Ministry of Defence

Joint Concept Note 3/21

Future Joint Personnel Recovery

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Head Concepts

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Preface

Purpose

1. Joint Concept Note (JCN) 3/21, *Future Joint Personnel Recovery* is an exploratory concept that aims to inform how future UK joint personnel recovery (JPR) is developed.[1] It is not intended to define how JPR operations should be conducted nor to act as a definitive operating concept; specific aims of the JCN are to:

- establish a future vision for JPR;
- establish the attributes and critical foundations of JPR; and
- provide Defence with insights into potential areas for JPR capability development.

Context

2. Examining a time frame from now until 2040, influenced by the Integrated Review and the Defence Command Paper, and using themes from the *Integrated Operating Concept* and Joint Doctrine Publication (JDP) 0-01, *UK Defence Doctrine*,[2] this JCN explores how changing the way we operate will affect the UK's approach to JPR. A new JPR policy was published in 2019, followed by a JPR strategy in 2020; these documents will provide a strong foundation for cohering JPR across Defence in the short term. However, the Military Capability Board (MCB) has requested a review of the conceptual underpinning of JPR; this JCN will, therefore, provide a long-term view that will shape how JPR might be developed beyond current policy and strategy.

1 Exploratory concepts assist in shaping the trajectory for force development. They provide insights into future ways of operating in response to threats and opportunities and provide linkages between horizon scanning and policy development, thereby informing strategic decision-making.
2 Joint Doctrine Publication 0-01, *UK Defence Doctrine*, 6th Edition is due to publish in 2021.

Audience

3. This concept seeks to inform JPR stakeholders within Defence and across government. As an exploratory concept it will be of value to the MCB and staff involved in Defence Force Development. It will also serve to inform a North Atlantic Treaty Organization doctrine review of JPR that is currently underway.

Structure

4. The publication is divided into three chapters. An overview is below.

   a. **Chapter 1** examines the strategic context against which future JPR needs to be considered. It then explores what JPR is and why it is conducted today and finishes by providing a vision for future JPR.

   b. **Chapter 2** establishes the key attributes of JPR and explores the critical foundations for future JPR development.

   c. **Chapter 3** examines the threats and opportunities that will affect future JPR and then explores likely milestones for JPR developments over the coming two decades which lead to key insights that will assist Defence with long-term development of future JPR.

Linkages

5. JCN 3/21 is underpinned by several publications and key documents that provide key linkages, greater detail and broader context to this publication. These include:

   - Integrated Review[3]
   - Defence Command Paper[4]

3 HM Government, *Global Britain in a competitive age: The Integrated Review of Security, Defence, Development and Foreign Policy,* 2021.
4 Ministry of Defence, *Defence in a competitive age*, 2021.

- Allied Joint Publication-3.7, *Allied Joint Doctrine for Recovery of Personnel in a Hostile Environment*;
- Joint Service Publication 998, *MOD Policy for Joint Personnel Recovery*;
- *Defence Joint Personnel Recovery (JPR) Strategy*;
- JDP 0-01, *UK Defence Doctrine*;
- *Global Strategic Trends – The Future Starts Today*;
- *Integrated Operating Concept*;
- JCN 1/17, *Future Force Concept*;
- JCN 1/18, *Human-Machine Teaming*;
- JCN 2/18, *Information Advantage*;
- JCN 1/20, *Multi-Domain Integration*; and
- JCN 2/21, *Future Electromagnetic Activities*.

Contents

Chapter 1

Background and vision

Section 1 – The strategic context

1.1. The pervasiveness of information and the pace of technological change are transforming the character of conflict. UK competitors are viewing the strategic context as a continuous struggle in which non-military and military instruments are used unconstrained by any distinction between peace and war. We are in an era of persistent global competition characterised by a return to grand strategy with a concerning likelihood of peer on peer escalation. The UK and our allies have been repeatedly exposed to attacks by competitors below the threshold of war in ways that exploit legal loopholes and gaps in international law, particularly in space and cyberspace. Meanwhile, terrorism, humanitarian disasters, crime, climate change and, as seen most dramatically with the COVID-19 pandemic, disease also threaten the security, stability and prosperity of nations across the world.

1.2. Faced with such challenges, the UK identified the need to operate in new and agile ways to protect the freedoms and values of our society. The *Integrated Operating Concept* and Joint Doctrine Publication 0-01, *UK Defence Doctrine*[5] highlight that, for the foreseeable future, personnel from the whole force will take part in a broad range of activity across the Integrated Operating Framework to address the challenges we face.[6] This activity ranges from peacetime training through to combat operations in hostile environments in which they risk becoming isolated personnel.[7] While this risk endures, Defence will continue to have strategic, operational and

5 Joint Doctrine Publication 0-01, *UK Defence Doctrine*, 6th Edition is due to publish in 2021.

6 The Integrated Operating Framework is a new conceptual framework introduced in the *Integrated Operating Concept* to differentiate military activity between operate (protect, engage, constrain) and warfight.

7 Isolated personnel is defined as: military or civilian personnel who are separated from their unit or organization resulting in a loss of positive and/or procedural control, that may require them to survive, evade, resist exploitation, and either have to make their way back to friendly control or require assistance to do so. NATOTerm.

moral responsibilities to provide joint personnel recovery (JPR). Figure 1.1 shows the span of JPR activities recognised by the North Atlantic Treaty Organization (NATO) and the UK in Joint Service Publication (JSP) 998, *MOD Policy for Joint Personnel Recovery*.[8]

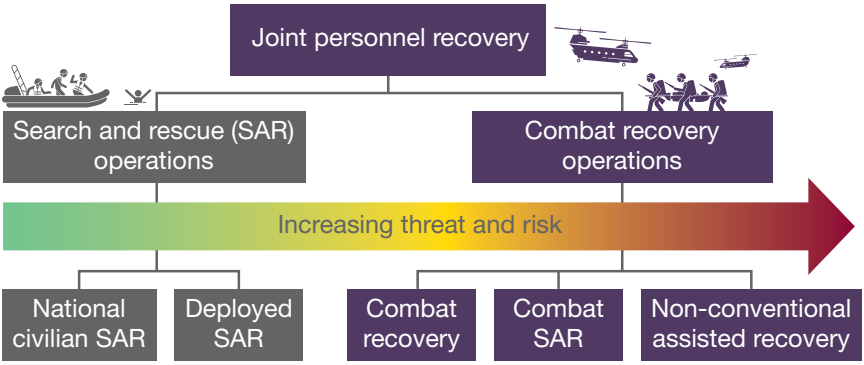

Figure 1.1 – Joint personnel recovery activities

Section 2 – Why joint personnel recovery?

