Land)
DCap	[Army] Director Capability
DCGS	Deputy Chief of the General Staff
DDH	Delivery Duty Holder
DE&S	Defence Equipment & Support
DLE	[DE&S] Director Land Equipment
DLOD	Defence Line(s) of Development
DMPP	Defence Major Projects Portfolio
Dstl	Defence Science and Technical Laboratory
EQT	Entry Qualification Trials
FLC	Front-Line Command
FOC	Full Operating Capability
GDLS	General Dynamics Land Systems
GDLS-UK	General Dynamics Land Systems UK
GMPP	Government Major Projects Portfolio
IOC	Initial Operating Capability
IRTB	Issue, Recommendation, Timing, Background
LSSR	Land Systems Safety Regulator
MEL	[HSE] Maximum Exposure Limit(s)
ODH	Operational Duty Holder
PB	Programme Board
PMRS	Portfolio Management Reporting System
RAG	Red/Amber/Green [rating]
RGT	Reliability & Growth Trials
RtL	Risk to Life
SME	Subject-matter expert
SRO	Senior Responsible Owner
VDM	[DE&S] Vehicle Demonstration & Manufacture

