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DEFENCE IN THE DIGITAL AGE

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DEFENCE IN THE DIGITAL AGE

GENERAL ARTICLES

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REVIEWS

THE IMPERATIVE OF INNOVATION

IN his speech at RUSI in July 2024, the Chief of the General Staff emphasised the transformative potential of data and digital innovations as a key part of achieving the British Army's ambitious goal of doubling and tripling its lethality by the end of the decade. Highlighting the urgent need for modernisation, General Sir Roly Walker articulated a vision where advanced technologies would play a pivotal role in integrating data from all domains to gain precise battlefield advantages. This strategic shift underscores the imperative for the British Army to pull the future into the present, ensuring that it remains adaptable and responsive to the rapidly evolving threats and technological landscapes.

In the realm of modern warfare, the implementation of a full stack[1] solution for tactical reconnaissance strike complexes (TRSC) is paramount. Networks form the backbone of this solution by supporting data flow, which in turn empowers decision-makers with timely and accurate information. Furthermore, digital innovations significantly enhance the impact that these decision-makers can have on the battlefield, by accelerating effector response times. This interconnected framework ensures that every layer, from data acquisition to actionable decisions, works seamlessly to maintain superiority on the battlefield.

The proliferation of drone warfare has profoundly transformed modern combat. Adversaries at the battlegroup and brigade level can now sense and effect each other at ranges exponentially further than just a decade ago with organic assets within their own task organisation. The ability to deploy and counteract these uncrewed systems has become a critical component of contemporary defence strategies, necessitating continuous innovation and adaptation.

The rapid evolution of modern warfare necessitates a continuous and meticulous adaptation of our strategies, capabilities and organisational structures. The collection of articles brought to you by the Information Directorate team in this issue of *The British Army Review* provides a comprehensive examination of the British Army's endeavours to modernise Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) capabilities, leverage data for decision-making advantage, and address the critical role of networks in digital innovation.

"The rapid evolution of modern warfare necessitates a continuous and meticulous adaptation of our strategies, capabilities and organisational structures."

The articles collectively underscore the British Army's strategic pivot towards a future where digital integration and data-driven decision-making are not just enhancements but necessities. This evolution is driven by an imperative to remain adaptable and responsive in the face of rapidly changing threats and technological landscapes.

Moreover, the narrative woven through these discussions emphasises a broader cultural shift within the military. It's not merely about adopting new technologies but fostering a mindset that values continuous learning, agility and a willingness to challenge conventional doctrines. This cultural transformation is as critical as the technological advancements it accompanies, ensuring that the British Army is not only equipped with the latest tools but also prepared to use them in innovative and effective ways.

The emphasis on projects like Zodiac, Asgard, McBride, Tiquila, Serpens and Iris illustrate a comprehensive approach to modernisation. These initiatives are not isolated efforts, but parts of a cohesive strategy aimed at building a robust and resilient military infrastructure capable of facing future challenges. Each project plays a vital role in enhancing various aspects of military capability, from intelligence gathering and data processing to network security and operational execution.

As we look towards the future, the British Army's commitment to embracing these changes and pursuing excellence in digital innovation sets a benchmark for military forces worldwide. The lessons learned and the advancements made will undoubtedly influence global defence strategies, highlighting the importance of integration, collaboration and forward-thinking in maintaining a strategic edge.

In conclusion, the modernisation of ISTAR capabilities, the emphasis on data-driven decision-making and the critical role of networks in driving digital innovation represent a significant leap forward for the British Army. These efforts not only enhance operational effectiveness but also prepare the military to navigate the complexities of future warfare with confidence and agility. The journey ahead is challenging, but with a clear vision and a steadfast commitment to innovation, the British Army is well-positioned to meet the demands of the modern battlespace. **– Major General Mark Purves, Director Information (Army Chief Information Officer)**

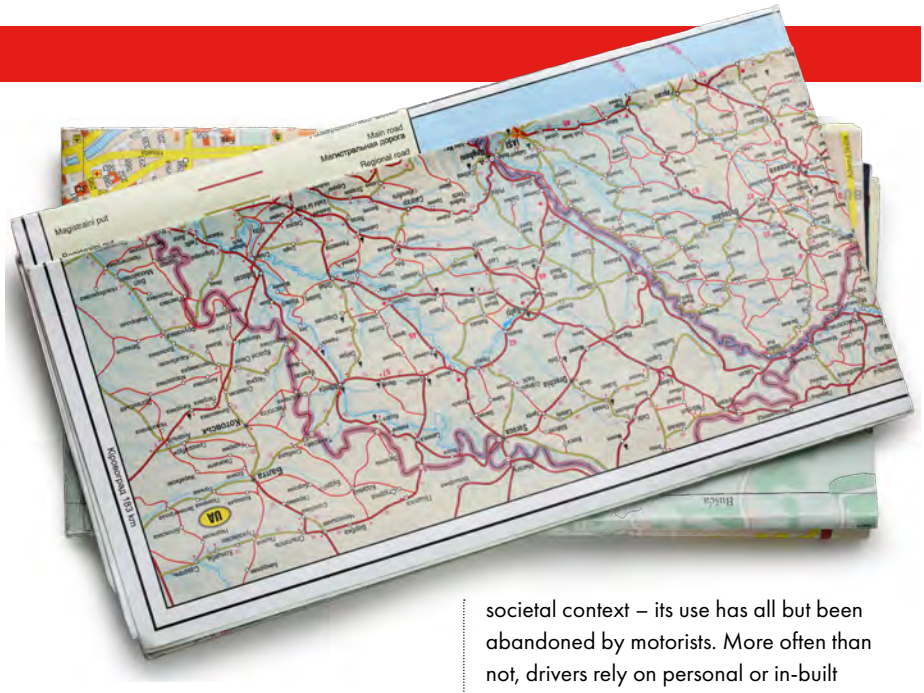
[1] *In this context 'full stack' refers to all the capabilities that are required to deliver TRSC from the core data to dots on a map to enhanced target identification and prioritisation.*

'Better Off With Map And Nokia'. Undoubtedly not the eponym those working in Defence procurement at the turn of the millennium had any desire to hear from the mouths of soldiers stepping into the then brave new world of Bowman (pages 15-19).

