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Ministry of Defence

DEFENCE SAFETY AUTHORITY

ANNUAL ASSURANCE REPORT

APRIL 2016 – MARCH 2017

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INTRODUCTION

1. The purpose of the Defence Safety Authority (DSA) is to provide independent assurance to the Secretary of State (SofS) for Defence that his safety policy is being implemented.[1] To do this the DSA aims to undertake proportional and risk-based safety assurance,[2] regulation, enforcement and investigation to enhance Defence capability and reputation. Its priority is to reduce and ideally prevent loss of life, injury and damage to equipment, capability and the environment. The DSA cannot do this alone and relies on close relationships with the regulated community, the engagement of their leadership and the development of an effective Safety Culture.[3] The DSA depends on its independence, authority and freedom to engage. It relies on its credibility and adequate resourcing. This is the third Director General (DG) DSA Annual Assurance Report (AAR) since the formation of the DSA in April 2015. It covers the period April 2016 to March 2017, with additional findings to June 2017 included to take account of my recent assumption as DG and early ABC 17 reflections.

2. There has been important progress over the last year in specific areas. There is a clear commitment from senior leadership (Top Level Budget Holders (TLBH) and Senior Duty Holders (SDH)) to understand, manage and integrate safety better. TLB Safety (and Environment) Management Systems (SEMS) are more evident and bedding-in. The concept of Duty Holding has common agreement with principles now established.[4] I've witnessed countless examples of strong leadership and determination to make structures, process and activities safer. There is a greater thirst across the TLBs for evidence on which to balance their risk judgements. We are getting better at assuring safety across activities, rather than just within domains and there are notable examples of forward planning with an aim of reducing safety risk. However, as evidence in the Report will show, there is still much to do.

3. Managing safety in Defence is unique. The nature of Defence activity, in force generating, preparing and using often-bespoke capabilities, is by necessity inherently dangerous with our people exposed to significant risk as they train and operate. Many of these risks remain exclusive to Defence. This important distinction and the essential need to train as we wish to fight go some way to setting the safety challenge.

4. The tragic loss of 4 lives during the reporting period, although no higher than in each of the last 4 years and 11,643 work-related injuries and ill-health incidents in the MOD in 15/16,[5] remind us of the enduring need to remain focussed on safety and to strive for

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[1] Charter for the Defence Safety Authority, dated 24 March 2015, para 2.

[2] The scope of this activity currently provide only very limited assurance that TLBs are promoting and implementing SofS's policy statement on Health, Safety and Environmental Protection as resource constraints mean that the DSA focuses assurance capacity on the areas of activity covered by Defence regulations.

[3] 'The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to and the style and proficiency of, an organisation's health and safety management. Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures.' *ACSNI Human Factors Study Group: Third Report - Organising for Safety* (London: HSE Books, 1993).

[4] Principles of Duty Holding were endorsed by the Defence Safety Committee in Jun 17.

[5] Figures for 2016/17 will not be available until later in the year. MOD Health and Safety Statistics 2011-2016 published 17 November 2016 records 11,643 work-related injuries and ill-health incidents in the MOD in 2015/16. Of these, 63% involved members of the Armed Forces and, of these, 2,669 (36% of Armed Forces injuries) were sufficiently serious to require reporting under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). By comparison, only 15% of reported injuries to civilian staff were RIDDOR reportable. Of the Armed Forces injuries, 45% were sustained during training or exercise, 24%

continuous improvement. During the year 2 Crown Censures[6] were served on the MOD and another is likely to result from investigation of an incident that took place in 2014.[7] In the last 5 years the MOD has received 4 Crown Censures. In the same period, 3 have been issued to all other Government bodies and organisations exempt from prosecution.[8]

CONTEXT

5. Understanding context is important. This Report comes at a time of continued significant change in capabilities, organisations and the way we do business in Defence. The eight key themes articulated in Defence Strategic Direction 2016 include Capability Delivery, People, Innovation, Organisational Reform and Efficiency,[9] all of which will continue to bring wide-ranging change, with modernisation, transformation and further delegation of funding as common themes. As well as a number of major change initiatives, such as the Army Command Review, the Defence Fire and Rescue Project (DFRP), DE&S Transformation and the impending review of Head Office,[10] ABC17 has highlighted the significant resource pressures across the Department, which are likely to lead to further changes to organisations and potentially outputs, owing to activity reductions. After many years of high operational tempo, the majority of the Armed Forces (less the RAF's current high-tempo operational commitments) are adapting to new post-operations postures, with implications for their size and shape as we move towards Joint Force 2025 (JF25).[11] There are also a considerable number of major capability programmes, most notably Carrier Enabled Power Projection (CEPP), nearing critical stages in their introduction to service.[12]

6. The greater the challenges, the more we should ensure the safety of our people and the public, where applicable, is given the highest priority and resourced accordingly. In this Report, managing safety through change and ensuring sufficient Suitably Qualified and

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during sport, recreation or Adventurous Training, compared to 22% in the course of normal duties. However, the fidelity of these statistics is impaired by the variability of the sources of health and safety data from which they are compiled, and the fact that 3 of the 10 sources were discontinued in 2012.

[6] A Crown censure is the way in which HSE formally records the decision that, but for Crown immunity, the evidence of a Crown body's failure to comply with health and safety law would have been sufficient to provide a realistic prospect of securing a conviction.

[7] One for the death in 2013 of Cpl Dunsby, LCpl Roberts and Trooper Maher while undertaking a selection exercise in the Brecon Beacons. The second was for the death of Fusilier Griffiths who received a fatal bullet wound to the neck in 2011 during a live training exercise at Lydd Ranges military firing range in Kent. A further Crown Censure is expected for the death of LET Edmonds who was crushed in a lift shaft in HMS BULWARK in 2014.

[8] It should be noted the House of Commons Defence Committee Report 'Beyond Endurance? Military Exercises and the duty of care' dated 5 Jul 16 recommended '...that the military exemptions in the Act (Corporate Manslaughter and Homicide Act 2007) be amended so that the MoD can be prosecuted if it has been subject to a Crown Censure from the Health and Safety Executive for a particular incident'. Para 150.

[9] Defence Plan 2017 draft v11.0 as at 6 June 2017, Annex B – Strategic Context, para 6.

[10] This list of change programmes is not exhaustive. Others include the formation of the Submarine Delivery Authority, the establishment of DG Nuc and transfer of responsibilities to him, privatisation of supply chain arrangements in DE&S, the impending transfer of infrastructure funding and changes to HQ structures in Air Command and Navy Command Headquarters.

[11] Defence Plan 2017 draft v11.0 as at 6 June 2017, Annex A – CDS's Foreword, p1, notes that there are currently 30 operations underway in over 20 countries. While these account for only a few thousand people, comparison with ten years ago when over 20,000 were committed to just 2 major operations indicates the scale and nature of change. The risks facing Defence's deployed personnel are different too. Notwithstanding air activity on Op SHADER, the greatest safety risks to our deployed conventional forces are more from Health and Safety shortfalls, such as electrocution. (Interview with COS (Ops), PJHQ Jun 17)

[12] Among major equipment programmes highlighted in the Defence Equipment Plan 2016 dated 27 January 2017 are: Queen Elizabeth Class carrier, Type 26 Global Combat Ship, Astute and Dreadnaught submarines, AJAX, Mechanised Infantry Vehicle, Sea and Land Ceptor missiles Spear Capability 3, Lightning II, P-8A Poseidon, Wildcat and 5 new aircraft for the Military Flying Training System.

Experienced Personnel (SQEP) are highlighted as pan-Defence challenges requiring special attention. It is vital we understand the implications for safety of the changes we are making. SofS's safety policy requires Organisational Safety Assessments (OSAs) to be made during the planning and execution of change.[13] These should be completed by the Senior Responsible Officer (SRO) for the programme, but there is evidence many of our major change programmes are not doing this.[14] As well as effective leadership, a theme I will return to, managing safety through times of change requires responsibility, accountability and authority to be properly aligned and empowered through formal delegation. This is not currently the case for many major projects across the TLBs. SQEP shortages have been highlighted in past AARs and still feature – indeed in some cases the SQEP challenge is getting worse and increasing the safety risk.[15]

7. The effects of resource constraints, especially within ABC 17, on activity levels are becoming apparent.[16] All 2* aviation Operating Duty Holders (ODH) attending a recent MAA-led Military Operators' Council[17] reported reduced activity levels, owing to financial pressures. Whilst ODHs can ensure currency levels are maintained, greater risk is being taken in the competency of crews.[18] Not only does this reduce the quality of the capability on offer to operational commanders, but has downstream consequences on retention and the Moral Component. There is also the danger of safety being compromised as aircrew can feel under more pressure to complete training sorties, despite carrying faults on their aircraft.

8. Equally, for the DSA to deliver successfully against its Charter, momentum must be maintained in implementing the endorsed findings of the Defence Safety Review (DSR). These findings are captured in the Programme for Regulation and Investigation of Safety by the MOD (PRISM), which owing to funding and manpower shortages is in danger of stalling. The consequences of DSA resource challenges are felt most acutely by the regulated community in reduced levels of assurance and assistance, while the DSA can currently

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[13] OSAs are mandated in DSA01.1 - Defence Policy for Health, Safety and Environmental Protection (Chapter 4 – Risk Management – para 5) requires that 'that at the proposal stage and, prior to any implementation of change in an organisation, the person requiring the proposed organisational change is to conduct an Organisational Safety Assessment of the impact on existing safety baseline, HS&EP risks and performance. Further guidance on the requirements for and conduct of OSAs will be published in DSA01.2 in December 2017. DG DSA wrote to DSC members in June 2017 on the Assessment of the Impacts of Organisational Change – DSA/DG/DSC/1/17 dated 2 Jun 2017.

[14] The DSA is conducting an audit of the requirement for OSAs across Defence. Among the 16 major change programmes surveyed so far: the OSA for the Army Command Review was conducted after the change had taken place and was largely superficial, the OSA for DE&S Transformation has been reviewed several times during the course of the change programme and OSAs have not been conducted for either DFRP or the transfer of Infrastructure funding to the Service TLBs. OSAs will also be required for the formation of the Submarine Delivery Agency and the transfer of various nuclear responsibilities into DG Nuc's area.

[15] For example in specific aviation QHI and Safety Staff appointments and in RAF aircraft technicians and REME aviation engineering supervision. Shortage of SQEP also affects Defence's Nuclear regulator.

[16] For example, GS/05/03/09 dated 28 March 2017 – Reduction in Aviation Activity for the Joint Helicopter Command (JHC).

[17] DMAA chaired MOC on 12 June 2017.

[18] For example, the JHC has had the majority of overseas exercises cancelled for its non-specialist forces and those not committed to operations in Afghanistan in FY17/18. This resource driven reduction in activity already builds on reductions on the Commando Helicopter Force in 16/17 and will effectively prevent helicopter air and ground crews from growing and in some cases establishing proficiency in operating in hot, high and desert environments. These skills are essential to the safe operation of aircraft in these environments and take years to develop fully. If not maintained, these skills cannot be re-gained in extended Readiness timelines without a significant increase in risk (the risk is of Controlled Flight into Terrain caused by flight in a Degraded Visual Environment).

provide only very limited assurance that TLBs are promoting and implementing SofS's policy statement on Health, Safety and Environmental Protection (HS&EP).

9. This report:

a. Reviews the effectiveness of safety management across Defence, assessing the degree of assurance we can have of safety management and our confidence in that assessment.

b. Summarises my judgement of the most significant Safety Risks Defence currently faces, with a detailed assessment of the risks involved and discussion of the importance of assurance in understanding and managing Safety Risks.

c. Reviews the maturity and resourcing of the DSA itself, its progress in implementing PRISM and near-term opportunities including promoting safety in Defence, emphasising safety in Leadership, conducting pan-domain joint safety audits, making better use of the Defence Safety Committee and introducing the need for more usable Measures of Effect (MOE).

d. Lists Defence safety related fatalities and Service Inquiries and Accident Investigations undertaken.

HOW WELL IS DEFENCE DOING?

DOMAIN SAFETY ASSURANCE STATEMENTS

10. Assurance is essential to understanding and managing overall risk within the bounds of safety policies, regulation and culture. It provides those managing and overseeing risks with vital information about the effectiveness of their risk management systems and the levels of risk carried. Assurance must be applied at all levels, 1st, 2nd and 3rd party, to be fully effective as each level builds on the evidence gathered by the ones below it.[19]

11. In its Regulator role, the DSA provides a 3rd party independent assurance of safety management in the domains and environments it regulates. This includes the Regulators' responsibility to assure against the areas where the Department has Disapplications, Exemptions or Derogations (DEDS),[20] as well providing a level of assurance about the TLBs' ability to comply with their responsibilities under Statutory HS&EP legislation.[21] TLBs' compliance with Defence regulations is measured in part through levels of enforcement action and compliance with legislation by our 3rd party assurance activity.[22]

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[19] The Defence Policy for Health, Safety and Environmental Protection (DSA01.1) defines 1st party, or internal, assurance as activity, generally audits, conducted by a unit to demonstrate that its safety management arrangements are functioning adequately. The second level of assurance is 2nd party assurance by higher formations, normally at TLB level, to provide evidence that their units are managing safety in accordance with their direction. External, or 3rd party, assurance activity is fully independent of both those managing activities and the organisation to which they belong. (DSA01.1 Chapter 5 – Checking and Performance Reporting – para 3). It notes that 3rd party assurance audits are conducted by Defence Regulators as part of their regulatory processes in understanding how organisations are performing in their specific areas of interest.
[20] A Disapplication refers to an element of law or regulation that explicitly does not apply to Defence; an Exemption from law or regulation is granted on application to the SofS in the interests of national security; and Derogation is lessening of the requirements of law or regulation for justifiable practical or operational reasons.
[21] Assurance of compliance with legislation is a Defence Authority function, rather than a Regulator role.
[22] The MAA conducts a comprehensive programme of 3rd party assurance, including formal audits and oversight of Air Safety management activities, covering all 6 ODHs, 27 Delivery DHs, 30 DE&S Project Teams, 13 Approved Contractor Flying Organisation, 108 Approved Design Organisations, 49 Approved Maintenance Organisations and 45 Continuing Airworthiness Management Organisations. In the Land

The quality of each Regulator's assessments also depends on the effectiveness of the Regulator itself. The following assessments relate to both the management of safety in the Regulated domains and the assurance capabilities of the relevant Regulator.