1.3. JPR is a critical force protection activity that protects those deployed, reassures those at readiness, provides a strong moral base for families of UK personnel and insulates the UK government from strategic and operational risks borne from the loss or capture of UK forces and information.[9] Failure to provide JPR has potentially severe consequences. Commanders risk losing, not only personnel, but operational momentum, morale of the larger force and essential public support if JPR is not available. JPR also helps prevent adversaries from exploiting captured personnel for intelligence, propaganda or as leverage during negotiations with strategic consequence by enhancing the chances of them avoiding capture, as well as preparing them for conduct

8 Joint Service Publication (JSP) 998, *MOD Policy for Joint Personnel Recovery* (JPR) currently only considers JPR as recovery of isolated personnel from situations that present a threat of potential capture and exploitation; it does not include search and rescue operations, hostage recovery or non-conventional assisted recovery.

9 Force protection is defined as: all measures and means to minimize the vulnerability of personnel, facilities, equipment and operations to any threat and in all situations, to preserve freedom of action and the operational effectiveness of the force. NATOTerm.

after capture. The UK uses the term JPR whereas NATO uses the term personnel recovery.[10] JPR will be used throughout this concept to aid understanding across Defence, however, Chapter 3 proposes aligning this term with NATO. Annex 1A provides a visual example of a JPR mission unfolding.

Exploitation of captured UK personnel

In 1991, images of Flight Lieutenants John Peters and John Nichol, shot down and captured in the 1991 Gulf War, were exploited by Iraqi authorities for strategic gain. This was in contravention of the Law of Armed Conflict, attracted worldwide condemnation and still receives media coverage today. In 2007 a team of eight Royal Navy sailors and seven Royal Marines operating in the Northern Arabian Gulf were captured by Iranian personnel. The Iranian authorities exploited the captives for strategic effect by releasing footage of the personnel.

© RAF News

10 Personnel recovery is defined as: the sum of military, diplomatic and civil efforts to effect the recovery and reintegration of isolated personnel. NATOTerm. UK divergence is articulated in UK national elements in Allied Joint Publication-3.7, *Allied Joint Doctrine for Recovery of Personnel in a Hostile Environment.*

1.4. The UK benefited from coalition and allied provision of JPR in Iraq, the Balkans and Afghanistan. However, operations in Libya highlighted UK JPR deficiencies when operating outside a United States (US)-led operation. As the UK adopts the Integrated Operating Framework, operating in new ways and in new places, potentially outside allied and coalition operations, the UK approach to JPR needs to be invigorated.

Section 3 – UK joint personnel recovery today

1.5. The UK has remained extremely dependent on allies with more advanced and dedicated forces, notably the US, France, Germany and Italy, for high-end JPR capabilities during operations.[11] In 2001, the Ministry of Defence published an endorsed UK policy, supported by a JPR concept of operations. This capability achieved initial operating capability in 2003 but did not achieve full operating capability due to operational commitments in Iraq and Afghanistan. A revised policy was issued in 2015 expressing no ambition to generate dedicated JPR forces, relying instead on each of the front line commands preparing capable forces that could be allocated to the operational commander when necessary.[12]

1.6. UK JPR is delivered through diverse arrangements including all three single Services, other government departments (OGDs), allies, coalition forces, host nation organisations and contracted civilian organisations. Figure 1.2 illustrates UK JPR capability. JPR is not a specified Defence Task, a stand-alone capability or a Defence output and the UK has few dedicated force elements for the JPR role.[13] Thus,

11 Although UK forces may be able to prosecute immediate recoveries using organic capabilities on an ad hoc basis in high-end threat situations, a JPR mission in such circumstances would normally rely upon a highly complex composite air operation including a suppression of enemy air defence package.

12 MAB capabilities are not considered within the scope of this publication. Although the UK has delivered world-leading casualty evacuation, medical evacuation and medical emergency response team specialist support during combat operations, these specialist roles are not considered to be JPR.

13 Mountain rescue teams and search and rescue helicopters in Cyprus are the only dedicated UK JPR assets however these are not currently considered within JSP 998 due to the document's narrow understanding of JPR.

JPR is an implied task supporting the delivery of several Defence Tasks and currently relies upon flexibility and 'double-hatting' of designated and capable force elements to recover isolated personnel as well as exploiting linkages across government and with allies and partners.[14]

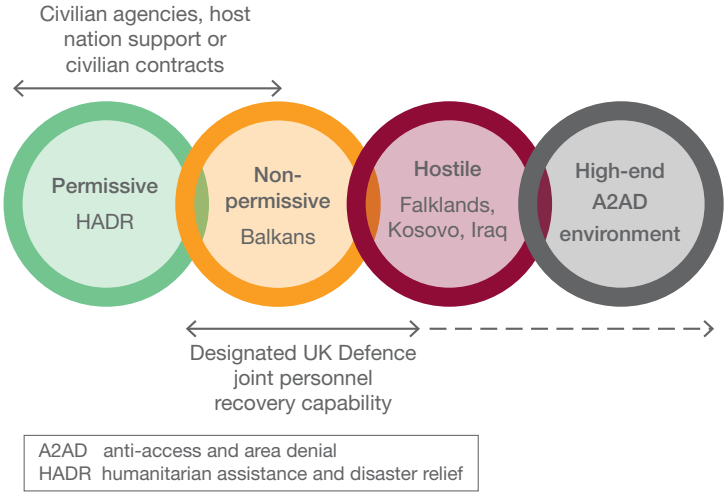

Figure 1.2 – UK joint personnel recovery capability

1.7. **UK Joint Personnel Recovery Centre and command and control.** The Joint Personnel Recovery Centre (JPRC), located at Northwood, is the UK hub for JPR and is on 24-hour call via the Permanent Joint Headquarters Duty Operations Controller. The JPRC's global network is extensive and its strength. However, command and control links across that network can be unreliable, particularly when dealing with some government departments and international partners that do not operate on a 24-hour basis. Timely passage of secure information can also be frustrated due to inconsistent or incompatible information technology connectivity between government departments, allies and partners. Meanwhile, beacon purchases across Defence have not been well coordinated resulting in some not capable of being tracked by satellites and others not tracked by the JPRC software.[15]

14 Descriptions for the terms dedicated, designated and capable force element can be found in the lexicon.

15 Some beacons have been purchased at unit level and have not been incorporated onto the Joint Personnel Recovery Centre software.