Whether or not such derision was deserved (and the system's well-documented, problematic past suggests that, at least originally, detracting voices were warranted), the moniker afforded to the Army's communications successor to Clansman can – ironically – be considered something of a compliment in today's context.

How so? Try asking those new recruits using Bowman in the British Army of 2024 what a Nokia is, and I'll bet you'll receive more blank looks than you do nostalgic smiles. A tongue-in-cheek observation, perhaps, but given how much the world and technology have evolved around it, the system's staying power is commendable.

I first heard Bowman mentioned in excited whispers during a reporting assignment to Kosovo, where soldiers deployed on six-month peacekeeping tours during the early noughties revelled in the opportunity to buy



bootleg CDs from the entrepreneurial locals who had quite literally set up shop outside the gates of British camps. As evidenced by the brisk business for Republica and REM rip offs, music and video downloads had yet to emerge as the dominant force in the field of entertainment. Indeed, the first iteration of the iPod was not launched until October 2001 (post Bowman's conception). Fast forward to today and Bowman remains in service, although admittedly not for much longer, while the iPod – a product which spanned five models and 26 iterations across two decades – was discontinued by Apple in 2022 having sold an estimated 450 million units.

While accepting that comparing a military's 'primary land environment command and control system' with a consumer-targeted portable audio player is not comparing apples with apples (excuse the pun), the obsoletion or maturity of other 'newer' technologies demonstrates the difficulties associated with force development (pages 43-45) and trying to ensure the Army does not find itself behind the technological curve.

As touched on by Colonel Pete Brunton in this issue of *The British Army Review*, those being asked to innovate and accelerate modernisation today and that will fight tomorrow signed up to serve with expectations of working in an organisation at the cutting-edge. Human-machine integration is not a leap of faith for the current generation, but an intuition honed by the realities of modern life.

Take, for example, the 'Map' in Bowman's early nickname and consider how – in a societal context – its use has all but been abandoned by motorists. More often than not, drivers rely on personal or in-built satellite navigation devices to get them from A to B, taking for granted their in-car companion's ability to avoid lengthy delays caused by accidents ahead and to warn them of the presence of speed traps. This journey to dependence has been achieved in part by drivers being reassured by positive experiences of the technology, but also through machine learning. Proficient systems assess habits, building an understanding of where a driver deviates from instruction and adapts its route planning accordingly.

Similarly, the ubiquitous smartphone is a hotline to a world of knowledge (as well as potential misinformation – pages 24-25) rather than just a means to contact family and friends. Any doubts over the reliability of Siri's weather forecasting have long since evaporated and, more significantly, people expect to be able to ask their phone a question and have it respond.

Technology's touch is also being felt in myriad ways on the modern battlefield, as evidenced by the first-hand experiences of the Ukrainian drone operator who has contributed to this edition (pages 20-23), which explores the challenges and opportunities of implementing a new digital backbone for the Army. Bowman's endurance has been demonstrated in spades but, as it prepares to bow out after nearly three decades, the pressure on the Service to make sound calls on the direction of technological travel are greater than ever. Thankfully, the data-rich pages that follow suggest every effort is being made to ensure any costly capability cul-de-sacs are avoided.

– Andrew Simms

WHEN IT'S A SPRINT NOT A MARATHON: INTEGRATING AT PACE

AUTHOR

Dave Williams, Army Chief Technology Officer

WESTERN military policy formation and doctrine have been gravitating toward the idea of integration for nearly a decade. Integration equips Defence with the ability to act in a manner greater than the sum of its parts, allowing us to work with government, our allies and industry to deliver our desired outcomes.

Despite difficulties in predicting the future of warfare, armed forces are constantly preparing themselves for the next conflict by adapting their organisations, acquiring new equipment and producing novel warfighting concepts.[1] As focus has shifted from fighting insurgents to the prospect of being pitched against peer or near-peer adversaries, integration has come to the fore in many Western forces – as reflected in concepts and doctrines such as integrated campaigning,[2] the Integrated Operating Concept[3] and multi-domain integration.[4]

Integrating multiple systems from different manufacturers across land, air and cyber domains within compressed timelines is crucial for operational success in modern military operations. These systems, developed by various manufacturers, often operate under different standards, are categorised under distinct operational domains and used for different purposes. Achieving integration at pace therefore presents a significant challenge for military organisations facing dynamic threats.

The British Army's Chief of the General Staff emphasised this challenge at the RUSI Land Warfare Conference, identifying the theme of "pulling the future into the present" as being

[1] *Freedman, 2017.*

[2] *US Department of Defense, 2018.*

[3] *UK Ministry of Defence, 2021.*

[4] *Black et al., 2022.*

critical for enhancing combat readiness. Historical lessons from World War II and the Gulf War demonstrate the logistical and technical challenges of integrating systems. However, the complexity of modern systems and the speed of technological advancement introduce unprecedented factors. Recent conflicts, such as the war in Ukraine, underscore the need to adapt swiftly to evolving threats.[5] This article examines the challenges and opportunities of integrating technology at pace to set the conditions for the unfair fight, drawing from historical and contemporary military experiences.