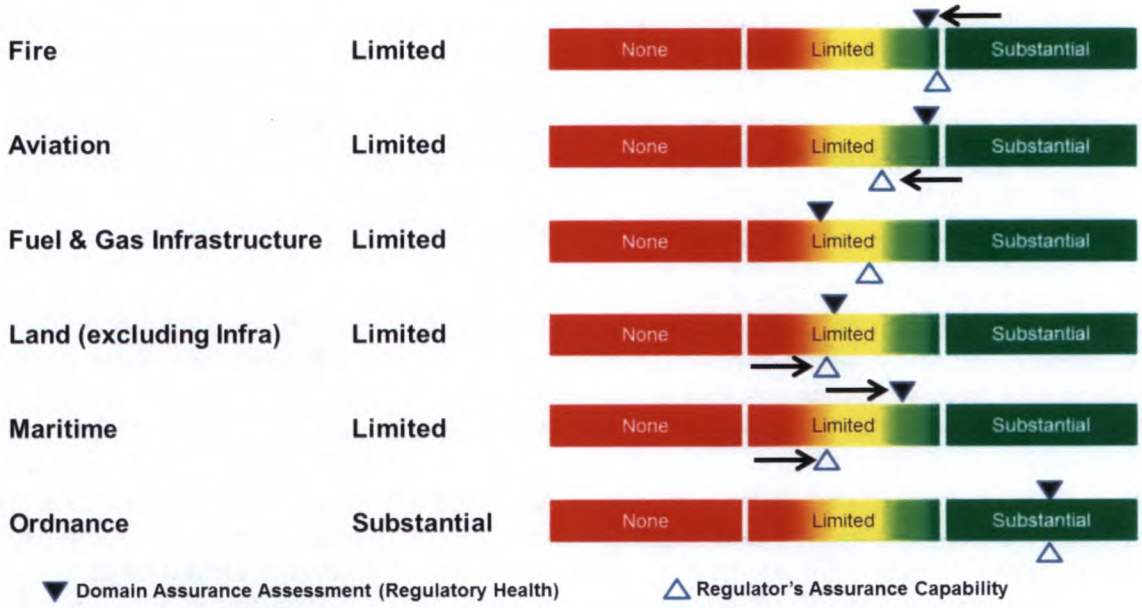

Figure 1. 2016/17 Assessments of Safety Assurance.[23]

12. The diagram at Figure 1 represents my judgement of the regulatory health of each domain, combining the assurance assessments from each Regulator and my judgement of those assessments based on the Regulator's oversight capability.[24] The regulatory health of the Nuclear domain and my assessment of its Regulator are classified SECRET (to protect process and capability) and is covered in Annex B.

13. It is important for the Defence Board to note that these assurance assessments do not currently cover compliance with the full scope of SofS's HS&EP policies, including compliance with legislation governed by non-MOD regulators such as the Health and Safety Executive (HSE). Work this year has identified the extent of this important shortfall against my ability to discharge the full extent of the DSA's charter and the organisation and

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domain, in 2016/17 the Fuel & Gas Safety Regulator undertook inspections of 228 fuel sites comprising 376 installations and inspections took place to license the first 12 of 40 Defence Adventurous Training Centres. The Maritime Regulator completed audits of all 3 of the newly appointed maritime ODHs, while the Nuclear Regulator completed 84 planned inspections, reviewed 125 safety submissions and approved 35 other activities. The Ordnance Regulator completed 576 assurance inspections and audits in the same period and put in place a structure of stakeholder safety committees. In 2016/17 the Fire Regulator undertook 110 risk-based fire safety audits and began to create a 3rd party assurance capability for Airfield Rescue Firefighting.

[23] Diagram shows Assurance Assessments from the DSA Regulators' areas, with Fuel & Gas Infrastructure shown as a separate category from Land as directed by the Defence Board during its consideration of the 2015/16 DSA Annual Assurance Report (Minutes of October 2016 Defence Board meeting, Item 5 Action 4).

[24] These assessments use the Defence Internal Audit Classifications for assurance as updated July 2014:

Full Assurance: System of internal control established and operating effectively.
Substantial Assurance: System of internal control established and operating effectively with some minor weaknesses;
Limited Assurance: System of internal control operating effectively except for some areas where significant weaknesses have been identified.
No Assurance: System of internal control poorly developed or non-existent, or major levels of non-compliance identified.

resources required to do so. These are beyond the DSA's current capabilities and capacity and are discussed further in the section on the DSA.

14. While there are some areas of progress, including notably in the Maritime environment, little of substance has changed from last year. With almost all of the domains assessed as **Limited Assurance**, the Defence Board can have confidence that systems to manage safety are in place in those domains and working, but there are still significant weaknesses. This means we cannot be fully confident that we know how well risks are being managed, or understand what the consequences of a failure in risk management would be. By contrast, **Substantial Assurance** would indicate only minor weakness and demonstrate a better understanding and control of risks.

15. On its own, 3rd party assurance by the DSA is not enough, as it depends and feeds on good information from the lower assurance levels. The most important level of assurance is 2nd party, which is how TLBs who own the bulk of the risk of activities in Defence can assure themselves that they understand how much risk they are holding and whether their SEMS and management of risk is appropriate and effective.[25] TLBs' own 2nd party assurance should provide a more comprehensive assessment of compliance with both regulation and legislation than 3rd party assurance alone. However, inadequate levels of 2nd party assurance activity and capability are common themes across the domains, limiting collective understanding of both compliance and risk. Improvement beyond **Limited Assurance** and effective Risk-based assurance will be difficult to achieve without a significant improvement in the scope and quality of 2nd party assurance activity and sustained 3rd party assurance capabilities.[26]

FIRE SAFETY ASSURANCE

16. A notable change this year is the decreasing level of assurance in the Fire domain, which has fallen from Substantial Assurance last year to **Limited Assurance** this year. Defence Fire Safety Regulator (DFSR) assurance activity during the year identified a continual decline in performance and compliance against many key regulatory articles, which combined with evidence presented by TLBs and supporting organisations, raises concerns about the capacity for Defence to manage fire safety risk appropriately. This reflects evidence of an increasing level of non-compliance with statutory legislation, including circumstances that constitute potential breaches of certain Articles and building regulations,[27] in part because the arrangements for funding and carrying out maintenance and repairs mean that essential work is not being done.[28] Other factors include a shortage

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[25] While interpretation of SEMS varies across domains the basic components of an effective SEMS should be policies, defined processes, competent people and feedback mechanisms. Further work is needed to standardise and improve understanding of SEMS across TLBs and domains.

[26] It appears that one of the blockers to effective 2nd party assurance is a proper understanding of what TLBs are responsible for, especially where statute responsibilities and Duty of Care rather than Defence regulations are concerned. The distinction between statute law, MOD policy, Defence regulation and the areas of overlap between them will be clarified by the DSA's current work to review safety JSPs and republish the key policies in the DSA01 series of publications (DSA01.2 for specific policies and DSA01.3 for DSA processes), although this is currently resource-constrained.

[27] The DFSR is an enforcing authority under the terms of the Regulatory Reform (Fire Safety) Order 2005 (and Fire Safety (Scotland) Regulations 2006). It therefore regulates Defence activity through statute legislation, not Defence regulations. If, in the opinion of the enforcing authority, a regulation has been breached an Article 30 Enforcement Notice is issued. Failure to respond to the Notice is a potential offence.

[28] There is anecdotal evidence of contract maintenance engineers failing to follow the defined British Standard maintenance schedules by not immediately undertaking the repairs for systems such as faulty emergency light fittings. As a consequence, a safety critical system remains in an unserviceable condition for longer than is necessary.

and lack of competency (SQEP) of persons appointed with fire safety responsibilities, the failure to identify and assess adequately the tolerability of known fire risks and a lack of suitable and sufficient 2nd party assurance of fire safety.[29] The Defence Board should note all these factors and the downward trend of assurance levels were highlighted in the last 2 AARs. The impact of this decline in performance in fire risk management is an increased risk of fire causing loss of life.

17. There is a lack of understanding across Defence of the fire-related roles and duties of stakeholders and contractors in infrastructure management and of the need to appoint competent people to roles bearing fire management responsibilities.[30] Although the level of enforcement activity was broadly comparable to last year,[31] in the course of 110 audits undertaken by the DFSR during this year, levels of non-compliance with fire safety regulations rose by over 30%, with the greatest increase in areas relating to appointment of responsible people and maintenance of infrastructure.[32] The one Prohibition Notice and the majority of Enforcement Notices issued concerned safety critical fire alarms and detection systems. Most related to accommodation buildings and were spread across all 4 Front Line Commands (FLC) and the Defence Infrastructure Organisation (DIO), although Army units featured more than most.[33]

18. This indicates Defence is bearing an increasing level of fire risk, often in areas where people are living. Although in some cases the problems are mitigated by moving people to other buildings, the widespread nature of the non-compliances and the lack of people who understand the fire safety implications of uncompleted maintenance, results in a risk to life that we do not understand fully. This risk and the actions proposed to address it are discussed in the next section of the report. However, for the purpose of assurance my conclusion is that the degrading management of fire safety in Defence's infrastructure, caused by a combination of uncompleted maintenance and repair work, a lack of understanding of fire responsibilities and of competent people to discharge them, together with deficient 2nd party assurance, has the potential to manifest itself as a Risk to Life should a fire occur in premises where the elements of the fire safety system are absent. As Defence fire risk management arrangements are currently the subject of a major change programme, these themes should warrant close scrutiny as the division of responsibilities between the new contracted services, DFRMO and DFSR develop.

19. The MOD's response to the recent Grenfell Tower fire provides illustration of what **Limited Assurance** of Fire Safety means. The extent of work the DFSR had to undertake, in support of the DIO, in determining Defence's exposure to fire risk caused by pre-fabricated external cladding, demonstrated significant shortfalls in the understanding of risk

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[29] Under current arrangements 2nd party assurance of fire safety is carried out on behalf of TLBs and Heads of Establishment by the Defence Fire Risk Management Organisation (DFRMO), who conduct Fire Risk Assessments (FRA) of buildings where risk to life has been identified in a Fire Safety Action Plan. There is evidence that in some cases the results of these FRAs is either not acted on, or not passed to those responsible for managing the risk – often in the mistaken belief that DFRMO themselves hold the risk. New arrangements for 2nd party assurance will apply following the implementation of the DFRP, but until the contract has been placed it is not clear what these will be.

[30] Such as Building Control Advisers, competent designers and tradesmen.

[31] One Prohibition Notice and 11 Enforcement Notices in 2016/17 compared to 2 Prohibition Notices and 9 Enforcement Notices in 2015/16.

[32] Non-compliance with Article 11 (Unit Fire Procedures) requirements rose from 51 of 110 audited to 63 (up by 23%), non-compliance with Article 17 (Maintenance of Infrastructure) from 49 to 66 (up 35%) and non-compliance with Article 18 (Safety Assistance and Qualified People) from 29 to 40 (up 38%).

[33] Prohibition Notice: Officers' Mess, RAF Henlow. Enforcement Notices: 6 Army, 2 JFC, 1 RN, 1 DIO, 1 RN and DIO.

being carried in this area. With **Full Assurance**, this information would be more readily available and the levels of risk better known.

20. **DFSR Assurance Capability.** The DFSR currently has adequate resource to conduct its statutory fire safety regulation, audit and enforcement functions, although the age demographic of the fire inspectors is a potential risk to any succession planning. The continuing high tempo of regulatory and assurance activity for DFSR has been particularly evident in the on-going Defence Infrastructure programme supporting Army re-basing, estate rationalisation and significant projects associated with supporting new Defence platforms. The DFSR's original role has been extended to include 3rd party assurance of Aerodrome Rescue Fire Fighting and wider Fire and Rescue response. Work continues with the MAA to determine how this role will complement MAA audits and with DFRMO to make the necessary inter-TLB transfer of resource.[34]

AVIATION SAFETY ASSURANCE

21. Director Military Aviation Authority (D MAA) reports an overall assessment of Regulatory assurance for the Air Domain of **Limited Assurance**. This remains unchanged from last year. The combined impact of the continued and concurrent change programmes across the Defence Aviation Environment (DAE), driven by the introduction of a considerable number of new capabilities and the associated organisational change,[35] the widespread resource constraints increasing under ABC 17 and the low levels of SQEP in a number of areas[36] have resulted in an aggregated Air Safety risk which although difficult to quantify, is undoubtedly increasing in many areas of the DAE. SQEP shortfalls across the DAE have led to the lack of consistent and effective 2nd Party Assurance[37] and are hampering the management and development of some Air SEMSs in both Aviation Duty Holding (DH) and DH Facing Organisations. This is also a contributory factor to the assessment of Limited Assurance.[38] Nevertheless, the Regulator is confident the Aviation DHs are aware of their risk levels and Risk to Life is being managed in a broadly compliant manner with responsibilities and accountability well understood.