1.8. **Defence attaché network.** For overseas JPR operations, the Defence attaché network provides a vital link to in-country government departments and host nations, particularly for Defence activity taking place outside coalition and allied operations.[16] The level of engagement and maturity of plans depend on the geopolitical situation and the level of Defence activity in each country. This is an implied and unresourced task for Defence sections that often rely on ad hoc personal Defence attaché networks and a 'can do' mentality. Incoherence regarding pre-deployment training, equipment and location reporting of Defence personnel can arise due to differing risk perceptions and operational control/operational command arrangements by different Defence organisations operating within a Defence attaché's area of responsibility.

1.9. **Funding.** Currently, front line commands independently fund capabilities that contribute to JPR; this has resulted in a compartmentalised and sometimes inconsistent approach.[17] The 2020 strategy proposes bringing JPR under UK Strategic Command which should help address this. Currently, the UK has the approach that designated and capable JPR assets and personnel are allocated to JPR tasks on a flexible basis. No NATO nation, including the US, has sufficient capacity to cover JPR requirements for all global military activities. Therefore, it would be unrealistic for the UK to consider establishing a dedicated JPR capability for all UK activity. The manner in which a sovereign UK JPR capability is delivered will require careful consideration, including determining the balance between dedicated, designated and capable forces that will be required to support the new Integrated Operating Framework.

1.10. **Mindset.** JPR is often misconstrued to be a specialist heliborne activity provided for aircrew and a narrow cadre of those prone to capture. That exclusive view of JPR has resulted in culturally engrained unfamiliarity and engagement with JPR within some organisations in Defence. This will be examined in more detail in the insights section of Chapter 3.

16 Where Defence does have in-country UK assets available, Defence attaché support provides an essential link for host nation approvals for access basing and overflight and coordination of any information required to conduct a specific JPR task.
17 For example, beacon procurement differs across top level budgets.

The UK has relied extensively on other nations' combat search and rescue capabilities in recent conflicts

1.11. **Window of opportunity.** JPR is an activity that relies on joint, allied and cross-government cooperation. The Multinational Capability Development Campaign (MCDC) joint personnel recovery 2040 study, currently in draft, warns that 'conceptual and policy gaps create an unclear overall picture and lead to undesired interpretation on personnel recovery requirements and responsibilities'. This is pertinent to UK JPR in which governance, procurement, training and procedures have not been well harmonised in recent years. Meanwhile, UK JPR capabilities do not match those of peer allies, while linkages with OGDs and command and control of JPR outside allied and coalition operations are inconsistent. Thus, Defence carries significant JPR risks that could have negative operational or strategic consequence.[18] As the Integrated Operating Framework is adopted, personnel will begin to operate increasingly in new locations, potentially without access to Defence JPR assets and relying on host nation, OGDs or other partner support. There is also likely to be an increase in exposure to long-standing threats to Defence personnel

18 The JPR working group assessed deltas between policy in JSP 998 and current UK personnel recovery capabilities. Scenarios, assessed by the Defence Science and Technology Laboratory, involved a carrier strike group-based intervention and a short-term training team in Africa. A table-top exercise run against two *Defence Strategic Direction 2016* compliant scenarios highlighted that the current approach to JPR gives rise to Defence carrying risk in three key areas: training (individual and collective), equipment capabilities and coherent pan-Defence governance.

of extremist and criminal hostage taking or of illegitimate detention of Defence personnel by states.[19] UK JPR requirements are, therefore, likely to increase.

1.12. **Vision.** Defence has recently focused on establishing better JPR governance, policy, strategy and resource; this will provide a firm foundation for improving short-term coherence, and a solid baseline for future capability development. As Defence changes operations in line with the Integrated Operating Framework and as the multi-domain integration change programme is being implemented, the time is right to examine how JPR should be progressed to ensure that it is embedded in Defence's long-term planning. This requires a vision.

Future joint personnel recovery vision

The vision for future JPR is that: Defence establishes an affordable, integrated, global joint personnel recovery capability supporting the range of operations across the Integrated Operating Framework that minimises the chances of isolation, capture and interrogation whilst maximising opportunities to recover and reintegrate isolated personnel.

The Royal Navy is trialling various remotely operated systems that could be used for joint personnel recovery purposes

19 This publication will not consider hostage recovery. However, JPR basing resilience, force protection arrangements, isolated personnel training, cultural awareness and social media awareness are all important factors in reducing the chances of Defence personnel becoming isolated.

Key points

- Across the Integrated Operating Framework, UK Armed Forces personnel will continue to be exposed to situations that could cause them to become isolated. JPR will, therefore, remain an enduring requirement for Defence.
- JPR is not a specified Defence Task, a stand-alone capability or a Defence output, with the result that conceptual underpinning, procurement, training and procedures are not harmonised and hence suffer from inefficiency and lack of coherence.
- Currently, Defence does not have a global JPR command and control framework that is suitable for the level of ambition set out in the *Integrated Operating Concept*.
- The UK has relied heavily upon allies for JPR in recent operations and does not have a dedicated JPR capability. UK operations rely upon 'double-hatting' designated and capable force elements for JPR delivery.
- A mindset exists in some Defence organisations that JPR is for a narrow cadre of aircrew and those likely to be exposed to capture. However, JPR is relevant for all Defence personnel.
- As Defence changes operations in line with the Integrated Operating Framework and as the multi-domain integration change programme is being implemented, the time is right to examine how JPR should be progressed.
- The vision for future JPR is that: Defence establishes an affordable, integrated, global joint personnel recovery capability supporting the range of operations across the Integrated Operating Framework that minimises the chances of isolation, capture and interrogation whilst maximising opportunities to recover and reintegrate isolated personnel.

Annex 1A – Complexities of a joint personnel recovery mission

1A.1. JPR missions are complex. The images below depict JPR training and demonstrate some of the complexities.

Preparation and planning. JPR requires significant preparation and planning. Coherent policy, strategy, doctrine, training, operational plans, collaborative networks and capabilities held at readiness need to be in place for JPR to be effective.

Execution – location and support. Following reporting of an isolation event, location and authentication of isolated personnel need to be quickly established using any means available to allow effective mission planning. Where communication is possible, personnel can be supported with situational awareness of adversary and environmental threats. This can also aid evasion actions and enhance morale.

Recovery – tasking and command and control. Tasking of JPR capabilities needs to be rapid; pre-prepared plans, capabilities held at readiness and effective command and control contribute to speed of action. Recovery may range from re-prioritisation of immediately available and non-specialist capabilities at unit level through to highly complex rescue packages involving dedicated JPR assets.

Recovery – interoperability. JPR often relies upon cooperation across NATO and with other allies and partners; interoperability is achieved through effective doctrine, training and networks. The UK has relied heavily on allied capabilities in recent conflicts.