CHALLENGES OF SYSTEM INTEGRATION ACROSS CAPABILITIES

Integrating systems that have been designed independently by different manufacturers (and without interoperability in mind) presents numerous challenges. Operation Overlord in World War II provides an historical example of this: Allied forces had to coordinate land, air and naval assets across nations with distinct equipment and communication systems. John Keegan notes that communication failures between air and naval bombardments resulted in unnecessary losses at Omaha Beach,[6] highlighting the dangers of poor integration under critical time constraints.

Similar issues are evident in the current conflict in Ukraine, where the Ukrainian military have rapidly integrated NATO-supplied equipment – such as M142 HIMARS, Patriot air defence systems and Turkish Bayraktar TB2 drones – with their older Soviet-era infrastructure.[7] According to a report by the Institute for the Study of War, significant modifications to command and control systems have led to delays during critical engagements.[8] The combination of differing data formats, communication protocols and encryption standards have resulted in limited interoperability, complicating battlefield coordination amid an ongoing war.

At the RUSI Land Warfare Conference 2024, the Chief of the General Staff emphasised the necessity for forces to adopt a multi-domain approach, integrating systems across land, air, sea and cyber domains to respond to crises such as Ukraine. The accelerated evolution of technology development has meant that success on the battlefield requires integrating legacy systems with modern technologies; the Ukrainian war has demonstrated this to be particularly challenging but essential for success.[9] The diversity of platforms – including drones, air defence systems and communication equipment – requires rapid adaptation and creative solutions, often during active conflicts, when success demands development and evolution take place in a matter of days not years. Achieving seamless interoperability between systems from various manufacturers, especially under compressed timelines, demands overcoming differences in communication protocols, encryption methodologies and hardware interfaces.

Therefore, to be successful we must not just evolve our technological integration but integrate and co-develop with our industrial partners. The Chief of the General Staff described this as the one Defence model; joining our tacticians with our technicians to exploit battle-winning technologies by integrating the world-class people working for Defence, industry, academia and our allies.

COMPRESSED TIMELINES: URGENCY IN MODERN OPERATIONS

The urgency of modern military operations highlights the importance of rapidly fielding interconnected systems capable of synchronising across multiple domains. Ukraine's experience reflects this need – conflict requires integration of systems without the luxury of lengthy testing or traditional procurement cycles[10] and hence the need to adapt Western risk culture to lean towards a minimum viable construct and increasing capability by spiral development.

Ukraine's integration of increasingly modern technologies – such as drones and satellite communication platforms – has allowed it to counter Russian military superiority. However, the rapid integration of these systems has also exposed challenges, including the difficulty of sustaining operational tempo when integration lags. The inability to integrate systems swiftly can slow manoeuvre warfare and limit strategic flexibility.[11] The restoration of manoeuvre warfare in Ukraine has been impeded by the complexity of integrating various platforms sufficiently to support fluid, combined-arms operations.[12] This reinforces a critical lesson for global militaries: compressed timelines for system integration will likely become the norm, and failure to act quickly could severely hamper military responses to dynamic threats.

All militaries around the globe will face the same challenge in their efforts to both optimise current capabilities for the fight tonight and modernise for the fight tomorrow night. But with the convergence of threat and technological advancement, success favours the bold when it comes to deterrence and warfighting. The British Army marked these lessons and has taken bold steps in combining optimisation and modernisation, integrating modern solutions

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[5] *Institute for the Study of War, 2023, "Ukraine Conflict: HIMARS and NATO Equipment Integration." ISW Analysis. Available at: understandingwar.org/report/ukraine-conflict-himars-and-nato-equipment-integration*

[6] *Keegan, J. (1982). Six Armies in Normandy: From D-Day to the Liberation of Paris. London: Pimlico.*

[7] *RUSI (2023). "Integrating Western Military Systems into Ukraine's Soviet-Era Infrastructure." Available at: rusi.org/publications*

[8] *Institute for the Study of War, 2023.*

[9] *Bailey, J. (2023). "Multi-Domain Integration and Its Impact on Modern Military Operations." Defence Studies, 23(2), 112-130. Available at: assets.publishing.service.gov.uk/media/6579c11a254aaa000d050c6e/20201112-ARCHIVE_JCN_1_20_MDI_Official.pdf*

[10] *Institute for the Study of War, 2023.*

[11] *Kagan, F., Barros, G., & Hird, K. (2023). "Ukraine and the Problem of Restoring Maneuver in Contemporary War." Institute for the Study of War. Available at: understandingwar.org*

[12] *Miller, R., Jones, P., & Williams, D. (2022). "Artificial Intelligence in Military System Integration: Reducing Time to Deployment." Journal of Defense Research, 18(1), 45-60.*

into current field capabilities such as Asgard[13] in an any sensor, network or effector model.

TECHNOLOGICAL ENABLERS FOR RAPID INTEGRATION

Technological advancements offer key enablers for integrating systems at speed. Among these, artificial intelligence (AI) and machine learning are particularly prominent. AI can automate aspects of integration, optimising the time required to harmonise diverse systems. Discussions at the RUSI Land Warfare Conference 2024 emphasised using AI to improve data-sharing protocols and optimise multi-domain operations.[14] Similarly, Ukraine has utilised advanced algorithms to quickly target and execute precision strikes by integrating sensors, drones and artillery systems.[15] However, to successfully exploit the AI revolution for battlefield advantage we must not overlook the criticality of our data management, cleansing and dissemination, and ensure that the British Army builds robust modular architectural approaches.