22. **MAA Assurance Capability.** The MAA lacks resilience and suffers from increasing levels of under-manning.[39] The MAA is 17% gapped across the organisation with pinch points in key safety critical areas such as Engineers due to the inability to recruit in the face of centrally imposed resource constraints and national shortages of specific skill-sets.[40] As

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[34] Work with DFRMO has identified 2 posts that will need to be transferred to the DFSR, but arrangements for this cannot be finalised until the new DFRP contract is in place and the future model for DFRMO is clear.

[35] New air capabilities currently being introduced include Lightning II, Poseidon P8, Airseeker, the Apache Capability Sustainment Programme (CSP), Merlin Mk2 CROWSNEST, Sentry CSP, Chinook Mk3 to Mk5 and Mk4 to Mk6A conversions, an upgrade to the C130J Hercules and both fixed-wing and rotary-wing platforms for the UK Military Flying Training System (UK MFTS) programme.

[36] Particular niche roles suffering from lack of SQEP include Test Pilots, Qualified Helicopter Instructors, aircraft engineering technicians in all 3 Services and Safety Managers.

[37] Although the majority of ODHs have wide-ranging 2nd party assurance systems in place, they typically involve a number of disparate organisations and often lack coherence. To support the regulated community the MAA has issued guidance, in the form of Regulatory Notice 2016/07 of August 2016, to explain the standard that is required of 2nd party assurance organisations.

[38] Examples of SEMS assessed as 'embryonic and fragile' include 22 Gp and COS Ops at the ODH level, 3FTS, 6FTS and RNAS Yeovilton at the DDH level and UK MFTS, Chinook PT and Britten-Norman Defence among DH-Facing Organisations.

[39] At 26 June 2017 38 posts in the MAA are vacant, of which 6 are in the Certification area, 15 in Oversight and Assurance and 4 in the Regulations division.

[40] As noted in the section of this report on DSA funding concerns, FY17 funding for the DSA makes provision for only 464 posts against an establishment of 472, while current In-Year pressures mean that we are unable

a result, it is unable to complete the full scope of its assurance and certification activities. Assurance of a number of approved organisations has been paused and the MAA has been unable to expand the approval schemes to the full scope that would align with other nations' approval schemes,[41] thus contributing to my assessment of **Limited Assurance**. Lack of capacity in the Certification division will delay the certification of new aircraft and major modification programmes over the next reporting period and will impact on the delivery of the Equipment Plan. Internal re-organisation has been initiated with options to establish a sustainable solution within the reduced allocated resources will be a focus of activity for the next reporting year.

LAND SAFETY ASSURANCE (INCLUDING FUEL & GAS INFRASTRUCTURE)

23. The Defence Land Safety Regulator (DLSR) comprises 4 specific areas: the Land Systems Safety Regulator (LSSR),[42] Movement and Transport Safety Regulator (MTSR), Fuel and Gas Safety Regulator (FGSR) and the newly-established Adventurous Training Safety Regulator (ATSR).[43] The DLSR's assessment of safety assurance combines assessments across these 4 regulatory areas and is assessed as **Limited Assurance,** unchanged from last year, albeit with an increasing degree of confidence in the validity of the assessment. There have been no significant changes to the issues raised in last year's report. The issues include Fuel and Gas Infrastructure,[44] SQEP provision,[45] (in particular experience and supervision levels) and the management of safety data (including reporting of incidents).[46] However, there is a sense that safety awareness is increasing and there is a growing momentum and desire to address safety issues and risks, many of which have been around for some time. There is still work to do to clarify the scope of the DLSR's remit, in particular where their regulatory regime has extended beyond the DEDs, for example, to high-risk activity.[47]

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to recruit beyond our current level of 410. As the bulk of the pain in Safety Critical posts is falling on the MAA (and DLSR) we are working with HOCS on a way to fill a further 24 posts.

[41] A further 25 organisations applied to join the MAA's Approved Organisations schemes during 2016/17, adding to the 215 organisations already covered. In view of this, together with the recurring workload of managing changes to the schemes, engineering manning constraints and the diversion of aircrew SQEP to assure the Flying Display season means that oversight of the Approvals schemes is now restricted to areas judged to be high risk rather than routine periodic assurance, limiting the visibility of the full assurance picture.

[42] The LSSR regulates the use of equipment within the land domain through regulations it publishes in JSP 454: Land Systems Safety and Environmental Protection. It conducts audits of TLBs and HLBs against the Safety and Environmental requirements of JSP 454 and monitors the performance of equipment through review of safety procedures and accident, defect and deficiency data received from the authorities responsible for operating the system. It also regulates the through life maintenance, test, inspection and certification for the roadworthiness of Tracked Vehicles and Wheeled Vehicles including trailers and vehicles approved to carry Dangerous Goods and conducts the annual and safety inspections of roadworthiness requirements.

[43] The ATSR was set up following recognition by the DSA and DSC that there was a need to regulate the MOD's Adventurous Training Centres, which had a disapplication from legislation requiring inspection and licencing of such centres catering for under-18s.

[44] For detailed evidence see the later discussion of the risk posed by the condition of the Fuel & Gas Infrastructure.

[45] Examples include Fuel & Lubrication Managers, supervision of REME vehicle technicians, especially at Reserve units and the experience levels of instructors at Adventurous Training centres.

[46] Although improvements are in hand to improve the use of the Joint Asset Management and Engineering System (JAMES) to manage land systems data and to make better provision of Safety Data Sheets and equipment Tie-Down Schemes, the required changes have not yet been delivered. While there has been an increase in reporting of Road Traffic Accidents to the MOD's claims handlers, the same increase has not been seen by the MTSR and it is clear that even when accidents are reported the data is often incomplete.

[47] In the case of the Defence regulation for inspecting and licensing Defence AT centres, this has been framed to cover all centres, whereas legislation requires only those centres used by under-18s to be licensed, on the grounds that activity is high risk and makes no age distinctions.

24. **DLSR Oversight Capability.** This year the DLSR has increased in regulatory maturity with the resources now available enabling confidence in their assurance activity to move up to Medium from the Low assessment of last year. FGSR has sufficient resource to conduct robust 3rd party assurance of fuel and gas infrastructure. The ABC 16 uplift of 10 posts has enabled the establishment of the ATSR and an increase in assurance capability within the LSSR. This has had a positive effect on the latter, enabling the LSSR to conduct assurance more ably and follow up on issues that would previously have been beyond their capacity, thus contributing to the increasing confidence in their assurance assessments.[48] MTSR has been restructured following an HSE external audit this year, which recognised the wide scope of their activities, but noted they were not making the best use of their resources. The new construct should be better able to provide support to the TLBs going forward.[49] The growing understanding of the complexity and diversity of safety risks across the Land domain means that DLSR will need to be fully resourced to its current level and may need to increase further in some areas to ensure adequate cover of high risk areas.

MARITIME SAFETY ASSURANCE

25. The Defence Maritime Regulator (DMR) has responsibility over 3 Defence Maritime areas: Shipping, Diving and Port Operations. It regulates these areas across all TLBs, not just the Naval Service. DMR judges the evidence available supports an assurance rating of **Limited Assurance** in the Maritime domain. This is the same as last year, although there are some encouraging initial signs.

26. The newly published Maritime Safety Strategy (MSS16) by the Royal Navy will provide a basis for future DMR audits, which will seek evidence of its implementation. The establishment and adequate resourcing of a three-tier DH construct in Navy Command, with clear guidance issued by the SDH, is another positive move to address the issues of Maritime Safety. However, the initial momentum created needs further resource to ensure success in areas such as the safety SQEP to support the DH construct, 2nd party auditing, use of Operating Safety Statement Reviews (OSSR) to manage platform fragility, management of technical documentation and development of a reporting culture that will produce the data needed to understand and manage risks. There remain underlying challenges of evidence,[50] persistent SQEP shortfalls and platform fragility that continue to require focus, effort and resource.[51] In DE&S Project SALUS has been launched to address SQEP and documentation shortfalls with similar early success and with clear signs of improvement, although as with the MSS, it will take a number of years to recover fully. However, there is still more to do in the other TLBs (Land, JFC and DIO), perhaps with similar safety strategies, to demonstrate ably maritime compliance across Defence.

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[48] For example, the ability to conduct follow-on inspections into repeated incidents of Landrover wheels falling off. An apparently low-level but pernicious hazard.

[49] Through the establishment of a DLSR HQ Analysis and Plans function to exploit the available regulatory intelligence and ensure that resources are targeted at the most appropriate areas.

[50] Last year's report noted that not enough evidence was available to establish a performance baseline for organisational assurance in Navy Command and DE&S and we have seen an improvement against this. However, there is still not enough evidence to set a baseline of organisational assurance in the Land Command or JFC areas of the Maritime domain and our assurance assessments in those areas are subjective.

[51] Reports from across the Ship Support Programmes indicate the maintenance burden on ageing ships is increasing and becoming more challenging with finite funds. This is likely to result in higher levels of safety and environmental risks. While the roll-out of OSSR will help to identify these increased risks continued operational pressures will limit the effect of risk control measures.

27. **DMR Oversight Capacity.** The past year has seen the DMR grow from 40% in strength to achieve almost full manning against the 'light' design construct defined on formation. However, as a small team regulating a large domain, SQEP capability and capacity are impacted heavily when staff leave or are unavailable. Since DMR is based on a lean regulatory model, a full complement of staff and the current level of programme resource is the minimum possible to deliver regulatory assurance across its 3 key Maritime areas.[52] This relies on both Duly Authorised Organisations to complete some assurance function on its behalf and the regulated community to conduct rigorous 1st and 2nd party assurance. The establishment of the DMR Analysis and Plans section, expected to be at Full Operating Capability by the end of 2018, will facilitate a risk-based Assurance and Regulation approach.[53] With the improved manning stance and new management support tools, the DMR now has a firmer base for assurance, regulation and enforcement across the Maritime Domain in line with the SofS's charter. There are also strong indicators that DMR's growing stature and credibility are encouraging more mature lower level assurance. As a result of both this and the progress made by the Navy I judge the rating of **Limited Assurance** is correct, but represents a significant improvement on last year.

ORDNANCE SAFETY ASSURANCE

28. The Defence Ordnance, Munitions and Explosives Safety Regulator (DOSR) assesses that internal controls across all related Defence activities are currently operating effectively and is able to provide **Substantial Assurance** of safety systems. Their main areas of concern relate to sustaining SQEP,[54] Explosives Safety associated with MOD Operations in Ports and Harbours[55] and Explosives risk assessment.[56] These are being closely managed through the DOSR functional safety committees.

29. **DOSR Oversight Capacity.** Regulatory performance within DOSR continues to develop and improve favourably with a focus on better ways of working through joint inspections and auditing with other DSA Regulators where practicable. A proactive approach towards recruitment for vacant posts is delivering positive results. Functional safety committees, established following a review of DOSR governance arrangements to ensure more effective stakeholder engagement, are working well and moving DOSR business forward.

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[52] Although this relies on the support of mature 1st and 2nd party assurance arrangements. Evidence suggests that these are still fragile in many DHs' Risk Control Systems. For example, audits of both NCHQ Surface Ships and Submarines ODH areas found evidence of only limited internal audit (1st and 2nd party), although there had been an improvement from the previous year. Other themes include lack of follow-up audits to confirm that action has been taken and limited capability to pull together data from 1st and 2nd party assurance activities to form an overall risk picture.

[53] The DMR Analysis and Plans section will also support the DNSR's requirements for analysis and planning.

[54] Shortage of Ordnance, Munitions and Explosives (OME) SQEP is a pan-TLB issue with small, ageing populations, niche skills and competition from industry all combining to make it a complex issue to manage. There are positive signs as recruitment and retention initiatives start to take effect, but also some evidence that the New Employment Model (NEM) and its pay scales has had a negative impact on the RAF Armament Trade.

[55] Following the issue of a Crown Prohibition Notice by the HSE for failing to provide adequate safe guarding to the members of public when handling explosives at the Marchwood Sea Mounting Centre (SMC), DOSR have been working closely with the HSE to develop and improve our joint understanding of the management of safety in Ports and Harbour areas. Lessons will have relevance to other MOD ports, including Glen Mallan jetty for the QEC and submarine berths in the Clyde.

[56] There is a risk that a lack of OME-risk awareness and failure to implement the necessary controls could impact on current and future MOD operations affecting personnel, assets, infrastructure and capability.

ASSURANCE FROM SERVICE INQUIRIES (SI)

30. SIs also provide evidence to complement assurance assessments. Details of the SIs convened or completed during 2016/17 are discussed later in this report and as many of them are still in progress I cannot refer to specific findings. However, some common themes emerge. In some cases levels of supervision have been inadequate or inappropriate, suggesting that lack of SQEP has put people in positions their training and experience has not adequately prepared them for. There are examples where individuals did not fully understand their responsibilities, or the need for risk management or risk control measures in particular circumstances. In other cases controls were in place, but the evidence suggests they were not applied as part of an overall SEMS and local 1st and 2nd party assurance proved inadequate in identifying this. While there are dangers in using individual occurrences to make wider points, I have no doubt that the SI process, which aims to learn lessons and prevent future accidents, also contributes to my overall assurance picture. Since the end of the period covered by this report I have convened a further 2 SIs, 2 have been completed and 6 are still in progress.