Recovery – threats and risks. Recovery operations can place personnel and assets at significant risk. Decisions to execute recovery require a risk/benefit calculation to be made based on threats.

Recovery – reintegration. Following recovery, personnel will need to be reintegrated into units. Medical care, debriefing and ongoing support play important roles in this.


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Chapter 2

Attributes and critical foundations

2.1. This chapter will examine the attributes of joint personnel recovery (JPR) and then establish the critical foundations for a future UK JPR capability. JPR has three attributes.

a. **Speed of action.** Speed of action is the most important attribute of an effective JPR capability. It increases the chances of successfully recovering isolated personnel.[20] Preparation, interoperability, situational awareness, effective command and control and exploitation of **any** means available enhance speed of action for JPR.

b. **Reach.** Effective JPR requires sufficient reach to recover isolated personnel. However, reach needs to be balanced against speed of action and threat.

c. **Flexibility.** JPR must be flexible, exploiting technology, networks and the skills of our people to their fullest.

Critical foundations of future joint personnel recovery

2.2. For future JPR to be successful there are a number of requirements that will need to be met. These are detailed below.

a. **Governance, policy and strategy.** JPR governance will need to be engaged to match UK ambition and ensure JPR risks are identified and managed. JPR development will also need to be innovative to achieve this when set against limited resource and increasingly challenging scenarios in which JPR may be required.

20 In a study of downed aircrew recovery/survival rates it was found that if isolated personnel cannot be recovered in the first two hours, the recovery probability drops to about 25%. Mouton, C, A., et al., 'Rescuing Downed Aircrews: The Value of Time, Santa Monica', RAND Corporation, 2015.

Placing JPR under a single lead command should simplify JPR development. However, given JPR is intertwined with single-Service capabilities, this is not without complexity. Careful agreement will be required to ensure that JPR development does not conflict with other programmes. Policy and strategy will need to be updated regularly to reflect future challenges and opportunities.

b. **Capability planning.** Effective JPR capability management and procurement will be required for the UK to support the ambitions of the *Integrated Operating Concept* and the broad activity that it proposes. Operating outside allied and coalition operations will require some new capabilities to be developed to fill the JPR gap that is almost entirely underwritten by our allies; this will afford the UK a degree of freedom of action as we operate in new ways and new places. Assessments will be required to establish where Defence will be exposed to risks of limited JPR provision. In particular, these will need to establish the increased likelihood of operating in high-end and anti-access and area denial (A2AD) situations and the estimated likelihood of expansion of global activity that will increase the JPR requirement. This will allow the balance between dedicated, designated and capable force element requirements to be determined.

c. **Doctrine.** Doctrine is a tool for command, education and adaptation and is essential for efficiency and integration of this complex capability. Doctrine also underpins JPR interoperability.

d. **Training.** The time-sensitive nature of JPR requires training to be extremely robust for potential isolated personnel as well as for those delivering the capability.[21] The persistent nature of the Integrated Operating Framework will result in an increasing

21 Joint Service Publication 998, *MOD Policy for Joint Personnel Recovery* highlights the courses required for personnel to be considered suitably qualified and experienced personnel. Personnel recovery training is mandatory for all military personnel, as well as Ministry of Defence civilians and contractors involved in UK operations.

likelihood of more personnel being exposed to risk of isolation across the globe; JPR training needs analyses should reflect this.[22]

e. **Sustainability.** Sustainability of JPR is important; the necessary support contracts to meet JPR requirements must be in place. Without this, risk must be tolerated or a commander's level of ambition may be constrained.[23]

f. **Culture.** Between 2001 and 2017, 74 soldiers from North Atlantic Treaty Organization countries were captured by opposing forces in conflicts ranging from large-scale interventions in Iraq and Afghanistan to smaller missions in Somalia and Libya demonstrating that any of our personnel are at risk of isolation and may require JPR.[24] A cultural change will need to be made in Defence recognising that an increased cross-section of Defence will need to be equipped and trained for JPR as we operate more widely.