Another critical enabler is the use of open standards and modular architectures. For example, NATO's Federated Mission Networking allows member nations to rapidly integrate systems in coalition operations by establishing common standards[16] and CMOSS (C5ISR Modular Open Suite of Standards). The latter is a specific and common modular open system approach comprising a suite of standards detailing various physical and logical interface definitions. It is a concept developed nearly a decade ago and is an example of how militaries can enhance integration speed by adopting similar open protocols and ensuring that future systems are built with modularity.[17]

Digital twin technologies, which simulate system integration in virtual environments, have also become increasingly important. The British Army has started adopting digital shadows to test and validate system integration, significantly reducing the time required for deployment.[18] Adopting this approach requires a cultural mindset shift to integrate and exploit our 'home' and deployed networks to accelerate the development of 'software' solutions for battlefield advantage. This approach is particularly valuable in conflicts like Ukraine, where ongoing combat operations limit real-world experimentation and testing opportunities.[19]

ORGANISATIONAL AND PROCESS INTEGRATION

Technical solutions alone are not enough to achieve successful system integration. Organisational, mindset and process adaptations are also crucial. One of the key lessons from Operation Desert Storm in 1991 was the importance of joint planning and communication between coalition forces.[20] The integration of US F-117 Nighthawk stealth bombers with British Tornado aircraft required precise coordination through clear communication channels, ensuring success in multi-domain operations.

In contemporary conflicts, organisational agility is equally important. The British Army's adoption of 'agile acquisition' practices fosters closer collaboration between defence contractors, system integrators and military end-users. As discussed at the RUSI Land Warfare Conference 2024, agile practices reduce bureaucratic delays and enable faster feedback loops, accelerating system integration. Moreover, clear communication with political stakeholders is vital to aligning strategic objectives with operational needs. Delays in procurement, as seen during the war in Afghanistan, often result from miscommunication between policymakers and defence contractors.[21]

CONCLUSION

Integrating multiple military systems from different manufacturers across land, air and cyber domains under compressed timelines remains a significant challenge requiring a landmark shift in approach and mindset. Historical lessons from World War II and the Gulf War demonstrate the importance of clear communication, organisational adaptability and technological enablers. In modern conflicts like Ukraine, the rapid adoption of advanced Western systems highlights both the opportunities and risks of fast-tracked integration.

By leveraging lessons from past and present conflicts and incorporating technologies such as software enabled, modular architectures and digital twins, militaries can equip their forces with the necessary tools to succeed in complex, fast-paced operational environments and set the conditions to fight the next fight.

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[13] *Asgard is the project name for the British Army's Tactical Reconnaissance Strike Complex that will be fielded to increase the lethality of Forward Land Forces who stand at readiness to reinforce the Baltics as part of NATO.*

[14] *British Army Review (2023). "Accelerating Modernisation: The Need for Multi-Domain Integration." Issue 189, chacr.org.uk/media/british-army-review*

[15] *Centre for Security and Emerging Technology, 2022, "AI and Military Interoperability: Challenges and Opportunities." Available at: set.georgetown.edu*

[16] *CNA, 2023, "Russian Cyber Operations in Ukraine: A Strategic Assessment." Available at: cna.org*

[17] *Bailey, 2023.*

[18] *British Army Review, 2023.*

[19] *British Army, 2024. Available at: army.mod.uk*

[20] *Mead, R. (2013). Desert War: The Battle of El Alamein. New York: HarperCollins.*

[21] *Moore, H. G. (1992). We Were Soldiers Once… And Young. New York: Random House.*

"To successfully exploit the AI revolution for battlefield advantage we must not overlook the criticality of our data management, cleansing and dissemination, and ensure that the British Army builds robust modular architectural approaches."

THE FUEL OF ADVANTAGE: WINNING THE NEW ARMS RACE

AUTHOR

Brigadier Stefan Crossfield is the British Army's Chief Digital and Data Officer.

DATA is increasingly understood as the fuel of advantage in future combat, but while opportunities may arise from ubiquitous access to it, leveraging data effectively will require carefully designed end-to-end infrastructure which forms firm foundations from which we can iterate and evolve.

The transformation of warfare today is increasingly dependent upon the accumulation, management and manipulation of data. The transformative difference between an F-16 and an F-35 is not their flight characteristics, but the latter's level of situational awareness and far greater ability to synchronise kinetic and electromagnetic effects. This allows the F-35 to be disproportionately lethal and survivable, and to act as a multi-domain force multiplier for other combat platforms and formations.

The military today is increasingly aware of the significance of data. Nevertheless, there remains something of a disconnect between digital systems supporting combat platforms and the digital architecture of the wider force in peacetime. This mismatch builds in vulnerabilities and fails to lay the foundations for retaining competitiveness as digital systems evolve. It is vital that the contest for data is understood as a continuous arena of competition and must be examined end-to-end, to tip the balance in our favour and set up the unfair fight.

CAPABILITY AS PROCESS

Russia's invasion of Ukraine and Israel's offensive into Gaza underscore how warfare will remain bloody and violent, and the capacity to fight will continue to depend upon troops and heavy equipment. However, the competitiveness of combat platforms, and the balance of attrition, is likely to increasingly be determined by software enabled systems and the rapidity and assurance of the data feeding them. When GMLRS [guided multiple launch rocket systems] were firstly employed in Ukraine, they proved devastatingly effective. As Russia came to understand the system, however, their effectiveness started to vary. Sometimes they would work. Sometimes entire salvos would miss due to electronic countermeasures or being kinetically intercepted. Success began to depend upon the layering of tactics to get through, and this required data on the enemy defences.