SAFETY ASSURANCE SUMMARY

31. These Assurance Assessments reflect the maturity of TLB safety governance. Although there is still much to do to improve Defence's safety performance, there is a notable improvement in safety awareness across all domains and evidence of strong leadership commitment. All TLBs are making progress in the development and use of SEMS, albeit with differing levels of maturity. The quality of safety occurrence reporting is also variable, but slowly getting better. This is especially welcome, as increased reporting improves the quality of objective data and from this, the understanding of risk.

32. The implementation of SEMS and the application of the DH concept vary along with levels of understanding of how these can assist effective safety governance. Both are well established in the Air environment and their maturity is such that attention has turned to the reinforcement of effective safety cultures. Good progress has been made by the Royal Navy with its Maritime Safety Strategy, the appointment of DHs (and re-issue of BRd 9147 Navy Command SEMS) and with the oversight of safety generally. Progress is evident in Land and Joint Forces Command, with a continuing healthy debate on how DH principles can best be applied. The Army recently held its first SDH chaired Safety Board and continues to work on developing its 2nd party assurance. DE&S is providing useful support in areas such as Maritime Safety, NSQEP and mitigation of the Typhoon MAC risk.

33. Restrictions in the oversight capabilities of some of my Regulators and limitations in the DSA's own ability to assure across the full range of SofS's HS&EP policy mean that these assurance assessments are not as thorough as I would like. I will return to the subject of the DSA's maturity later in the report, but note here some of the in-year savings measures being considered would, if taken, significantly reduce our ability to provide even the current levels of assurance.

34. **Recommendation:** The Defence Board should consider whether these levels of Safety Assurance are acceptable to it and, if not, what should be done.

WHERE SHOULD DEFENCE BE CONCERNED?

35. I have reviewed the risks identified in last year's report and used the assessments from my Regulators to produce an updated picture of the strategic safety-related risks I

believe Defence currently faces.[57] I have also compared these with the risks being held and managed by each of the TLBs for consistency (TLB-held risks are shown at Annex C). This comparison has highlighted a number of common themes, including SQEP and Infrastructure, between my assessment and those of the TLB Holders. These are the risks which, in my judgement, have the potential to cause significant loss of life and associated reputational damage or societal impact for Defence and I recommend that the Defence Board focuses its attention on them.

SUMMARY OF SIGNIFICANT SAFETY RISKS

36. A core of risks are carried over from last year. This is not surprising given their complexity and the timescale needed to address them. The focus is more one of ensuring momentum and continuing progress. The following 5 risks reported in last year's report remain relevant:[58] lack of SQEP, lack of safety assurance in the Maritime domain, risk of Mid-Air Collision (MAC), the poor condition of the Fuel and Gas Infrastructure and Inadequate Risk Management and Safety Assurance of activities the Land Domain.[59] An emerging risk of Fire Safety has been added this year, based on the DFSR's concerns covered earlier. I have categorised risks as follows:

a. **Pan-Domain Root Cause Risks**: the underlying effect of **Change** and the lack of **SQEP** discussed in the Context section of this report.

b. **Individual Safety Risks**: MAC, the condition of the Fuel and Gas Infrastructure, Management of Fire Safety and the associated Infrastructure Risks.

c. **Risks posed by a lack of Assurance**: SEMS and 2nd Party Assurance in the Maritime domain and Risk Management and Safety Assurance in the Land domain.

PAN-DOMAIN ROOT CAUSE RISKS

37. There are 2 notable pan-domain root cause risks which relate to the 2 main themes running through this Report – the first is **Change** and the second the growing mismatch between supply and demand for **SQEP**. These risks, along with financial pressures, have featured in previous significant analyses of Defence safety issues.[60] Their inclusion as strategic Safety Risks warrants special attention.

38. The risks relating to Change and SQEP each have 2 facets, with change affecting both our organisations (structure and processes) and our equipment programmes and SQEP being dependent on both Qualifications and Experience. These 4 factors and the interaction between them are main drivers of the pan-Departmental cumulative risk that we face and have the potential to translate into further Strategic Safety Risks. I will be developing these ideas further in work with the Defence Safety Committee (DSC).[61]

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[57] Using the definition of strategic safety risk set out in last year's report: a risk that poses a Risk to Life of sufficient magnitude to cause significant loss of life and associated reputational damage and societal impact to have strategic level consequences for the Department if realised.

[58] This list is not presented in any order of importance, as the differing nature of the risks make such comparisons largely meaningless.

[59] As noted in last year's report this is not specific to the Army TLB, but includes land-based activities carried out by all TLBs.

[60] Including the Haddon-Cave Nimrod Review and successive Independent Maritime Safety Reviews. Service Inquiry reports consistently identify factors relating to change and SQEP among those that contributed to accidents, especially in the areas of supervision and changes to organisations and their safety systems.

[61] We will also work with the Director Audit, Risk and Assurance (DARA) to ensure we reflect their contribution to the cumulative risk picture. This will also review how DSA feed into the MOD Corporate Risk process, as

PAN-DOMAIN ROOT CAUSE RISK – IMPACT OF CHANGE

39. **Organisational Change.** As noted earlier, the current context for Defence is one of widespread change to organisations, processes and force structures. As many of these organisations have responsibilities for managing safety, the effect of change on their safety management arrangements needs to be understood and taken into account. Organisational change has the potential to disrupt the alignment of responsibility, authority and accountability for those owning and managing risk. The use of OSAs provides mitigation, but relies on OSAs being conducted thoroughly and from the outset. The findings of each OSA need to be acted on by those responsible for the change programme and those with safety management responsibility. DMR in particular reports a lack of evidence of sufficient governance of change, or of reliable ability to track and monitor performance during change initiatives, as a contributory factor to the risk posed by inadequate safety management and assurance in the Maritime domain.

40. **Equipment Programme Change.** The challenges to safety management posed by the introduction of new equipment, with new and unfamiliar hazards, risks and mitigations are well recognised. As noted earlier, the number of new capabilities entering service in the next few years requires SROs and end-user TLBs to give these challenges close attention. What is less obvious is the increasing levels of risk incurred when equipment programmes are delayed and Force Elements continue to operate old equipment, often with declining reliability and support arrangements.[62] TLBs operating capabilities at either end of the procurement cycle between fielding and disposal need to have an adequate understanding of the safety risks arising from change.

LACK OF SQEP

41. Provision of sufficient SQEP remains a key risk, with the majority of Regulators reporting this as one of their top concerns. While this is not a new issue the combination of DE&S freedoms,[63] wage restraints, competition from outside Industry, restrictions on recruiting and the Future Defence Civilian Change Programme have the potential to create a 'perfect storm' for many of the regulated domains already struggling with SQEP provision. Shortages, pinch-points, recruitment and retention difficulties are also widely reported by TLBs.[64] While many assessments of SQEP shortages relate to the overall competence of personnel some draw particular distinctions between the need for qualified people and those with sufficient experience to be competent.

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required by the recent DG HOCS Performance and Risk Review (Record of DG HOCS Performance and Risk Review held on 3 May 2017. Bds Sec 3-3-29_HOCS dated 9 June 2017, Action 4).

[62] The fragility of many maritime platforms noted in my assessment of Safety Assurance in the Maritime domain is a prime example.

[63] The new freedom enjoyed by DE&S as a Bespoke Trading Entity to set its HR policies, grading structures and pay scales have the potential to make it an increasingly attractive employment prospect compared to other areas of the MOD and for it to attract key SQEP away from other TLBs.

[64] Lack of Maritime SQEP and competence is the second of Navy Command's Top 3 risks, assessed as threatening the 'operate safely' status (Maritime Safety Board supporting papers June 2017). Planning, conducting or supervising of high-risk activity by personnel who are qualified and experienced and of the correct rank is identified among the management controls for 3 of the top 4 risks identified by DCGS (Death/serious injury during Live Fire Training, Death/serious heat injury during Arduous Training and Death/serious injury as a result of operating military vehicles) in a letter to DG DSA on 28 June 2017. The Air Command Total Safety Command Board held on 2 May 2017 identified lack of SQEP as the third of its top 4 risks after Mid-Air Collision and Infrastructure issues. More generally, it is becoming apparent that the ability of the TLBs and the DSA to attract, train and retain Safety Critical personnel is being increasingly affected by the financial incentives and financial freedoms available to industry and some government organisations that are in direct geographic competition for SQEP.

42. **Lack of SQEP – Qualifications.** While the MAA reports shortages in the key aviation specialisations of engineering, aircrew and Air Traffic Management (an emerging pinch point area), it highlights particular areas where qualification is the key factor. These include Flying Instructors, Test and Evaluation specialists and qualified Air Safety specialists, all of which limit the ability of Aviation DHs to maintain levels of output.[65] The extent and impact of SQEP issues in the nuclear domain, which is also heavily qualification dependent for civilian staff in DE&S, is discussed in Annex B. DMR notes that SQEP shortfalls are being experienced in niche qualification areas of the civilian maritime support services,[66] diving specialists (both civilian and military) and environmental science and protection roles.

43. **Lack of SQEP – Experience.** Experience levels among aircraft engineering technicians – especially REME Class 1 and RAF SAC(T) avionics tradesmen – is a widespread concern.[67] The Air Member of Materiel has recently commissioned work to reassess how both experience and qualification levels in these areas can be better monitored.[68] DMR report that Maritime SQEP levels are below manning balance and forecast to remain so until at least 2020,[69] at which point the workforce will be composed of relatively junior and inexperienced personnel. The lack of experienced NSQEP naval personnel is also reported by DNSR. Based on evidence from their 2nd Party assurance, Navy Command have raised a Category B risk relating to dilution of experience in seagoing units, primarily focussed on junior rates and more junior senior rates, although in time, the loss of experience will work its way into more senior rates and junior officers. Work is being done with Defence Statistics to provide objective evidence that will give a measure of how much risk is being carried and where mitigation should be focussed. Evidence in the Land domain highlights the risk posed by lack of experience in those supervising activities, with DLSR inspections of Fuel and Gas facilities,[70] transport activities[71] and Adventurous Training Centres[72] demonstrating the difficulties TLBs are having with providing people with the necessary competence and experience to supervise the full range of their activities. DFSR also report the lack of SQEP in the fire safety domain remains a significant risk, particularly the understanding of appointed persons of their roles and responsibilities. The risks and impact of these shortages vary across the different domains, but lack of experience and the supervision of activities are a common theme, including in SI findings. It is my judgement that the lack of experience (and competence) in personnel responsible for the conduct of high risk Defence activities, will prove more difficult to monitor, manage and rectify. Continuing high levels of change and reductions in activity forced by resource constraints, will compound the resulting risks.

44. **Progress in Tackling SQEP Shortfalls.** Progress has been made in specific areas. For example DE&S have made progress with recruitment of Air Safety SQEP under the freedoms allowed by their new operating model and under Project SALUS, have

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[65] Aviation DHs have increasingly turned to reductions in output to mitigate SQEP shortfalls in the engineering, aircrew and Air Traffic Management domains. This exacerbates shortages by reducing training and development opportunities.
[66] Including port traffic masters, pilots and Queen's Harbour Masters.
[67] Especially in JHC: Comd JHC's JHC/1/2/1 dated 2 February 2017 – JHC SQEP Assessment.
[68] AFBEX(17)03(X) RAF Engineering SQEP – Think Piece; A Paper by AMM dated 9 February 2017.
[69] Manning balance is the prevailing trained strength requirement within a tolerance band of plus one per cent and minus two per cent to reflect routine structural and organisational change within the Services.
[70] FGSR issued 13 Enforcement Notices for the lack of SQEP Fuel & Lubrications Managers at facilities.
[71] During MTSR inspections 26% of observations related to inadequate supervision and 58% of inspector interventions were to stop unsafe activities – twice the rate observed the previous year.
[72] The first round of AT centre inspections has shown that activities are being led by relatively inexperienced instructors with little senior supervision and, on occasion, qualifications below the minimum civilian equivalent.

injected over 60 persons into maritime roles. However, caution is required that this success is not at the expense of denuding other areas of the Maritime domain in either Navy Command or other DE&S teams. In the Nuclear domain a number of initiatives are in place and there is evidence these are having a positive effect, although vulnerability remains in this small, highly skilled group. Most welcome is the implementation of a university-linked 5 year programme, funded by DG Nuc on the Sustainment of Independent Nuclear Expertise and the establishment of the Nuclear Undergraduate Apprenticeship Scheme.

INDIVIDUAL RISK – MID-AIR COLLISION (MAC)

45. **Extent of MAC Risk.** The risk of MAC remains an inherent aviation risk which all Operating DHs feature among their top level Air Safety risks. Although low probability, any such incident carries a risk of both loss of life and severe reputational and societal damage to Defence. The total number of Airprox involving UK military aircraft during 2016 remains broadly consistent with previous years[73] but within this there has been a significant growth in the number of reports (15% of total) of Airprox involving Small Unmanned Air Systems (UAS) (drones and model aircraft). The MAA continues to work with the Department of Transport and the British Air Line Pilots Association (BALPA) to assess the risks associated with MAC between manned aircraft and UAS and in supporting the UK Airprox Board's activity to categorise better Airprox involving these aircraft. Owing to the continued proliferation of UAS and following discussions with the Chief of the Air Staff (CAS), the RAF has recently taken the lead in developing a Defence approach to the UAS risk. There has been a continued reduction in the number of military Airprox with Commercial Air Traffic (CAT).[74]

46. **Use of Collision Warning Systems.** There is some evidence that the increased use of Collision Warning Systems (CWS) has been effective in reducing Airprox incidents with Air Systems equipped with Secondary Surveillance Radar (SSR).[75] Small UAS, gliders and light aircraft may not be fitted with SSR so cannot be detected by CWS, but technology improvements in SSR, resulting in weight and cost reductions, should increase SSR utilisation and provide improved electronic conspicuity. Some training aircraft have been fitted with other less capable systems such as PFLARM, a system which is compatible with General Aviation, particularly light aircraft and gliders. This was achieved using an innovative approach in collaboration with industry which will see the Tucano fleet fully fitted within 4 months from May 2017. During 2016, MAA regulation was updated to ensure that CWS is explicitly considered in the Air System Safety Cases (ASSC) and in the specification of new or modified Air Systems.[76] In multinational airspace, the number of Airprox involving UK Military Air Systems increased slightly from 14 in 2015 to 17 in 2016,[77] the majority occurring within the Middle East Joint Operating Area. Internal MAA assessment has confirmed no common causes or themes.