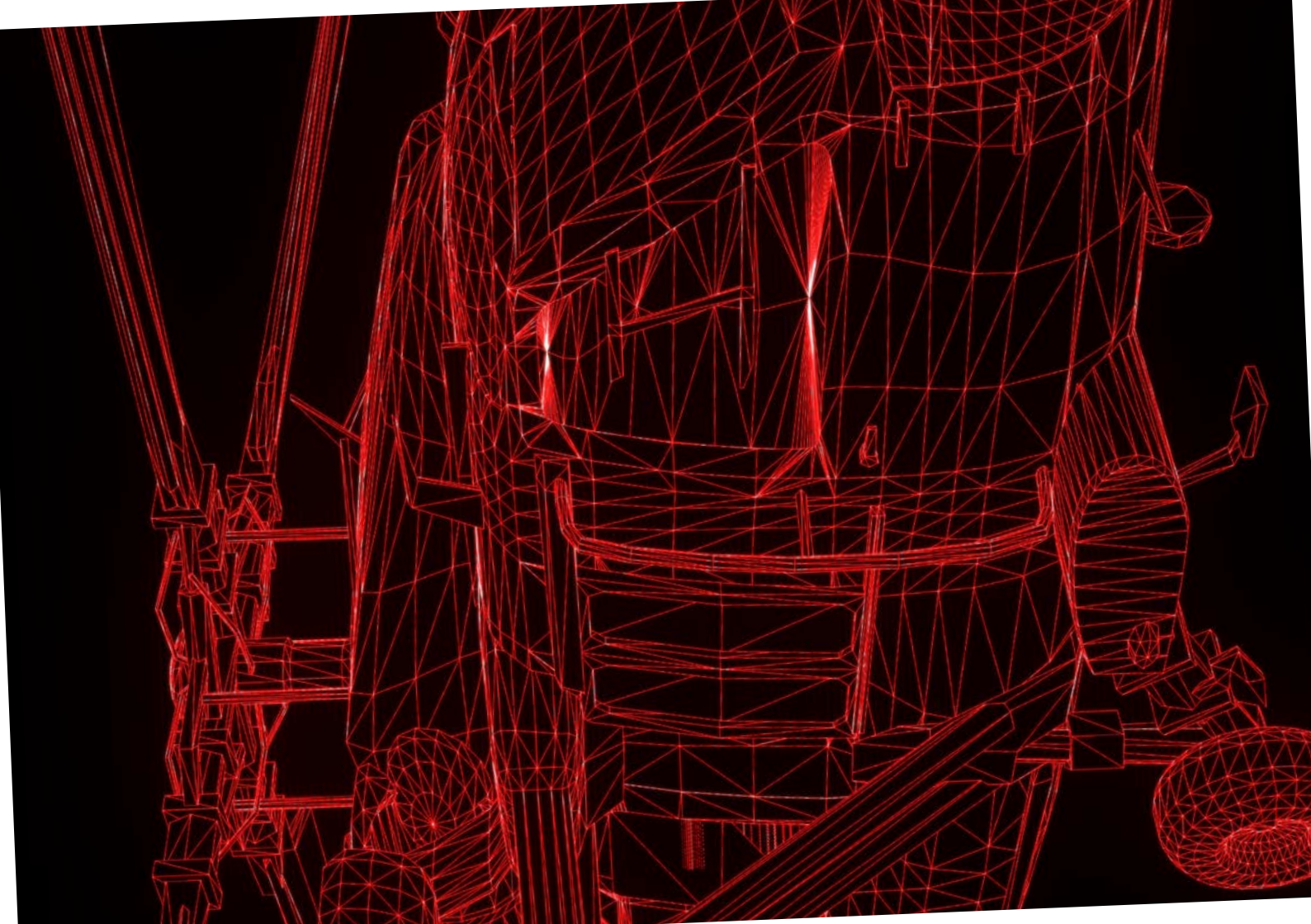
Key points

- The attributes of an effective JPR capability are: speed, reach and flexibility.
- The critical foundations for establishing effective future JPR are: governance, policy, strategy, capability planning, doctrine, training and sustainability.
- A cultural change will need to be made in Defence recognising that an increased cross-section of personnel will need to be equipped and trained for JPR.

22 Greater cultural awareness and local knowledge is likely to reduce the likelihood of abduction or personnel becoming isolated, especially in urban environments with a strong cultural identity. The ability of isolated personnel to conduct themselves appropriately could also improve the chances of recovery, especially in sub-threshold environments.

23 *Defence Joint Personnel Recovery (JPR) Strategy*, 2020, paragraph 2.

24 Jorgensen, J. F., 'Prisoners in the War on Terror; Captured NATO Personnel since 2001', *Small Wars Journal*, 16 April 2017.



Chapter 3

Milestones and insights

3.1. This chapter examines threats, opportunities and potential milestones for joint personnel recovery (JPR) development. These lead to key insights for the longer-term development of future JPR, which are built on the critical foundations established in the previous chapter.

Section 1 – Threats and opportunities

Threats

3.2. Developments of future JPR should take account of the threat that will be faced out to 2040. Allied forces will become less likely to retain the technological edge that they have enjoyed for decades as adversaries increasingly gain access to cheaper and more readily available technologies. The UK and its allies cannot expect to operate in uncontested physical or electromagnetic environments, nor should they assume access to levels of intelligence, surveillance and reconnaissance (ISR) coverage that have been available in recent conflicts; this will make finding, fixing, locating and communicating with isolated personnel more difficult. Additionally, Defence will not have full control of the information environment; other actors will use many means to gather information about UK Defence operations and personnel that they will exploit during an isolation event and after capture for strategic gain.

3.3. Hypersonic long-range missiles, chemical, biological, radiological and nuclear (CBRN), offensive cyber capabilities and anti-access and area denial (A2AD) systems will proliferate while directed energy weapons are likely to appear on ground-, maritime- and air-based platforms. This will complicate JPR. Meanwhile, space is becoming increasingly contested which will affect our access to technologies that are essential enablers for JPR. Analysis indicates that JPR is likely to become particularly difficult in

high-end and A2AD scenarios.[25] It will become harder to hide and operate within a more transparent battlespace. The UK does not, realistically, have resource to develop a dedicated UK JPR capability for high-end and A2AD situations and will need to continue to rely on allied and coalition capabilities. However, the UK may be required to play a contributing role in alliance and coalition JPR missions, requiring increased allocation of designated and capable assets. Operations in high-end and A2AD situations could also result in scenarios in which the risk/reward calculus precludes JPR mission attempts. This requires a mindset change by UK personnel who have become used to the assumption that a JPR mission will always be mounted in the event that they become isolated.[26] Therefore equipment and training programmes will need to be adjusted to ensure that personnel are better prepared to survive and evade for long periods.

3.4. Easily available, cheaper and smaller night vision devices and thermal imaging systems combined with better methods of detecting existing JPR location beacons and devices will allow adversaries, including non-state actors, to locate and capture isolated persons more easily.

Opportunities

3.5. **Information Age technology.** Information Age warfare will be digitally transformed and comprise ubiquitous data, cloud computing and artificial intelligence, thereby elevating the ability of UK forces to sense and understand to new levels across all of the domains.[27] Vast quantities of data will be gathered from myriad sensors and artificial intelligence will be employed to manage the cognitive burden. Efficient use and understanding of the cyber and electromagnetic domain, communications, navigation, intelligence, target acquisition, command and control, weapon delivery and intelligence mission data (IMD) will become increasingly critical

25 'Combat Search and Rescue in Highly Contested Environments', Air Force Office of the Deputy Assistant Secretary of the Air Force for Science, Technology, and Engineering and Air Combat Command, June 2018.
26 Ibid.
27 Artificial intelligence is the ability of computer-based systems to perform tasks which would normally require human or biological intelligence. Autonomy is the characteristic of a system to determine its own course of action by making its own decisions (or advising which decision should be taken). Artificial intelligence is, therefore, an autonomy enabler. Autonomous systems can be virtual or physical.

to mission success of JPR.[28] The UK JPR capability in these areas is rudimentary at present underlining the importance of incorporating JPR into the multi-domain integration (MDI) change programme.

3.6. **Remote and autonomous systems.** Advances in artificial intelligence and autonomy open the possibilities for air, land and maritime platforms assigned to JPR to be increasingly remotely operated or autonomous. Remotely operated and autonomous systems will offer the flexibility of incorporating crew for missions only where deemed necessary, thereby balancing risk and mission type against efficient use of personnel.[29]

3.7. **Advance teaming and swarms.** Remote and autonomous technologies will allow teaming and swarming to become a reality during the time frame considered in this joint concept note (JCN). This will give rise to the possibility for sensor swarms and armed escorts to become part of JPR operations.[30]

Section 2 – Near term to 2030 milestones

3.8. **Digital backbone.** Development of a digital backbone by 2030 should allow more information to be stored and exchanged at pace. Isolated personnel report processes (ISOPREP) could be revolutionised through this initiative allowing data to be immediately accessible to operational commanders and joint personnel recovery centres (JPRC). As current technologies such as radios, beacons, smartphones and satellite phones become obsolete, investment in innovative hardware

28 Intelligence mission data (IMD) is defined as: a coherent, machine-readable, intelligence-derived data set required to deliver the designed operational capability of platforms, weapons and systems.