Much capability acquisition in the British Army today is platform centric. The lesson from Ukraine, however, is that no digital, data centric capability remains effective in the form in which it was originally designed. Once shot down or operated in range of certain

Article adapted from an original published by RUSI in December 2023 by Dr Jack Watling, Senior Research Fellow, Land Warfare, and Brigadier Stefan Crossfield.

collection systems, Russian electronic warfare operators develop novel effects that see the effectiveness of any given new platform plummet rapidly.

The longevity of the utility of weapons, systems and capabilities in Ukraine largely stems from the ability to alter the logic of their control. For example, unmanned aerial vehicles need to have their software updated regularly if they are to remain useable – leveraging the flexibility and extensibility of software centric systems. They need to have new radios and antenna fitted, or to have sensors swapped out to enable different navigation solutions. This is an iterative human/machine design process, much like that used in high end motor sports, using spiral development and rapid refresh cycles. The point is not that these iterations produce a better weapon, system or capability. Instead, the process of adaptation and change in the logic of operation has to be continuous and rapid to evade evolving enemy countermeasures. Sometimes this looks like regression rather than progress – but it's a new arms race playing out primarily in the software and data domain.

For the Army, therefore, this requires a software development team organic to the parent unit that is able to use operational data to update its capabilities in real time. The development cycle requires sufficient control of the data to be able to experiment with and alter it constantly. The sensor or communications payload employed may need to be able to be swapped out rapidly. The platforms employed can be cheap and disposable as they become the least relevant part of the capability. Any programme that is premised on buying 'something' rather than standing up a process to deliver an effect is, therefore, likely to be obsolete within weeks of first being deployed.

> **"The geography of the digital world has lakes and interconnections between them. Some flow at a steady rate. Others can be accelerated with pumps, but this takes investment and energy."**

Across the Ministry of Defence this need for alternative procurement mechanisms to deliver this type of spiral development has been recognised and there is significant senior buy-in and associated activity underway. Specifically, Commercial X in Defence Digital has reset how programmes perceive risk and opportunity. When the threat of rapid obsolescence through enemy action is considered up front, it becomes clear that alternate procurement mechanisms are necessary to save money and deliver resilient capability.

DIGITAL GEOGRAPHY

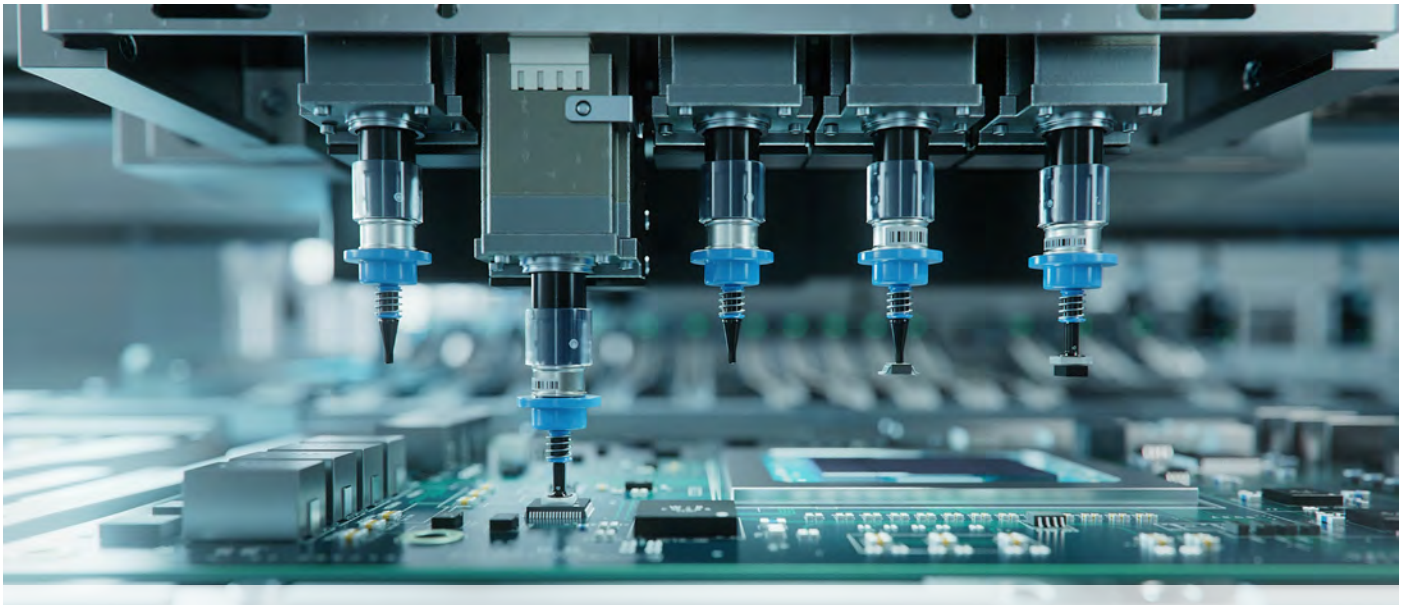
The 'cloud' is both a helpful and misleading piece of marketing. For the recipient of data, the cloud promises boundless accessibility to transformative tools. It therefore encapsulates the level of situational awareness, coordination and effect that would ideally be made available to a soldier, and thus the opportunity that data brings to the battlefield.

At the same time, the cloud is a falsehood. If data is 'in the cloud', it is actually just on someone else's computer – generally as part of a large server farm. These computers are physical objects, have requirements for power and are connected by a range of fixed and electromagnetic pathways. In short, cyberspace has a geography and is vulnerable to adversary intervention.