47. **MAC – Typhoon and Commercial Air Traffic (CAT).** Last year's report highlighted the high impact/low probability risk of a collision between the non-CWS-

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[73] Airprox in UK Airspace Report 31 shows 82 Airprox in 2013, 94 in 2014, 65 in 2015 and 82 in 2016.
[74] There was only one reported incident in 2016 compared to 2 in 2015 and 6 in 2014.
[75] Air Systems with SSR (Indicator Friend or Foe) can be detected by CWS. Incidents involving small UAS, Gliders, Para motors and light aircraft (which may not be SSR-equipped) were discounted from the total. In 2015, 38 of 65 reported Airprox were with SSR-equipped air systems. In 2016 this reduced to 25 of 82 reported Airprox being against SSR-equipped Air Systems. Incidents involving Small Unmanned Air Systems, gliders etc. (which may not be SSR-equipped) were discounted from the total.
[76] RA1205 requires the ODH explicitly to consider CWS in the ASSC. RA5820 requires new air systems or those subject to major modification to have CWS under Def Stan 00-970.
[77] Airprox reported by UK Military Aircraft when operating overseas dated Mar 17.

equipped Typhoon and CAT and focussed on the societal concern resulting from operating Typhoon without a CWS when other platforms are fitted with the capability. Over the last year CAS, as SDH, has prioritised resource and DE&S now has a funded programme for staged fitment of an Enhanced Collision Avoidance System to Typhoon.[78] Therefore, while there remains a risk of MAC between a Typhoon and a Civilian Airliner, clear action has been taken to reduce this and to address the societal concern expressed last year.

INDIVIDUAL RISK – FUEL AND GAS INFRASTRUCTURE

48. **Role of Infrastructure in Preserving Safety.** An emerging theme in this year's assessment of Strategic Safety Risks is the role of infrastructure and its maintenance in the preservation of safety. Infrastructure has featured in previous Assurance Reports since before the formation of the DSA and last year's report focused on the specific safety and environmental risks posed by the condition of the Defence fuel infrastructure. The evidence in this year's report, primarily but not exclusively from the DLSR and DFSR, indicates that there are similar problems with gas infrastructure and with fire safety aspects of infrastructure management (considered as a separate risk below). Problems with management of infrastructure, leading to concerns over fuel, gas and fire safety provide evidence of the limited effectiveness of safety governance in DIO.[79] The impending transfer of control of infrastructure funding from DIO to the TLBs will need close management to ensure the new arrangements are aligned with the TLBs' safety governance and the risks transferred understood.

49. **Condition of Fuel and Gas Infrastructure.** The condition and maintenance of Defence's Fuel and Gas Infrastructure remains the top safety risk in the Land domain. The **Limited Assurance** for Fuel and Gas Infrastructure having been discussed previously. The condition of fuel and gas infrastructure continues to present a Risk to life, threaten operational outputs and risks harming the environment (with potential reputational damage). The DLSR reports that 11.2% of their fuel site inspections resulted in formal enforcement action, broadly similar to the 11.7% for 2015/16.[80] Problems identified show an increase in instances of works raised during inspections not being completed within a reasonable and agreed timeframe, a trend particularly noticed in overseas facilities, which are generally older and more fragile. In addition, this year FGSR continued their assurance of bulk gas facilities, conducting 127 inspections of bulk gas facilities of which 44% resulted in formal enforcement action.[81] There is evidence that Defence is not and probably has not for some time, been maintaining its high-risk bulk gas facilities to meet statutory requirements.

50. **Current Position.** There has been an increase in awareness of fuel infrastructure safety across Defence and progress where funding has been found. Some £11M allocated by DIO to deal with outstanding remedial work in the UK led to quicker repairs and facilities returned to full capability. However, the overall approach can still be characterised as 'fix on fail'. Efforts being made to become more proactive are yet to show any effect. An example is the partial closure of the Oil Fuel Depot in Singapore in February 2017 following issue of a Prohibit Notice by DLSR for DIO's failure to conduct a professional inspection in the

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[78] Stage 1 is due to be delivered to the front line from Dec 18, with a further 2 stages added from late 2019 and mid-2021.

[79] Discussion at the DSC meeting on 7 June 2017 highlighted that the DIO have not been carrying out condition surveys of the Defence estate and have thus been unable to effectively target preventive maintenance activity to areas where it has been needed for safety reasons.

[80] In 2016/17 228 inspections covering 376 fuel installations resulted in the issue of 42 Enforcement Notices, a similar failure rate (11%) to that reported in 2015/16.

[81] Inspections of 127 bulk Liquid Petroleum Gas (LPG) installations across 24 locations led to 35 formal enforcement notices and a significant number of other corrective action requirements.

specified timeframe, combined with a number of non-compliant electrical components. Work is now on-going to rectify shortfalls, with the facility operating in a severely limited manner until work has completed.

51. **Mitigating Action.** There has been progress in trying to establish a fuel infrastructure estate that meets Defence's requirement whilst being sustainable within resources. DIO has completed surveys of all UK fuel facilities to identify the current state and predict when future funding will be needed to conduct, for example, major infrastructure works and life cycle replacement of components. In parallel, Defence Strategic Fuels Authority has examined the Defence requirement to ensure, when matched with the 'Better Defence Estates Strategy, the appropriate fuel infrastructure is provided. These 2 work strands will be the subject of coordinated ABC18 submissions by the DIO and JFC. Following funding delegation, TLBs will need to ensure they are able to provide sufficient co-ordination and coherence of delivery without the pan-TLB programme-level oversight currently provided by DIO.

INDIVIDUAL RISK – MANAGEMENT OF FIRE SAFETY

52. The risk raised by our current performance in Fire Safety Management has already been highlighted in the Assurance assessments and has increased to a level warranting inclusion here. It is based on an aggregation of issues comprising the maintenance of fire safety infrastructure, the competency of persons appointed to fire safety duties and the management of fire risk. The combined impact of these issues is an increased risk of a fire causing loss of life, with the associated reputational and societal concerns and potential negligence charges if such a risk was known to have existed and had not been addressed. The concerns of the Regulator are supported by DHs and DH Facing Organisations who have raised concerns over the capacity of Defence to manage the fire safety risk.[82]

53. Management of Fire Safety across Defence falls into 2 main areas: infrastructure and related maintenance and testing regimes, and the assessment and management of fire risk. These arrangements must meet the standards required by applicable legislation, Defence policy and regulation and guidance published by Government and the wider fire safety sector.

54. **Infrastructure Maintenance.** Findings from the DFSR's regulatory audit activities found that the largest area of non-compliance was in the maintenance of provisions for fire safety. This often related to shortages of resources and/or competent people. Examples include Industry Partner engineers failing to follow the defined British Standards maintenance schedule, delaying repairs until other fittings fail and reactive maintenance regimes, which rely on users to report faults, such as a broken fire door, in the absence of any inspection regime. This approach eventually results in an unsatisfactory situation, restricting escape from the building and increasing the risk to occupants and exacerbating fire and smoke spread and damage to the building. There is evidence of a reliance on regulatory intervention before those with duties take any meaningful action.[83] A further issue is the incidence of unwarranted fire alarm signals continuing at an unacceptably high

[82] Letters from Chief Executive DIO, Commander Home Command and Fleet Commander to DFSR.

[83] DFSR are working closely with DIO Project Managers to help improve understanding of the fire safety duties associated with infrastructure. As a result there has been an increase in the appointment of Building Control Advisers with a positive effect on compliance with fire safety regulations. However, in other areas an on-going lack of professional competency means that managers are waiting for intervention by DFSR rather than taking an active approach to fire safety duties.

rate,[84] caused mainly by ageing or poorly maintained systems or failure to manage the premises or educate the occupants on what activities cause the detectors to trigger. False alarms on a frequent basis create a lack of confidence among building occupants, resulting in delayed evacuation and a general apathy that in certain circumstances could lead to a Risk to life.[85]

55. **Competence of those Responsible for Managing Fire Safety Risks.** Concerns exist over the competency of personnel appointed to fire safety duties and the clarity with which roles and responsibilities are defined.[86] DFSR audits have found widespread evidence of failure by those appointed to positions of fire safety responsibility to recognise when a fire safety duty is not being fulfilled, including the need to have a suitable maintenance regime in place. When fixed active and passive fire safety systems have degraded due to age or lack of maintenance, the tolerability of the additional risk thus created should be reviewed, but this is often not happening. The issue is exacerbated by a lack of co-operation and co-ordination between personnel with an element of control,[87] leading to situations where Heads of Establishment/Commanding Officers have no knowledge of the unserviceable fire safety systems. Some work has been done by the Defence Fire Training Development Centre with professional fire service standards in this area having been cross-mapped. However, this has yet to be extended to non-professional staff training, designed primarily to support Army unit fire safety staff.

56. **DFSR and the Duty to Consult.** Fire legislation places a 'Duty to Consult' on those responsible for new infrastructure, requiring them to involve DFSR in the planning of their projects.[88] This activity has generally been effective and has improved understanding of where duties sit when designing, completing and regulating standards of works and the impact any changes may have on fire safety arrangements. The oversight DFSR provides in this area and the improvement in the fire resilience of new and refurbished infrastructure projects has been tangible.

57. **Supporting Evidence.** Doubts about the capacity of Defence to manage fire safety risks appropriately have been reinforced by a Fire Safety Infrastructure Deep Dive conducted recently at the direction of Commander Home Command. This confirmed a lack of understanding and identification of the roles and responsibilities associated with the management of Infrastructure Fire Safety within the MOD.[89] This report also reinforces my own assessment that fire risk-related infrastructure issues often manifest as degradation of operating capability, capacity and/or quality of life rather than in an immediate decrease in safety, as the mitigation often results in moving the occupants elsewhere. This 'masking' of the problem leads to a gradual degradation of capability and potentially means that problems may not receive the attention and resources needed to resolve them.

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[84] DFSR statistics record 4627 false alarms and unwanted fire signals across Defence in 2016/17, compared to 2125 in 2015/16. Greatest rises were in Land Command (1765 up from 207) and Navy Command (824 from 248), while JFC reported a drop (60 from 353). There were 287 actual fires at Land Command establishments, up from 115 in the previous year, although for Defence as a whole the number of fires fell from 534 to 456.

[85] The wider impacts of unwarranted fire alarms relate to the disruption of sleep patterns in staff undertaking duties such as flying, driving, medical and surgical tasks where fatigue can have serious consequences.

[86] SQEP in this context encompasses several roles including the appointed person, fire safety risk assessors and persons with duties to install and maintain fire systems.

[87] Such as Facility Management staff who provide services such as fire alarm testing and maintenance.

[88] A statutory process requiring the works originator or building control body responsible for generating new infrastructure works, to consult with DFSR.

[89] DFRMO Deep Dive Report into Infrastructure Life Safety (Fire Safety) Deficiencies within Defence, dated 19 May 2017.

58. **Impact of Change.** The delegation of infrastructure funding from DIO to theTLBs next year may help those holding the fire risks to manage them better. It could also lead to other unforeseen outcomes, particularly if those controlling the funding after transfer do not have access to the necessary infrastructure and fire risk management competences to do so effectively. This is an area the DSA will monitor. Similarly, the DFSR will remain closely engaged with the DFRP to understand the new contractual arrangements for fire safety management.

59. **Recommendation:** The Defence Board should consider the need for further action to address shortfalls in fire safety maintenance and in the competence of persons appointed to hold fire safety responsibilities, especially in the light of the changes currently being made to Fire Safety Governance. This should include the following:

a. A focus on Fire Safety competence to ensure Fire expertise/advice is available at local and Command levels and that training is available to improve understanding of responsibilities.

b. A review of the arrangements for 2nd party assurance of fire risk management.

c. OSAs to assess the safety impact of both the DFRP and the changes to infrastructure funding.

ASSURANCE RISK – SEMS AND 2ND PARTY ASSURANCE IN THE MARITIME DOMAIN

60. **Maritime Safety Strategy (MSS).** The Navy has made considerable progress in addressing shortfalls in their SEMS and 2nd party assurance over the past year. Concerns still remain regarding organisational change, SQEP and platform fragility, set against a sustained high tempo of operations, but there is clear evidence of progress following the 3rd Independent Maritime Safety Review. The development of the MSS[90] has been central to this along with the establishment of the Maritime Safety Board and good initial progress with DE&S's Project SALUS. There is also clear intent to sustain this momentum.