29 See Joint Doctrine Publication (JDP) 0-30.2, *Unmanned Aircraft Systems* for further detail.

30 Known as 'advanced teaming' and pioneered by the United States (US). An autonomous system may be launched organically from an air platform, or separately, and teamed to create effects that further exploit the attributes of height, speed and tactical reach to benefit an integrated force. A crewed platform may not directly control autonomous systems but use them to extend sensor coverage and provide defensive or offensive kinetic and non-kinetic effects; all whilst minimising risk to the crewed platform.

must keep pace with contemporary technological advancement and be interoperable with the emerging digital backbone. This has the potential to allow seamless transition of communication, including tracking of isolated personnel throughout all stages of the JPR process (report, locate, support, recover and reintegrate). The development of a digital backbone, in conjunction with broader platforms and systems will also allow transmission of information, protected from threats in the electromagnetic spectrum (EMS) and as close to real time as possible. For JPR missions this will enhance command and control, improve communication across government and with allies and partners, and allow an increase in sensor fusion, thereby building situational awareness. A digital backbone will also facilitate integration of IMD into existing platforms and systems for JPR. This will allow information to be exploited to a degree not previously available for Defence.

3.9. **Media and open source information.** Media, social media and open-source information will play a significant role in future JPR situations. Adversaries, possibly using artificial intelligence, will seek to harvest information from these sources about UK personnel likely to be captured. Training to ensure that personal details are safeguarded will continue to be required; this will become increasingly challenging given ever-expanding personal digital signatures. Following isolation events, adversary media and social media channels are likely to become highly active. Defence will need to explore how best to exploit this using geolocation techniques and machine learning. Information from such sources, fused with JPR command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) and IMD will enhance chances of successful recovery. Adversaries will also exploit media and social media to shock or for strategic leverage. Defence needs to prepare highly responsive media and communications plans that protect personnel and families and counter the adversary's strategic narratives.

3.10. **Rotary and vertical lift.** Rotary and vertical lift assets will continue to play an important role in JPR throughout the time frame considered in this JCN. In the coming decade, the medium lift rotary development programme should incorporate JPR considerations. The ability to operate in enclosed urban and littoral environments will also increasingly need to be considered for JPR. Speed, reach and manoeuvrability enhancements

are being pursued through developing tiltrotor and compound technologies. Improving the adaptability and affordability of platforms through a modular system approach is also becoming possible, thereby allowing sensors, protection and effects to be tailored to operations far more easily than before. Defence should examine such technologies in the coming decade in preparation for future procurement decisions, including those that will enhance survivability and protect communications in an increasingly contested EMS; cost will be a significant factor in this. Of note, climate change will require Defence to operate in increasingly harsh conditions. Rotary wing platforms will be particularly impacted by this with increasing ambient temperatures adversely affecting rotary performance.[31]

3.11. **Fixed-wing.** All fixed-wing assets have the potential to support JPR in appropriate circumstances. Increased attention to how to incorporate fixed-wing sensors and capabilities into JPR training and tasking could offer JPR advantages.

3.12. **Remote and autonomous air systems.** The period to 2030 will see significant development of remote and autonomous systems, particularly fixed-wing aircraft with vertical take-off and landing capabilities. This has the potential to have a significant impact on JPR across the Integrated Operating Framework, but particularly in hostile and high-end situations in which proliferation of technology will render JPR missions increasingly complex and dangerous to undertake. Remotely piloted aircraft systems are already highly capable of contributing to locating isolated personnel. Integration of information from such systems into a nascent multi-domain system will allow speed of action to be improved. However, it is unlikely that remote or autonomous recovery will become an established capability by 2030, although research and development in this area is well under way.

31 *Global Strategic Trends – The Future Starts Today*, pages 31–34 and page 148.

The period to 2030 will see significant development of remote and autonomous systems

3.13. **Uncrewed and autonomous ground and maritime systems.** Defence has an opportunity in the coming decade to begin to exploit emerging autonomous and uncrewed ground and maritime platforms for JPR purposes to a greater degree than had previously been considered, and for recovering a wider range of potential isolated personnel. Rapid recovery by organic uncrewed and autonomous multi-role assets could enhance speed of action and reduce the need to mount more complex specialist missions, thereby enhancing the chances of success.

3.14. **Survival, evasion, resistance and extraction technologies.** Beacons and tracking systems are rapidly becoming smaller, cheaper and more wearable.[32] Medium Earth Orbit Search and Rescue (MEOSAR) only detect beacons transmitting on 406MHz. However, not all UK Defence beacons transmit on that frequency. Furthermore, secure beacon technology will need to be issued and tracked in a more coherent way than currently occurs in Defence. Procurement of location technology also needs to be considered in conjunction with other government departments (OGD), allies and overseas partners to ensure interoperability. With personnel potentially needing to survive and evade

32 The International Civil Aviation Organization and the International Maritime Organization are proposing continuous aircraft and vessel tracking. Industry initiatives such as Global Maritime Distress and Safety Systems and Global Aviation Distress and Safety Systems are proposing to send position data of a plane or a ship every few minutes.

for longer periods than anticipated over the last few decades, Defence should exploit the expansion in the adventure sport and mobile technology industries to adapt equipment for longer-term evasion times. Mobile communications and rechargeable battery technologies already offer opportunities for isolated personnel to maintain permanent communication with JPRCs and have access to J2 intelligence updates, mapping and live satellite imagery that will assist with survival and evasion. Meanwhile, lightweight water filtration systems and food preservation technologies provide opportunities to significantly extend evasion times; this should include developing remotely operated systems to afford resupply to evading personnel. For personnel not issued with bespoke survival, evasion, resistance and extraction (SERE) communication and location devices, other solutions will need to be considered such as using mobile telephones and other technologies in novel ways to keep costs low.

3.15. **Joint personnel recovery training.** The increased likelihood that personnel may need to evade for long periods will need to be incorporated into training needs analyses. Investment in conduct after capture and reintegration training will also need to be supported. Simulation, emulation, virtual and augmented reality technologies are rapidly becoming cheaper and will enhance JPR training over the next decade. Live JPR training serials should be incorporated to a much greater degree than previously across Defence.

3.16. **Maritime developments.** Development of the Royal Navy's carrier strike and littoral strike forces will provide multiple options for the delivery of JPR missions or additional support in terms of C4ISR assets. The *Future Commando Force Concept* will include designated forces to support JPR.

3.17. **Land technology developments.** Technological and programmatic maturation of the land intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) programme, dismounted situational awareness and the evolved digital backbone also have the potential to contribute to JPR.