Accurate cartography transforms land and naval warfare by allowing military staffs to accurately calculate time and distance, synchronising movement to concentrate combat power where the adversary would find themselves disadvantaged. Once the geography is understood, military planners could also alter it, building canals, fuel bunkers and communication relays to expand the distance over which they could orchestrate effects.

The mapping of digital infrastructure – what data is stored where – is a prerequisite for a similar process in defence. Although small volumes of data can be widely accessed, rather like water, big data is harder to transport. The infrastructure needed to run large servers fixes them in geographic locations.

Thus, the geography of the digital world has lakes and interconnections between them. Some flow at a steady rate. Others can be accelerated with pumps, but this takes investment and energy. As with evaporation and precipitation from lakes, or the flooding caused by the destruction of infrastructure like the Kakhovka Dam, data can also migrate in less helpful ways.



"A force that depends upon advantage from these systems must be able to manufacture new munitions as existing stockpiles are expended. No country can afford a stockpile that will last for the duration of a major conflict and so initial stocks simply provide the time to ramp up production."

The British Army has committed to hosting data in 'the cloud', in line with Defence direction, and now under Project EOS, a transition is being planned and delivered. This is a painstaking process, however, precisely because it has to take note of the opportunities and threats across a continuum – spanning from assured fixed infrastructure 'at home' all the way to the complex and cluttered electromagnetic spectrum of the modern battlefield.

Much of the data that could improve situational awareness and competitiveness at the front could also be leveraged in the rear to design novel effects; the reality now, however, is that much of the data needed in the fixed to deployed domains is stranded in databases that are either inaccessible to key users or not known about.

Moreover, moving this data through the existing processes and infrastructure is unlikely to be achievable at the speed of relevance. Defence, therefore, must approach the design of its digital geography as a matrix, rather than a vertically integrated hierarchy, so that the most useful data is accessible to the most relevant user. Work in Defence Digital to deliver this matrix, known as a data fabric, will be a critical enabler.

Under Project Coeus, the British Army is starting the process of transforming the data it holds. This is not an insignificant challenge and will take time to complete. However, by adopting a series of principles that spans both legacy data holdings and future data collection, delivery is being accelerated. For example, by focusing on moving the algorithm to the data, not the data to the algorithm, data flows over networks are minimised. Coeus has also driven the British Army to define a universal data ontology up front and apply it broadly. This defines the rules and helps build data markets and not data silos.

SECURING CAPABILITY FOR CONFLICT

Just as the cloud is actually someone else's computer, artificial intelligence is not a disembodied entity, but the output of a mathematically defined physical electrical process. It is enabled by field programmable gate arrays and graphics processing units. These micro-electronics are what enables object recognition and the real time processing of targeting data. They are also a product of a complex manufacturing process. Because of the costs of entry to manufacture such complex components, the infrastructure has become hyper concentrated. One company in the Netherlands, for example, is the sole manufacturer of the machine tooling to build cutting edge chips, while the factories that manufacture them are in Taiwan and South Korea.

A force that depends upon advantage from these systems must be able to manufacture new munitions as existing stockpiles are expended. No country can afford a stockpile that will last for the duration of a major conflict and so initial stocks simply provide the time to ramp up production. But if the supply of the enabling electronics is fixed in states under blockade, then the availability of the relevant hardware may be disrupted to such an extent that the force must regress in its second echelon.

Put another way, you need PACE (primary, alternate, contingent and emergency) plans for your digital infrastructure, just as this is commonplace for the transport layer in warfare.

Another aspect of being safe to operate is understanding that the threat surface is a lot larger than critical data sets. Russia has been able to identify individuals linked to Ukraine's Special Services by targeting insurance databases and pension records. With the British Army setting up a Joint Special Operations capability, it must be considered that systems like Joint Personnel Administration, if penetrated, would provide the identities of all the personnel involved in these units. This could give away their movement to a theatre and thus provide an adversary with indicators and warnings. Being safe to operate requires mapping the threat from end to end and understanding that the targeting of data as preparation for conflict continues in peace time. The question is whether Defence as an enterprise is evaluating the assurance of its data in terms of its importance to itself, or its potential value to the enemy.

The significance of data as the foundation of how Defence can gain advantage is something that senior leaders have identified increasingly. But much of the associated discussion has remained ethereal. It is now critical that the discussion focuses on tangible requirements: obtaining data centres and assured supply chains, defining data value and standing up teams empowered to put data to use effectively. This can be captured as the need to drastically shift from an industrial to information age view of critical data assets as second only in importance to the people in Defence.

REALISING A RICHER BATTLEFIELD PICTURE: MODERNISING ISTAR

AUTHOR

Colonel Nat Haden, ISTAR Programme Director

IT is not controversial to state that in order to realise the ambitious vision set out in the Land Operating Concept the Army will require significantly more modern and effective Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) capabilities than it is currently equipped with. The necessity of a modern ISTAR system has been widely acknowledged for a number of years. The broad themes concerning the changing character of the land battlefield articulated in the Land Operating Concept – the find and fires revolution, the march of autonomy and growing digital, data and software dependence – are broadly the same drivers that led to the establishment of the Land ISTAR Programme in 2019.