61. **Progress.** The DMR reports progress in each of the 3 main areas of continuing concern. A baseline of organisational assurance has now been established in both Navy Command and DE&S, documenting the way in which safety will be managed. Organisational assurance arrangements in the other TLBs (Land and JFC) operating in the Maritime domain are less well developed.[91] Cumulative Risk Management is improving, with Operational Safety Summary Reports (OSSR) produced at key stages of a platform's operational cycle, improving understanding of the risks and fragilities involved. The current material state of the fleet, particularly among the older vessels or those in constant operational demand, is putting severe pressure on the support infrastructure and the generation of units to task. The developing DH construct is showing increasing understanding of this challenge and using risk management processes to good effect in Sea Clearances. Through a stronger commitment and understanding of safety, operational capability is being delivered by managing risk more effectively. Other areas of concern are the lack of evidence of sufficient governance of change, or of a reliable ability to track and monitor performance during change initiatives. The DMR's audit programme has identified

[90] 19 of 35 MSS 16 workstrands have been completed, with 13 more than 50% complete.

[91] In contrast to the RN's MSS and BRd 9147, Land and JFC activities in the Maritime domain lack Organisation and Arrangements (O&A) definitions to set out functions, responsibilities and safety liabilities, and are in the main unsupported by risk governance and measurement arrangements.

that the required 2nd party assurance and document evidence is still lacking,[92] but a clear will and leadership drive to improve this is evident. The maturing safety culture shows stronger leadership which is beginning to bring a greater understanding of cumulative risk and thus a stronger intelligent customer relationship with DH-Facing Organisations. The initial momentum created needs further resource to ensure success, but is clearly a positive move forward.

62. **Further Work Needed.** Overall, despite progress in certain areas, the risk picture is not clearly understood and difficult to manage.[93] Manpower gaps continue to place significant strain on both the operational and maintenance aspects of a range of activities, with little evidence of gapping yet being arrested and a consequent impact on the speed with which improvements to SEMS and 2nd party assurance can be made. With the future Navy programme set to continue at high tempo, particularly with the introduction of the Queen Elizabeth Class (QEC) into service with the Navy and the challenges this will bring, I judge that the risk posed by ongoing development of SEMS and 2nd party assurance in the Maritime domain merits continued attention.

ASSURANCE RISK – RISK MANAGEMENT AND SAFETY ASSURANCE IN THE LAND DOMAIN

63. Last year's report highlighted a lack of safety assurance for activities conducted by all TLBs in the Land Domain and in particular the Risk to life posed by non-operational activity such as military exercise training, arduous training, adventurous training and sport. Regulation of these land-based activities falls under the Health and Safety at Work Act 1974 (HSWA), with the HSE as the statutory Regulator. Responsibility for compliance lies with TLBs, who own a Duty of Care under the HSWA. Evidence showed limited internal safety assurance at unit and TLB levels. Experience in other domains suggests that once commanders become risk aware and understand the true picture of what they are responsible and accountable for, they actually become more forward leaning and better equipped to spot where the danger lies and develop effective mitigation strategies. Applying this lesson, together with more comprehensive 1st and 2nd party assurance, to the Land Domain could reduce the number of preventable deaths during the conduct of military training and the scope for future reputational damaging incidents.

64. **Developing Assurance Measures.** The tragic loss of 3 Reservist soldiers while undergoing physical aptitude training in Brecon in 2013 was in part a manifestation of the lack of effective assurance, with 2 more recent fatalities during separate live firing exercises (August 2016 and November 2016), serve as a reminder of the importance of effective assurance. During its consideration of last year's report, the Defence Board directed DG DSA and CGS, working with all the TLBs, to consider more detailed recommendations on how more robust assurance measures could be put in place.[94] This work concluded that 1st and 3rd Party Assurance levels were generally adequate, but there were gaps at the 2nd Party level, particularly where assurance activity is conducted across TLB boundaries.

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[92] Reinforced by evidence from Navy Command's own review of 2nd party assurance, which identified common themes of unclear organisation and arrangements and poor communication resulting in the SEMS being fragile and at risk. (5th MSB supporting papers June 2017)

[93] DMR audit evidence shows that the lack of clear functions or ownership of safety liabilities compounds the lack of effective business management and performance measurement. Improvements in open reporting are then hampered by inconsistent risk governance which challenges the ability to report or assure effectively. Management Information metrics are not uniformly in place and better tools are required to help identify and validate risk patterns.

[94] Minutes of October 2016 Defence Board meeting, Item 5 Action 6.

Work continues, led by the Army, to identify these inconsistencies and confirm inter TLB responsibilities and dependencies.

65. **Interventions by HSE and DSA.** Following last year's report the DLSR have engaged with the HSE to conduct a joint intervention into safety during individual training. Indications from the first tranche of visits to individual training units were positive with the HSE noting the professionalism of the units visited. The next tranche of visits this summer will include higher-risk units such as the Commando Training Centre Royal Marines and more advanced live firing training conducted at the Infantry Battle School. This year has also seen the implementation of a scheme, led by DLSR and supported by DMR, to inspect and licence Defence Adventurous Training Centres, expected to take 2 years to fully complete the first round of inspections of all 40 centres. Main themes emerging from the 12 Centres inspected so far include accident and incident reporting, the qualifications of instructors and supervision of activities, especially where the instructors themselves are inexperienced. These lessons have been passed to the TLBs' staffs at all levels and we are beginning to see them addressed. The ATSR are also currently conducting a review of assurance by the TLBs of activities conducted by units from within their own resources, including high-level expeditions, due to report in the summer.

66. **Recommendation:** The Defence Board should consider whether it is content with these assessments of Safety Risks and the actions being taken to address them.

WHERE COULD THE DSA HELP DEFENCE DO BETTER?

IMPLEMENTING THE FINDINGS OF THE DEFENCE SAFETY REVIEW

67. The DSA has come a long way in the 2 years since establishment. It declared Full Operating Capability (FOC) in April 2016, but with still much work to do. Most of the outstanding work deals with the PRISM Defence Safety Change Programme, which was directed by the Defence Board in 2016 to implement the 16 Key Findings of the Defence Safety Review (DSR).[95] Completion of this programme is essential if the DSA is to deliver successfully against its Charter and realise its full benefits to Defence. The PRISM work-strands were largely due to complete by the end of 2017, but owing to (current) resource constraints, face delays of up to 2 years.

68. Seeing PRISM through to completion will improve the assurance the DSA is able to provide to the Defence Board and TLBs. This plays a key part in understanding and managing the levels of risk being held. There is a relationship between DSA resourcing and the level of assurance that can be provided and a balance to be struck to meet the needs of the Department and those in the TLBs carrying risk. The forthcoming zero-based review of funding in HOCS[96] should help Defence understand better where to set its cursor in balancing its risk appetite against the cost of safety to Defence.[97]

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[95] The 11 PRISM Workstreams are:
Core Projects: Project 1 – Organisational Separation, Project 2 – Report, Analyse and Exploit, Project 4 – Regulation, Project 5 – Duty Holding Policy, Project 6 – Defence Accident Investigation Branch, Project 7 – Enforcement and Assurance.
Enabling Projects: Project 3 – Information Management and Information and Knowledge Management, Project 8 – Workforce, Project 9 – Regulatory Practices, Processes and Operating Procedures, Project 10A – Business Management, Project 10B – Strategy, Organisation, Governance and Influence and Project 11 – Communication.

[96] The recent DG HOCS Performance and Risk Review directed a review of the governance and funding of DSA as part of the work on the Departmental Operating model, noting DSA's accountability (only to the Secretary of State) and independence (in both chain of command and budgetary lines), to make

CURRENT FUNDING CONCERNS

69. The DSA has a robust Business Plan setting out its resource requirements[98]. The Plan identifies a need for £52.5M for FY2017/18, an annual total that remains relatively stable over the decade.[99] Based on confirmed Control Totals, the DSA has been allocated £46.124M to cover both manpower and programme costs. There is a gap over the 10 years of some 15%, throughout which the annual shortfall remains relatively consistent. This gives an in-year variance of £6.4M.[100] DSA manning levels and its Programme funding are areas that will be affected:

a. **DSA Manning.** The DSA currently has 57 gapped posts against an establishment of 472, although current funding is only enough for 464 and we are now facing further in-year pressure that may result in additional gapping below this level.[101] In addition to the impact on PRISM, these resource constraints limit the DSA's ability to carry out the full range of activity required by its Charter. In particular it can provide only very limited assurance that TLBs are promoting and implementing SofS's policy statement on HS&EP. We are particularly limited in conducting the full range of our assurance activity,[102] which affects the fidelity of the assurance assessments we can make in this report and constrains our ability to help TLBs understand the levels of risk they are carrying. Our certification of equipment is on the critical path for a number of major programmes,[103] and this may be

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recommendations to the Permanent Secretary in his capacity as the Department's most senior official for safety. (Record of DG HOCS Performance and Risk Review held on 3 May 2017. Bds Sec 3-3-29_HOCS dated 9 June 2017, Action 3).

[97] Comparable high risk industries place great importance on safety, and make significant investment in it. Recent research has highlighted that oil and gas companies' spending to ease concerns on health, safety and environment (HSE) will increase by 60% to $56 billion in 2030 up from $35 billion in 2011, as heavily publicised environmental disasters have increased regulatory scrutiny. http://www.luxresearchinc.com/news-and-events/press-releases/read/oil-industry-spend-health-safety-and-environment-jumps-60-56. Safety performance is becoming a major factor in business performance. A US guide to investment in safety notes that employers paid $51.1 billion in 2010 – nearly $1billion per week – for direct workers compensation costs (medical plus indemnity) for the most disabling workplace injuries and illnesses. It also suggests that each prevented lost-time injury or illness saves $37,000 and each avoided occupational fatality saves $1,390,000. Investors are increasingly using workplace safety and health measures to screen out underperforming stocks and are showing stronger returns for doing so. Over 60% of CFOs reported that each $1 invested in injury prevention returned $2 or more and over 40% said productivity was the greatest benefit of an effective workplace safety programme. Source: The Business Case for Investment in Safety – A guide for executives. http://www.nsc.org/JSEWorkplaceDocuments/Journey-to-Safety-Excellence-Safety-Business-Case-Executives.pdf BP has reported that the final cost to it of the 2010 Deepwater Horizon incident, in which an explosion and fire on an oil exploration rig in the Gulf of Mexico killed 11 people and created an oil spill that caused major environmental damage, will have been $61.6 billion – a third of the company's market capitalisation before the accident. *Washington Post*, 14 July 2016. https://www.washingtonpost.com/business/economy/bps-big-bill-for-the-worlds-largest-oil-spill-now-reaches-616-billion/2016/07/14/7248cdaa-49f0-11e6-acbc-4d4870a079da_story.html?utm_term=.2e175a79088e

[98] Defence Safety Authority Business Plan 2017, DSA/02/02 dated 22 May 2017.

[99] With variances which allow for inflation as well as minor changes in activity levels.

[100] This compares with a final outturn for FY2016/17 of circa £47M during which my workforce was gapped by an average of 13% and my Travel and Subsistence and outsourced activities were severely curtailed, as were our inspection tempo and ability to horizon scan.

[101] This total grows to 483 this year in my Business Plan and remains steady at 484 from next year. HOCS would recognise a funded position of 464 at the start of FY 16/17 with an end of year figure of 472, post our joint work.

[102] Examples include: auditing of BLB and HLB SEMSs, inspection of Fuel & Gas Infrastructure and Adventurous Training Centres, approval schemes for trusted organisations.

[103] Such as QEC, Successor, Lightning II, P-8A Poseidon, Chinook Mk3 to Mk5 and Mk4 to Mk6A conversions and both fixed-wing and rotary-wing platforms for the UK Military Flying Training System (UK MFTS) programme.

jeopardised if we are unable to fill gapped posts in these areas. Finally, the priority that I have given to safety critical posts[104] in allocating available manpower means that my HQ and Policy teams have suffered unduly, with an impact on work to rationalise and simplify safety policies.[105]

b. **DSA Programme Funding.** Although the DSA's requirement for programme funding is limited, there are some key elements of it that could be affected by HOCS in-year options.[106] If taken, these could remove funding for key work. The impact would include reducing further audit activity and levels of assurance, restricting certification for many new and upgraded aircraft, delaying the rationalisation of Safety Policy and removing the DSA's ability to look forward, horizon-scan and prepare for new technologies such as nano-technology, energy weapon systems, cyber-protection and the increasing use of both maritime and land-based unmanned air systems. Potential impacts on Nuclear Safety are covered in Annex B.

NEAR-TERM OPPORTUNITIES

70. **Promoting Safety in Defence.** Unit visits, Service Inquiry (SI) findings and general feedback have raised the need for more active promotion of safety in Defence. This goes beyond raising awareness of what the DSA is and does, although this is necessary.[107] It is more about creating a Safety Culture through more comprehensive, through career training and exposure to how Defence manages safety, what SofS's HS&EP Policy means, what good (and bad) looks like, how risk is controlled and managed and what Duty Holding and Duty of Care mean. The Defence Safety Committee in its June 2017 meeting agreed to this requirement and tasked the DSA to conduct a Training Needs Analysis to cover all levels including SDH coaching/training. I hope this will be complete by the end of the year. If accepted the cost for training courses will fall to TLBs. Additionally, the DSA is reviewing its STRATCOM plan and I have offered to speak at the Joint Services Command and Staff Course and on other military and Civil Service courses.

71. **Safety in Leadership.** Safety is still regarded by many as an additional task or responsibility and in some cases HS&EP is too readily delegated as a "J4 sport". Safety and especially Duty of Care must be seen as being a mainstream leadership responsibility – applicable to all leaders irrespective of rank, with specific responsibilities allocated to Duty Holders and Heads of Establishment. This also includes leadership through change. Doing this should get our leaders to regard safety as integrated and integral to all activity and help develop an appropriate Safety Culture. I have already discussed this with Comdt Sandhurst Group with a view to proposing an amendment to the Army Leadership Code.