Section 3 – 2030 to 2040 milestones

3.18. During the mid-2030s a number of milestones are likely to be met. These are detailed below.

a. **Location technologies.** Satellite technologies are expected to proliferate as space becomes increasingly exploited within the 2030–2040 time frame. Sensors will become increasingly capable and integrated through a digital backbone, further contributing to location, speed and accuracy. Bio-implant location devices have the potential to ensure personnel do not become separated from location equipment during isolation events and may allow location following capture.

b. **Aircraft technology maturation.** Autonomous aircraft technology is expected to mature to allow high payload and endurance mission sets to be conducted in the 2030–2040 time frame, realising the potential for remote or autonomous recovery.[33] Establishing research and development partnerships with allies and the private sector now will allow early access to these technologies.

c. **Advanced teaming.** Exploiting autonomy and artificial intelligence and teaming crewed with uncrewed platforms offers the potential for increased persistence, mass and agility with the added benefit of removing the human from direct exposure to risk in areas of high threat. Cost savings are not guaranteed through developing new technology; however, if they do emerge, it may be possible for dedicated JPR force elements to become financially viable in the future. This would potentially revolutionise Defence JPR provision.

d. **Maritime developments.** In the second decade considered in this JCN, the Royal Navy expects to introduce several uncrewed underwater, surface and aerial craft that may be useful in finding

33 The US Air Force has already placed a solicitation for a personnel recovery/transport vehicle. Small Business Innovation Research, 'Personnel Recovery / Transport Vehicle'. Meanwhile Bristows has been conducting uncrewed search and rescue trials in the UK. SUAS News, 'Bristow and Schiebel carry out UK's first unmanned search and rescue aircraft trial', 2020.

and recovering personnel. These could include overboard recovery, uncrewed aircraft, tethered aircraft systems to increase line of sight and automatic overboard detection systems.

Section 4 – Insights

3.19. **Long-term development.** Recent development of JPR policy and strategy and the establishment of the JPR Working Group has already begun to cohere JPR; consolidating JPR under a single command will further enhance this. However, this JCN has implications for the longer-term development of JPR. The policy and strategy will need to be regularly reviewed to take into account the significant challenges and complexities that will emerge as technologies mature, new threats emerge, as we adopt the Integrated Operating Framework and also broaden our operations into new geographic operating areas as articulated in the Integrated Review and Defence Command Paper.

3.20. **Command and control.** Reviewing command and control arrangements of JPR outside allied and coalition operations is a most pressing aspect of JPR; this can be realistically reviewed and implemented within a short time frame.[34] It is imperative that JPR requirements are considered in the development of a digital backbone given it is a capability that is extremely dependent upon integration.

3.21. **Expansion of UK interpretation of joint personnel recovery.** Clear areas of overlap, particularly command and control arrangements and procurement, exist between search and rescue (SAR), deployed SAR and JPR. The UK should consider incorporating SAR and deployed SAR into UK policy and doctrine in line with other North Atlantic Treaty Organization (NATO) Allies and adopting the NATO term 'personnel recovery'.

34 Joint personnel recovery (JPR) would benefit for inclusion in current command and control discussions regarding 'componency' given the inconsistency between JPR risks perceived by different Defence organisations operating with the same part of a Defence attaché's area of responsibility.

3.22. **Establishing a UK personnel recovery agency.** Defence could seek to establish cross-government agreement to establish a national UK personnel recovery agency. This would incorporate Defence and OGDs JPR capabilities requirements to establish a more integrated JPR approach.

3.23. **Defence attachés.** The Integrated Operating Framework will require Defence attachés to be increasingly engaged and to ensure that enduring relationships, plans and command and control are in place with in-country Foreign, Commonwealth and Development Office/OGDs and host nations for JPR. This will place a burden on Defence section personnel who will need to be tasked, trained and resourced accordingly.

3.24. **Survival, evasion, resistance and extraction technologies.** Investment in technologies to provide isolated personnel with advantage in an increasingly challenging SERE environment will be required. Beacon procurement must consider satellite compatibility and should be harmonised across Defence. To rapidly expand SERE capabilities more widely across Defence, existing technologies already in use (such as mobile phones and radios) should be considered to be adapted for JPR purposes. Exploiting rapidly developing technologies in the telecommunications, space, computing, battery and adventure sports industries should also become a priority for future JPR development. Interoperability will need to be a paramount consideration for procurement, with experimentation a key part of innovation.

3.25. **Joint personnel recovery training.** The changing posture of Defence will increase the number of personnel required to conduct SERE and JPR delivery training. Conduct after capture training and reintegration training, processes and capacity will also need to be reviewed to determine if they are sufficient to meet the ambition of the Integrated Review. Simulation, emulation, virtual and augmented reality for JPR training should also be actively pursued. A much greater emphasis across Defence should be placed on incorporating JPR training into live training scenarios to enhance UK JPR effectiveness and to stimulate a greater engagement with JPR across Defence.

3.26. **Joint personnel recovery and the multi-domain integration change programme.** To exploit JPR capabilities to the greatest extent

possible, Defence could incorporate JPR in the MDI change programme. Given its interconnected nature across Defence and with OGDs, allies and partners, JPR would be an excellent programme for MDI change.

3.27. **Sovereign joint personnel recovery capability development.** Significant and difficult decisions will need to be made as Defence develops a sovereign JPR capability tailored to new challenges and the Integrated Operating Framework. Rotary wing will continue to play an important role throughout the time frame of this JCN. JPR will, therefore, need to be considered in the development of future rotary wing. A decision on whether the UK should establish a designated heliborne extraction force will need to be made in the short term to provide sufficient JPR capacity to cover UK operations to match increasing UK global ambition. It is unlikely that current capacity will allow for a heliborne capability to be dedicated; careful double-hatting of capabilities would appear to be the most likely route to achieving such a capability. However, limitations and risks of adopting such an approach will need to be clearly understood.

3.28. **Future joint personnel recovery risk-benefit calculus.** We may need to recalibrate our decision-making surrounding JPR mission approval as the threats brought to bear by adversaries become increasingly capable. In high-end and A2AD situations, the risk-benefit calculus may preclude mounting JPR missions. This will represent a significant change in expectation for our personnel and will require new approaches to training and equipment provision.