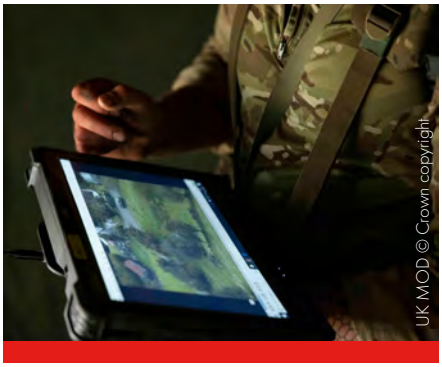
This requirement has been consistently reinforced by the ongoing conflict in Ukraine, which, combined with lessons learnt through experimentation and the wider adoption of technology in society, not only identifies the capabilities the Army requires, but also reinforces the importance of the ISTAR 'fight'. Although the prevalence and sophistication of sensors at every level arguably makes it more difficult for combatants to hide on the modern battlefield, the increase in sensor quantity and quality has been matched by a commensurate increase in counter-ISTAR and deception capabilities by our adversaries. Consequently, gaining the information required to target the enemy successfully at a time and place of our choosing will almost certainly require a series of deliberate integrated ISTAR operations designed to fight the Army's capabilities into an opponent's battlespace.

The Land ISTAR Programme is now starting to deliver equipment into the Army. The core capability being delivered is Zodiac, which will deliver the digital backbone across tactical and operational communication systems required to produce and maintain a digitised common intelligence picture. It will also provide the mechanism to link current and future battlefield sensors digitally to effectors and the processing ability to sift through the noise and use artificial intelligence and other analytical tools to bring critical information to commanders at the speed of relevance. The first instantiation of Zodiac is now in service with 3 (UK) Division and is being used to support ongoing exercises. It is due to be rolled out more widely in 2025 as an operational capability through Project Asgard.

Cross-domain integration of Zodiac will be delivered through Project McBride, which will bring information into the land environment from the other domains ensuring commanders have access to the most relevant information as fast as possible. It will also feed information from the land domain back into the joint environment. Working together Zodiac and McBride will give commanders during future land operations access to the rich intelligence

picture described in the *How We Fight 2026 Concept* paper and allow information generated in the land domain to be rapidly exported to defence, partners and allies.

In addition to the digital backbone the programme will deliver a number of modern sensor capabilities that can be digitally linked into the network. The first of these will be Project Tiquila, which is in the process of delivering a modern uncrewed aerial system (UAS) to support brigade level operations. The platform is due to reach its initial operating capacity in spring 2025. The project has been designed with a capability integration cycle that can support both the agile development of existing platforms and the acquisition of new technology without the requirement to set up a separate procurement process. This will ensure that future UAS platforms can be much more rapidly adapted to meet the developing operational requirement and critical advances in both friendly and enemy capabilities. The first iteration of this cycle has begun even before the first tranche of equipment has been delivered, seeking to integrate a next-generation Global Navigation Satellite System-resilience package onto Stalker, the larger of Tiquila's two platforms.



"The [Tiquila] project has been designed with a capability integration cycle that can support both the agile development of existing platforms and the acquisition of new technology without the requirement to set up a separate procurement process. This will ensure that future UAS platforms can be much more rapidly adapted to meet the developing operational requirement and critical advances in both friendly and enemy capabilities."

The programme will deliver a new 'Land Tactical Deep Find' capability that will replace Watchkeeper with a modern UAS system optimised to support the divisional and corps deep battle. Through Project Serpens the programme will also deliver a series of new networked battlefield sensors capable of detecting enemy artillery mortars and rocket fire. This will include a passive acoustic sensor that should replace the current capability when it enters service in the next few years, a new close find radar capability and a deep find radar that will eventually replace the in-service Taipan radar.

In addition to the sensors delivered through the programme the intent is to progressively link all relevant existing and future sensors into the network through Zodiac. This will include future electronic warfare, aviation, air defence and ground mounted reconnaissance sensors, subject to technical and resource considerations.

Although it will deliver a significant increase in technical capability, the equipment represents

only part of the system required for the Army to operate in the way envisioned through the Land Operating Concept. There will also be significant challenges in the generation of the doctrine, people, processes and training required to operate the 'system of systems' effectively.

For ISTAR capabilities to operate effectively they must be fully coordinated with electronic warfare, ground-based air defences and lethal and non-lethal effectors. To achieve this, there must be suitable doctrine and a training environment that allows the Army to practice and evolve the full integration of its sensors and effectors against a realistic enemy. The complexity of generating a realistic training environment that can replicate the volume and veracity of real-world data it aspires to be able to use on the future battlefield is difficult to underestimate and well beyond the capacity of current simulators or training exercises.

The agile development of systems requires consistent user investment to evolve the system effectively. This is not just about the desire of individuals to support the development process, but also the opportunity they have to do it. For example, outside of operations the only environment in which a divisional headquarters runs through the processes required to use the full range of its capabilities is on exercise. Consequently, although Zodiac has the ability to be updated on a daily basis, operators may only be in an environment where they understand and can validate how they want to evolve it for a few weeks each year.

Lessons from ongoing conflicts can be utilised to drive the development of equipment, but with evolutionary cycles that can be measured in weeks as potential adversaries also develop at pace, adaptations will quickly become obsolete bringing the cost effectiveness of matching an operational tempo of development into question. Evolving against lessons learnt in a simulated environment also carries significant risk as it will ultimately be attempting to compete with a computer programme rather than a live enemy.

The aspiration is to build seamless digital links from every sensor through the relevant decision maker to every effector. However, even with limitless resources, technical, procedural and security factors will limit the ability to do this. For example, the Army plans to operate with NATO by default, but national caveats on the releasability of intelligence will always mean that for full situational awareness it will need to maintain a national network that is separate to the one that links it to its allies. Although gateways can move data between these networks, it can only do so if the data is of the right classification, which much of it will not be.