72. **Joint Safety Management Audits.** This year saw the first joint safety management audit, conducted by DSA Regulators (jointly led by DLSR and MAA, with DFSR and DOSR input) and the Army on the British Army Training Unit (BATUK) in Kenya. This joint venture provided a more complete and cross-regulator boundary picture of the organisation. It provided useful findings to the Army as well as lessons for the DSA in how these audits are best conducted. A similar audit of Clyde Naval Base followed. Building on these

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[104] Of the 57 gapped posts, 17 are assessed as Safety Critical to be filled by SQEP.
[105] Including work on review of DEDs and JSPs, and rationalisation of policies into the new DSA01 series of publications.
[106] The consequences of funding limitations were detailed in a letter to the VCDS and DG HOCS (DSA/DG/Comms/External dated 31 May 2017).
[107] As recommended by the House of Commons Defence Committee in their report *'Beyond endurance? Military exercises and the duty of care'* released on 22 April 2016. Recommendation 2 (para 21) https://www.publications.parliament.uk/pa/cm201516/cmselect/cmdfence/598/59811.htm

successes, I intend to conduct joint audits, for the British Army Training Unit Suffield (BATUS), Canada and the Carrier Enabled Power Projection (CEPP) Programme. The latter is at the request of the Senior Responsible Officer for CEPP (DCDS(MilCap)) and will focus on the main interfaces that enable the Carrier capability to deliver operational effect and assessing whether Risk to life is being appropriately considered and managed within the wider CEPP programme. The CEPP Audit will report in early 2018.

73. **The Defence Safety Committee (DSC).** The role of the DSC is to support the development of Safety Policy, improve safety governance, identify current and future safety concerns and assist in development of future Annual Assurance Reports. As the DSC's Chair, I have refreshed its role and frequency (3 times per year). I have also stressed the importance of the DSA establishing a closer partnership with TLBs, with a clearer common purpose based on trust and greater transparency. The DSC will provide an opportunity for the DSA to understand and respond to pressures facing the TLBs as they transform and modernise in line with the SDSR and Joint Force 25.

74. **Establishing a Defence Medical Services Regulator.** I am currently working with the Surgeon General to implement the recommendation of a Defence Operational Capability Assessment of the Defence Medical Services, for the Inspector General function to transfer into the DSA. Subject to senior leadership agreement, I intend to achieve IOC for the resulting Defence Medical Services Regulator (DMSR) by 1 December 2017, with FOC at a date yet to be determined in 2018.

MEASURING THE EFFECTIVENESS OF SAFETY GOVERNANCE

75. The need for more refined methods for measuring the effectiveness of Defence's safety governance arrangements is abundantly clear.[108] Although this report and its predecessors provide a starting point, our understanding and management of safety risk would be better focused and balanced if we had better Measures of Effect (MOE) for Defence's safety performance and for our systems for managing safety. Using existing data and extant processes where possible, the aim is for those managing safety at all levels to have access to more and better objective data, including the reporting of hazards and near-misses as well as on incidents. This should allow for more objective analysis, assessment and judgement of overall levels of safety risk and the effectiveness of mitigation strategies. Working with the DSC, I intend to develop a range of such measures over the next year.

AUDITING THE DSA

76. I regard regular independent audit of all elements of the DSA as essential in ensuring the DSA remains fit for purpose, efficient and effective. Audit also allows for better external scrutiny and performance review. The DSA will be audited towards the end of 2017, using experts from the Health and Safety Executive (HSE) and other external

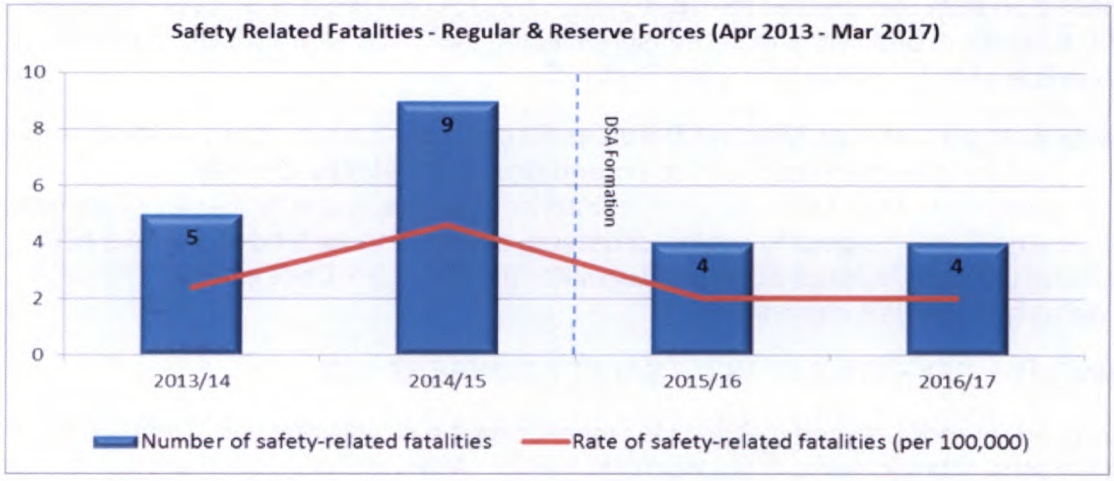
[108] While a range of measures, including numbers and rates of work-related deaths and injuries, are available through Defence Statistics the underlying data needed to understand the impact in terms of cost or capability lost, such as working days lost is incomplete and poor quality, often due to inconsistencies in reporting requirements and mechanisms. We will be working with Defence Statistics to improve this. Of note, of the 10 available TLB sources of health and safety data for the 2016 Defence Statistics report, 3 were discontinued in 2012 (MOD Health and Safety Statistics: Annual Summary & Trends Over Time 2011/12 – 2015/16, published 17 November 2016, p58).

bodies.[109] All the DSA's Regulators will be audited at least every 3 years or following a change in their leadership.

DEFENCE SAFETY-RELATED FATALITIES

77. There were a total of 4 potentially safety-related fatalities in the period covered by this report. This is comparable to figures over the last 4 years which average 5.75 per year. Annex A contains a brief summary of each of the incidents.

78. Figure 2 presents, by Financial Year, the actual number and the rates per 100,000 of potentially safety-related deaths during the period April 2013 – March 2017). The fatalities included are those considered by the DSA to have a potentially safety-related implication.



Source: DSA and Defence Statistics[110]

Figure 2. Safety Related Fatalities.

SERVICE INQUIRIES AND ACCIDENT INVESTIGATION

79. During the period of this report, as the primary Convening Authority for safety-related statutory Service Inquiries (SIs), I have convened 9 SIs and a number of non-statutory SI. Details of the SIs convened or completed in the period of this report are outlined in Annex D. In addition, details of the non-statutory SIs carried out where I have elected not to conduct an SI but the potential existed for Unit-level lessons to be learned, are also outlined at Annex D.

80. The Defence Accident and Investigation Branch (DAIB) has continued to build on its capability as an organisation carrying out impartial and expert no-blame safety investigations across all domains, deploying trained accident investigators on a near weekly basis and delivering pan-Defence post-incident management training. The delivery of a series of comprehensive Service Inquiry accident investigation reports directly addressing concerns raised in the House of Commons Defence Sub-Committee on military training has served to highlight the genuinely independent stance of the DAIB and the DSA's clear ability to provide critical review of the Department's shortcomings.

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[109] Also as recommended by the House of Commons Defence Committee in their report *'Beyond endurance? Military exercises and the duty of care'* released on 22 April 2016. Recommendation 3 (para 22) https://www.publications.parliament.uk/pa/cm201516/cmselect/cmdfence/598/59806.htm

[110] Rates are calculated using strength data for UK Regular and Reservist Armed Forces, Military Provost Guard Service and Locally Engaged Personnel.

SUMMARY

81. This Report provides my assessment of the level of safety assurance across Defence and outlines what I consider to be the most significant safety-related risks to the Department. I have covered those areas, which I believe the Defence Board should be aware of and have provided evidence to back-up and bring to life issues raised. I have been careful to balance evident progress with areas still needing Defence Board attention, whilst recognising the unique challenges faced by Defence in preparing force elements for combat. Many of the fundamental building blocks for effective safety and environmental managements systems are now in place. Further maturity will come with sustained momentum in senior leadership commitment, the better promotion of safety, including enshrining 'leadership in safety', and the fostering of a safety culture.

82. I have drawn the Defence Board's attention to the continued significant change in capabilities, organisations and the way we do business in Defence. This poses additional safety risk, which can only be understood and managed with appropriate safety data (and Measures of Effect) and sound assurance arrangements to inform and direct subsequent action. The danger signs are clear to me and in my judgment managing safety through change warrants greater oversight and control.

83. The high priority given to safety by the Department is clear and must continue. But safety cannot become a 'bottomless resource pit', particularly with SQEP and funds in short supply. It is for the Defence Board to determine its safety risk appetite and to set the cursor, in terms of prioritising resource, to where it feels it is most appropriate. There will be quick wins and I have highlighted where the DSA could do more in assisting the Defence Board and the senior TLB leadership, who as SDHs, are the major risk owners.

84. I have not suggested priorities for resourcing as the relative importance of how safety risk can be manifested varies and includes – Risk to Life, Risk to Capability, Risk to Environment and Risk to Reputation. For example, post the tragic Grenfell Tower incident, there might be an urgency to attend to the Fire Safety risks and assurance shortfalls detailed earlier in this report. Whilst this is understandable, the evidence suggests Fire risks do not pose the greatest Risk to Life – the likelihood of this risk being realised is lower than others mentioned. Indeed, Fire Safety is not specifically mentioned in any of the top safety risks provided by the TLBs at Annex C.

85. I draw the attention of the Defence Board to the shortfalls within Assurance. Assurance is essential to understanding and managing overall safety risk within the bounds of safety policies, regulation and culture. Yet across all domains, less for Ordnance, only Limited Assurance can be provided. This undermines any accurate assessment. The Defence Board should decide whether it is satisfied with these levels and the inability of the DSA to provide the SofS assurance against his Health and Safety and Environmental Policy statement.

86. The Defence Board will be aware that the majority of safety risks detailed in this year's Report are not new, with most only showing limited improvement. The lack of SQEP is proving particularly stubborn, yet its adequate resourcing is fundamental to safety in every area and at all levels. The Defence Board should satisfy itself that it agrees with these risks and that it is giving these risks sufficient attention. Fundamental to improving safety are culture and leadership. Both need training and education if safety is to be seen as part of 'business as usual' and everyone's duty and responsibility.

ANNEX A: DEFENCE SAFETY-RELATED FATALITIES

There were 4 potentially safety-related fatalities during the period 1 April 2016 – 31 March 2017.

Yak 52 Light Aircraft Crash, Boscombe Down – 8 July 2016
Flight Lieutenant Alexandre Parr

Live Firing Exercise, Otterburn, Northumberland – 22 August 2016
Private Conor McPherson

Live Firing Exercise, RAF Tain, Scotland – 1 November 2016
Lance Corporal Joe Spencer

Fatal Shooting, OP SHADER – 2 January 2017
Lance Corporal Scott Hetherington

ANNEX B: Nuclear Assurance (SECRET)

ANNEX C: TOP 3 SAFETY RISKS HELD BY TOP LEVEL BUDGET HOLDERS

TLB	Safety Risk 1	Safety Risk 2	Safety Risk 3
Navy Command	**Failure to Follow Processes** Failure to follow process and/or Safe Systems of Work, leading to harm to equipment and/or personnel. Likelihood: 5. Very High Impact: D. Severe	**Lack of Maritime SQEP** Lack of Maritime SQEP and competency, leading to harm to equipment and/or personnel. Likelihood: 5. Very High Impact: C. Major	**Infrastructure** Infrastructure not fit for purpose, leading to harm to equipment and/or personnel due to fire. Likelihood: 4. High Impact: C. Major
Army Command	**Live Fire Training** Death/serious injury during Live Fire Training. Failure of processes and/or procedures leads to death or serious injury. Likelihood: 5. Very High Impact: D. Severe	**Heat Injury in Training** Death/serious heat injury during Arduous Training. Failure of processes and/or procedures leads to death or serious injury. Likelihood: 5. Very High Impact: D. Severe	**Operating Military Vehicles** Death/serious injury as a result of operating military vehicles. Failure of processes and/or procedures leads to death or serious injury. Likelihood: 5. Very High Impact: D. Severe
Air Command	**Mid-Air Collision** Risk to Life from Mid-Air Collision (MAC) leading to death of 1st and potentially 2nd and 3rd parties. Likelihood: 2. Low. Impact: E. Critical.	**Infrastructure** Risk to Personnel and Assets due to DIO underfunding leading to non-compliance with safety legislation and regulations. Likelihood: 3. Medium Impact: D. Severe.	**Lack of Airworthiness SQEP** Output risk or Risk to Life from Air Accident due to Airworthiness Engineer SQEP Shortfall. Likelihood: 3. Medium. Impact: D. Severe.