Royal Air Force Regiment using remotely piloted aircraft systems to locate an isolated individual during a training exercise

3.29. **Remotely operated and autonomous systems.** For Defence to exploit remotely operated and autonomous air, land and maritime systems to their full potential, procurement programmes should include JPR requirements into the Defence line of development process from the outset of project initiation and in collaboration with allies and the private sector. Remotely operated and autonomous systems may allow Defence to establish some dedicated recovery capabilities, especially if technological advances result in decreasing platform costs, although reducing costs cannot be assumed. In addition to examining emerging remotely operated and autonomous technologies for recovery, Defence should explore how these systems could deliver capabilities including intelligence, surveillance and reconnaissance and strike support to JPR recovery missions as well as support for evading personnel in situations in where threats preclude immediate recovery. Smaller systems may also assist with providing real time close in ISTAR feeds to evading personnel and for extractions in complex urban environments. These systems could be game changing for JPR.

3.30. **Legal and ethical considerations.** Defence should begin to explore the legal and ethical position of recovery of personnel using autonomous and remotely operated systems. The risk/benefit calculus for recovering personnel will need careful consideration given its lifesaving potential; thresholds for carriage will differ from those being considered for peacetime carriage. Similarly, the legal and ethical position on bio-implant technologies should be explored for JPR.

3.31. **Culture and mindset change.** Our approach to JPR needs to change. We need to recognise that it is an important part of force protection, that anyone in Defence can become isolated and that many of our capabilities that we do not currently consider as JPR assets could be used as part of a JPR response, particularly as an immediate one. JPR consideration needs to become part of the DNA of Defence and we need to think of how we integrate this to a much better degree with allies, OGDs and partners if we hope to exploit our existing assets to their full potential.

Key points

- Threats will proliferate and become increasingly complex. Operations in high-end and A2AD situations may preclude recovery, requiring a change in mindset, training and equipment.
- The transition towards Information Age warfare must be embedded into future JPR developments.
- Remote and autonomous technologies should be exploited to enhance JPR.
- Advance teaming and swarm technologies are rapidly advancing and offer a range of benefits for Defence that should be explored for JPR utility.

Insights

- The critical requirements for JPR should be prioritised in the immediate term to consolidate JPR coherence that is being established through the policy and the strategy.
- JPR command and control arrangements need to be reviewed. JPR considerations will need to be included in digital backbone considerations.
- The UK should consider incorporating SAR and deployed SAR into UK policy and doctrine in line with other NATO Allies and adopting the NATO term 'personnel recovery'.
- Defence could recommend establishing a national personnel recovery agency. Defence should consider whether JPR should become a core and specifically funded Defence Attaché task.

- JPR should be incorporated in the MDI change programme.
- Rotary assets are likely to remain central to JPR capabilities until 2040. Defence should consider whether to establish a designated heliborne extraction force. Double hatting of capabilities is the most likely route to achieving an affordable global sovereign JPR capability.
- Remotely operated and autonomous systems may be game-changing for future UK JPR. Vigorous research in this area needs to be pursued now.
- We will need to recalibrate our decision-making and risk benefit calculus surrounding JPR as threats present increasing challenges.
- Training should be reviewed to examine the breadth of activity anticipated by the IOpC with greater emphasis placed on both synthetic and live JPR training serials across Defence.
- Investment will be required into SERE technologies to ensure beacons are compatible with satellite detection systems and harmonised across Defence. Innovative exploitation and experimentation of emerging technologies will be required.
- A culture and mindset change needs to occur in Defence to recognise that anyone in Defence can become isolated.
- JPR needs to be better integrated across Defence, wider government and with allies and partners.

Lexicon

Section 1 – Acronyms and abbreviations

A2AD	anti-access and area denial
C4ISR	command, control, communications, computers, intelligence, surveillance and reconnaissance
CBRN	chemical, biological, radiological and nuclear
DCDC	Development, Concepts and Doctrine Centre
EMS	electromagnetic spectrum
IMD	intelligence mission data
IOpC	Integrated Operating Concept
ISOPREP	isolated personnel report processes
ISR	intelligence, surveillance and reconnaissance
ISTAR	intelligence, surveillance, target acquisition and reconnaissance
JCN	joint concept note
JDN	joint doctrine note
JDP	joint doctrine publication
JPR	joint personnel recovery
JPRC	joint personnel recovery centre
JSP	joint Service publication
MCB	Military Capability Board
MCDC	Multinational Capability Development Campaign
MDI	multi-domain integration
MEOSAR	Medium Earth Orbit Search and Rescue
MOD	Ministry of Defence
NATO	North Atlantic Treaty Organization
OGD	other government department

SAR	search and rescue
SERE	survival, evasion, resistance and extraction
TLB	top level budget
UK	United Kingdom
US	United States

Section 2 – Terms and definitions

This section is divided into two parts. First, we list endorsed definitions followed by other terms and descriptions that may be useful to the reader.

Endorsed definitions

force protection
All measures and means to minimize the vulnerability of personnel, facilities, equipment and operations to any threat and in all situations, to preserve freedom of action and the operational effectiveness of the force. (NATOTerm)

isolated personnel
Military or civilian personnel who are separated from their unit or organization resulting in a loss of positive and/or procedural control, that may require them to survive, evade, resist exploitation, and either have to make their way back to friendly control or require assistance to do so. (NATOTerm)

personnel recovery
The sum of military, diplomatic and civil efforts to effect the recovery and reintegration of isolated personnel. (NATOTerm)[35]

Other useful terms and descriptions

capable joint personnel recovery force elements
Force elements capable of conducting or supporting JPR missions, but may not have received specific recovery training or equipment. Almost all UK force elements are capable of this role. (JSP 998)

combat search and rescue
The recovery of non-detained isolated personnel from a situation where hostile interference may be expected, using forces that are nationally designated and specifically trained and equipped to conduct recovery. (JSP 998)

35 This definition is used in JSP 998, *MOD Policy for Joint Personnel Recovery* as the definition for joint personnel recovery.

dedicated joint personnel recovery force elements
Force elements that have been trained and equipped to conduct recovery and it is their only role. (JSP 998)

deployed search and rescue
The recovery of isolated personnel in distress, in support of deployed operations and exercises, where no threat is posed by hostile interference. (JSP 998)

designated joint personnel recovery force elements
Force elements that have been trained and equipped to conduct recovery missions but it is not their primary role. (JSP 998)

intelligence mission data
A coherent, machine-readable, intelligence-derived data set required to deliver the designed operational capability of platforms, weapons and systems. (JDN 1/21 – proposed)

non-conventional assisted recovery
Recoveries using non-conventional forces or other types of assistance when conventional means are not suitable. (JSP 998)

reintegration
The process of providing medical and psychological care to personnel recovered from isolation and debriefing them for time-sensitive intelligence and lessons identified purposes. The aim of reintegration is to return personnel to full duty status. (JSP 998)

search and rescue
The location and recovery of persons in distress in an environment where hostile interference is not expected. (JSP 998)

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