TLB	Safety Risk 1	Safety Risk 2	Safety Risk 3
Joint Forces Command	**Seismic Activity in Cyprus** Risk to British Forces Cyprus of seismic activity resulting in collapsed buildings leading to major injuries and potential fatalities. Likelihood: 2. Low. Last major event measured 6.4 in the late 90s. No significant damage. Predicted quake interval 20 - 50 years. Impact: E. Damage to services and C2 nodes; Health & Safety. Loss of capability, reputational risk, costs, regulatory non-compliance could result in internal and external enforcement action.	**Infrastructure** Inadequate and insufficient infrastructure maintenance, leading to infrastructure failure or non-availability for operations and/or injury/ill-health to staff and/or others. Likelihood: 4. High. Some HLBs/PJOBs see this as an issue now; others rate it as 'likely in the future'. Impact: Severe. D. Loss of capability, reputational risk, costs, injury/ill-health to staff and/or others, regulatory non-compliance could result in internal and external enforcement action.	**Workplace Stress** Reduction in health and safety standards leading to ill-health to staff and/or others. Likelihood: 3. Medium. Some HLBs see this as an issue now; others rate it as 'likely in the future'. Impact: C. Major. Loss of capability, reputational risk, costs, statutory non-compliance could result in external enforcement action.
Defence Equipment & Support	**Failure of SEMS** Products, Systems or Services lead to a serious accident or incident attributable to a failing in the DE&S safety management system. Likelihood: 5. Very High Impact: E. Critical	**Change – DE&S Transformation** Serious accident or incident attributable to a failure to positively manage safety and environmental protection (both acquisition and occupational) as a result of DE&S Transformation. Likelihood: 5. Very High Impact: E. Critical	**Infrastructure** Inability to provide a safe, secure, resilient DE&S estate that supports our outputs to the FLCs, with effect on health & safety of personnel and environmental contamination. Likelihood: 3. Medium Impact: D. Severe

TLB	Safety Risk 1	Safety Risk 2	Safety Risk 3
Defence Infrastructure Organisation	**Infrastructure Compliance** Defence Estate not Health, Safety and Environment Compliant Effect: As a result of insufficient funding to undertake building component lifecycle replacement and remedial repairs:- (i) Assets are closed causing a loss of operational capability. (ii) Assets are less resilient causing unforeseen asset failures between statutory and mandatory inspections, causing health & safety and environmental non-compliance and a risk to life. In addition increased wilful public incursion onto the training estate results in risk to life to the public and training outputs Likelihood: 5. Very High Impact: E. Critical	**Lack of Infrastructure SQEP** Inability to recruit and retain an effective staff Effect: Due to an inability to recruit or retain sufficient resources with the specialist skills sets and experience required there is a risk that DIO will not be able to deliver or meet customer needs under its future stewardship role potentially reducing operational effectiveness and loss of capability. Likelihood: 5. Very High Impact: D. Severe	**Infrastructure Funding** Unaffordable Defence Estate Effect: Due to historic under-investment and insufficient in-year Control Totals, DIO are unable to fully satisfy FLC project requirements and cannot invest to deliver assumed savings in RDEL resulting in an inability to maintain the estate to meet Operational need – the estate remaining larger than Defence requirements. Inability to address DEL requirements could result in a loss of capability through impact to operational requirements, safety, training, morale. Likelihood: 5. Very High Impact: E. Critical
Defence Electronics & Components Agency	**Hazardous Substances** Use of substances hazardous to health, with risks to health, dermatitis, occupational asthma etc. fire and environmental damage. Likelihood: 3. Medium Impact: H&S, Environmental, reputational, financial.	**Workplace Transport** Workplace transport, pedestrian movement and vehicle movement around site. Effect: physical, fractures breaks, strains etc. property damage Likelihood: 3. Medium Impact: H&S, Environmental, reputational, financial.	**Contractors** Contractor Control Effect: loss of output, health hazard and physical hazard. Likelihood: 3. Medium Impact: H&S, Environmental, reputational, financial. Outputs/capability

TLB	Safety Risk 1	Safety Risk 2	Safety Risk 3
Head Office & Corporate Services	**Failure to monitor the hearing capability of firearms users.** Potential statutory breach for failing to meet the requirements of the Noise At Work Regulations by not undertaking health surveillance through audiometric testing, resulting in MDP personnel hearing being harmed and impair their future ability to undertake firearms or other high noise exposure roles. Likelihood: Potential for serious chronic damage to the hearing of officers, if the controls measures fail or are not adhered to resulting in potential enforcement action and certainly Common Law claim actions. Impact: Risk of regulatory enforcement, reduction/loss of operational capability, impact on resources and damage to the reputation of MDP and MOD.	**Carriage of excessive weight of equipment by MDP operational officers.** Continual increase in the weight of equipment an MDP officer is expected to carry on their body will result in an escalation of strain and sprains and upper body and back injuries leading to yet increased levels of sick absence. Likelihood: Policy requirements in addition to customer requirements for MDP officers to perform tasks with additional specified equipment and in addition the age profile of the MDP results in a high likelihood the effect may be realised. Impact: Risk of regulatory enforcement, reduction/loss of operational capability, impact on resources and damage to the reputation of MDP and MOD to deliver outputs.	**Whole-body vibration caused by Rigid Inflatable Boats (RIB).** Continual exposure above levels set in legislation result in an escalation of back injuries and muscular-skeletal aches and strains leading to increased levels of sick absence. Likelihood: Customer requirements for MDP officers to perform tasks with changeable environmental (sea and wind) conditions, plus the age profile of the MDP results in a high likelihood the effect may be realised. Impact: Risk of regulatory enforcement, reduction/loss of operational capability, impact on resources and damage to the reputation of MDP and MOD to deliver outputs.

TLB	Safety Risk 1	Safety Risk 2	Safety Risk 3
Defence Science & Technology Laboratories	**Failure to maintain infrastructure** SHEF incident resulting from failure of facilities or work equipment i.e. loss of containment Likelihood: 4. High Impact: Ill health, Injury, death, damage to property/environment, loss capability, adverse legal/regulatory impact and negative impact on reputation	**Failure to adequately manage operational interfaces** Failure to adequately manage operational interfaces may lead to loss of control, coordination, communication and cooperation between Dstl and its strategic partners, contractors, visitors etc. Likelihood: 3. Medium Impact: Loss of capability, loss of containment, serious injury, ill health major environmental incident.	**Internal control via SHEF arrangements** Effect: SHEF arrangements and capability fails to provide direction, clarity of roles, responsibilities and ALARP control measures. Likelihood: 3. Medium Impact: Avoidable incident, loss of reputation, breach of legislation

Likelihood

	Likelihood	Probability	Approximate frequency	Description
5	Very high	> 90%	Occurs at least once every 5 years	Is a common occurrence in MOD
4	High	51 - 90%	Occurs once every 5 - 10 years	Has occurred within MOD many times
3	Medium	26 - 50%	Occurs once every 10 - 20 years	Has occurred in MOD on several occasions
2	Low	11 - 25%	Occurs once every 20 - 50 years	Has occurred on a small number of occasions in MOD's history
1	Very low	<10%	Occurs less than once every 50 years	Has occurred once / never in MOD history

Impact

Category	Title	Health, Safety & Environment Impact (not as a result of hostile action)
E	Critical	- Multiple fatalities or multiple severe permanent disabilities (in a non-theatre environment) which causes inability to continue a normal way of life/reduces quality of life - Permanent loss/damage beyond remediation to an important and publically high profile natural resource/geographical area/species - Multiple incidents causing a major environmental impact (EA Common incident Categorisation Scheme - Cat 1)
D	Severe	- Single death or injuries to multiple individuals which are life threatening and/or have a short-term impact on normal way of/quality of life (in a non-theatre environment) - Severe damage over a wide area and/or on a prolonged basis to a natural resource, including controlled waters, or geography requiring multi-year remediation - Single incident causing a major environmental effect (EA Common Incident Categorisation Scheme - Cat 1) - Multiple incidents causing significant environmental effect (EA Common Incident Categorisation Scheme - Cat 2)
C	Major	- Single injury which causes permanent disability or permanent impact on way of life (in a non-theatre environment) - Injuries to multiple individuals of a non-life threatening nature which have a short-term impact on normal way of/quality of life (in a non-theatre environment) - Moderate damage to an extended area and/or area with moderate environmental sensitivity (scarce/valuable environment) that requires months of remediation - Single incident causing a significant environmental impact (EA Common Incident Categorisation Scheme - Cat 2)
B	Moderate	- Injuries to multiple individuals of a non-life threatening, non-permanent nature which require first aid only (in a non-theatre environment) - Moderate damage to an area, and that can be remedied with MOD resources - Multiple incidents causing minor environmental effect (EA Common Incident Categorisation Scheme - Cat 3)
A	Minor	- Injury of a non-life threatening, non-permanent nature which requires first aid only (in a non-theatre environment) - Limited short term damage to an area of low environmental significance/sensitivity - Incidents causing minor environmental impacts (EA Common Incident Categorisation Scheme - Cat 3)

ANNEX D: DEFENCE SERVICE INQUIRIES AND NON-STATUTORY SERVICE INQUIRIES

1. The following Defence Services Inquiries were convened or completed during the period covered by this report:

a. **Watchkeeper 031 (16 October 2014).** A Watchkeeper Remotely Piloted Air System, operated by Industry, crashed whilst landing at West Wales Airport, Aberporth due to weaknesses in the automatic take-off and landing system and inappropriate use of a master override facility. The report was published on 12 August 2016.

b. **5 RIFLES (18 June 2015).** A soldier collapsed and died during his annual fitness test, due to natural causes. The SI report, with 19 recommendations to enhance safety, was published on 17 August 2016.

c. **Watchkeeper 006 (2 November 2015)**. A second Watchkeeper crashed whilst landing at MOD Boscombe Down. The SI Panel identified three causal factors for the accident and made fifty-eight recommendations to enhance safety. The SI Panel also looked at the similarities between this accident and the previous Watchkeeper (WK031) accident in October 2014. This report was published on 15 December 2016.

d. **Puma (11 October 2015).** A Puma helicopter crashed in the vicinity of a landing site in Kabul. Tragically, 5 NATO personnel died in the crash of which 2 were RAF crew. This report was published on 15 December 2016.

e. **Brecon (30 July 2013).** An SI was convened in July 2015 to investigate the circumstances surrounding the loss of 3 soldiers who died whilst undertaking an endurance march as part of selection for a specialist military unit. The inquiry also reviewed the safety arrangements now in place for the whole of the selection process for Regulars and Reserves. This report was published on 21 April 2017.

f. **1 RIFLES (29 September 2015).** While undertaking basic parachute training as part of an adventurous training expedition, a soldier died following a collision and entanglement with another parachutist. This report was published on 12 April 2017.

g. **Yak 52 (8 July 2016).** A civilian-registered Yak 52 aircraft, on contract to the Empire Test Pilots School, crashed in a field 8nm west of MOD Boscombe Down, resulting in the death of a Royal Air Force pilot and serious injuries to a civilian pilot.

h. **Rifles Training Team, Infantry Battle School (19 July 2016)**. A soldier collapsed and died 400m from the finish of an 8 mile loaded march. It has been confirmed that this death was not the result of any safety failure.

i. **HMS AMBUSH (20 July 2016)**. Whilst conducting a training serial at periscope depth HMS AMBUSH, an Astute-class submarine, collided with Merchant Vessel ANDREAS approximately 3nm to the east south east of Gibraltar. Both vessels remained sea worthy with no reported injuries to crew on either vessel.

j. **Griffin (9 August 2016).** A Griffin helicopter (ZJ241) operated by the Defence Helicopter Flying School, RAF Valley, encountered severe vibration after landing in the vicinity of Yr Aran, Snowdonia. During the subsequent shutdown the

aircraft caught fire. The crew evacuated safely but the aircraft was rapidly consumed by the fire and sustained Category 5 damage.

k. **Otterburn (22 August 2016).** A soldier from 3 SCOTS received a fatal gunshot wound [redacted] during a night Live Fire Tactical Training exercise at Heely Dodd Battle Shooting Area on Otterburn Training Area.

l. **RAF Tain (1 November 2016).** Whilst part of the waiting detail prior to a night live firing sniper shoot, a soldier from 3 RIFLES received a fatal gunshot wound [redacted]. A SI was convened 12 January 2017 after further information was received from the Police regarding the nature of the death.

m. **Camp Taji (2 January 2017).** A soldier from 2 LANCS suffered a fatal gunshot wound whilst inside his room in the accommodation block at Camp Taji, Iraq.

n. **Watchkeeper 042 (3 February 2017).** Watchkeeper 042 crashed into the sea in Cardigan Bay to the north of West Wales Airport. The Unmanned Air Vehicle (UAV) was being flown by a Thales/UAV Tactical Systems crew under a Military Flight Test Permit for the purpose of conducting a de-icing equipment trial.

o. **Watchkeeper 043 (24 March 2017).** Watchkeeper 043 crashed into the sea in Cardigan Bay to the North of West Wales Airport. The Air Vehicle was being flown by an Army / UTacS/ Thales crew under a Military Flight Test Permit for the purpose of conducting an Army student conversion sortie.

NON-STATUTORY SERVICE INQUIRIES.

2. The Defence Accident and Investigation Branch carried out the following Non-Statutory Inquiries, some of which are still in progress, in the period 1 April 2016 to 31 March 2017:

a. Warrior Rear Door – [redacted] (19 April 2016).

b. Warrior Training Area Accident (25 April 2016).

c. Field Electrical Power Supply Fire (3 May 2016).

d. Parachuting Accident (4 May 2016).

e. Warrior Fire (20 June 2016).

f. Challenger 2 Crush Injury (26 June 2016).

g. Reaper ZZ205 (August 2016).

h. Foxhound Crash (11 September 2016).

i. Automated Gate – Crush Injury (6 February 2017).

j. Landrover Wheel Detachment (6 February 2017).