Without updated doctrine and concepts for digitised ISTAR, and without a clear understanding of fighting digitised ISTAR in the land domain, there is an absence of qualifiable or quantifiable data. There is a risk of making bad decisions based on flawed assumptions as structures evolve to utilise these capabilities before their impact is fully understood. A good example of this is the assumption that greater digitisation will mean that fewer people will be required within organisations to deliver the effects that are required. If the intent is to operate in exactly the same way but to digitise existing processes this may be the case. However, to deliver the model envisioned through the Land Operating Concept the Army will need to be able to process data in a quantity and with a speed that is currently unachievable. It will also need to fully integrate all sensors and effectors to achieve maximum impact on a peer adversary, which will require the coordination of a complex systems of systems in a way and at a pace that has not been done before. This will not be achieved through a fully digitised system in the foreseeable future, if ever, but through human machine teaming at every level. Consequently, to deliver the functionality that the Army requires it may have to increase the number of people involved in some processes and reduce or change the location of people in others. It is not possible to predict this until the equipment is in-service.

The challenges listed above are significant and will need to be addressed if the Army is to fully modernise in the way that it intends. Because in many cases they are new there are no clear answers on how they should be solved. Consequently, the key to addressing them is to apply the same agile approach across all lines of operation from our organisational structures to our training that we are planning to do with our equipment. Our allies and partners are also addressing the same issues and so sharing information with them as they evolve will also be critical. This will ensure the Army can take full advantage of the significant enhancement in ISTAR capability that will be delivered in the coming years, and through it develop the system required to enable the Army to win battles in the land domain.

THE NECESSITY OF NETWORKS TO DIGITAL INNOVATION

AUTHOR

Colonel Pete Brunton is Assistant Head of the Land Environment Tactical Communications and Information Systems Programme.

THIS article will outline the current context of the most prevalent tactical network in Defence, highlighting how the technical debt built up within the in-service system is stifling our ability to innovate at the speed of relevance, and to achieve the Chief of the General Staff's direction to double lethality by 2027. It will also examine how investment in the network will not only allow for far more cost effective and speedier upgrades in the future, regaining and maintaining competitive advantage, but also have a positive effect on recruitment and retention. It will outline the findings of Project Iris and the principles that will guide the programme going forward, and allow us to avoid experimental fratricide, as well as touching upon some of the changes that will be necessary to institutionalise digital innovation across Defence.

CONTEXT

The current primary land environment command and control system is a suite of hardware and software elements, with the main constituent components being Bowman, the Common Battlefield Application Toolset (ComBAT), and the Infrastructure and Platform Battlefield Information System Application (P-BISA). Collectively, these elements are known as Bowman or BCIP (Bowman, ComBAT, Infrastructure and Applications).

The Bowman element integrates digital voice and data technology to provide secure radio, telephone, intercom and tactical internet services in a modular and fully integrated system, consisting of radios, tactical routers, control devices and cryptographic modules. ComBAT is the Battle Management Application, providing situational awareness, instant messaging, mission planning, logistics, intelligence and a geographical information system. Infrastructure consists of the displays, printers, servers and bulk transfer devices used in formation command posts. Finally, P-BISA is a version of ComBAT optimised to be used in the turrets and crew stations of complex armoured fighting vehicle platforms on ruggedised displays.

First entering service in 2003, the software and some hardware elements of the system have been periodically updated either through a major BCIP roll out or via more frequent, though lighter touch, capability updates (CU) comprising security patches, bug fixes and minor enhancements. The current iteration fielded in 2019 is known as BCIP 5.6, and the CU4+ is due to field in early 2025. The next significant update planned is known as BCIP 5.7, addressing operating system obsolescence, replacement of user data terminals and improved automated test equipment; this is due to field in 2027.

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BCIP is a Defence programme, used by all three Services in the land environment, and therefore its scale is significant. The capability is deployed across circa 17,000 land platforms, circa 130 naval vessels, circa 200 aircraft, and it is in continual use on deployed operations, as well as enabling virtually all land environment training activity. In addition, it has dependencies with most other Defence projects and programmes, either being incorporated into legacy and future platforms, or providing the digital backbone enabling the linking of sensors, effectors and command posts.

TECHNICAL DEBT

Though it remains a competent capability for combined arms manoeuvre, the relative age of the system and its design incorporates significant technical debt.[1] As well as the obsolescence and availability challenges expected in hardware elements that are in their third decade of use, both the peer threat electronic warfare environment and the way in which we wish to fight have changed significantly since Bowman first entered service.

To highlight how this technical debt manifests itself, consider a typical current operational use case. In order to achieve such requirements as low probability of intercept and low probability of detection against peer electronic warfare threats, increased dispersal of friendly force elements or command posts, greater data throughputs and ranges and increased native[2] interoperability with partners and allies, more modern waveforms are necessary. Suitable waveforms are available from multiple vendors, and are portable[3] across a variety of hardware platforms.

The Bowman series of radios, while very capable when they entered service, reflect the design philosophy and doctrine of that time. The waveform is a United Kingdom bespoke design, hardwired into the radio itself. Unlike modern radios, capable of running a library of software-defined waveforms in common use across NATO, the only way to change from the bespoke Bowman waveforms is to replace the radio hardware completely. Though theoretically possible, the current Bowman waveforms are not currently portable without significant investment to other hardware solutions, meaning that backwards compatibility in a mixed fleet will be challenging and therefore disproportionately expensive to achieve.

The challenge doesn't stop here. The Bowman family of radios are tightly coupled to the current in-service tactical router,[4] meaning a change of radio hardware also requires a consequential change of the router on all complex platforms. Furthermore, the current Bowman routing algorithm is tightly coupled to the in-service router, and all current in-service and about to deliver vehicle platforms have been optimised around the BCIP 5.6 space, weight and power envelope.

The potential impact of this is huge. The cost of replacing the necessary hardware in order to deploy a modern waveform for the scale of the Land Fleet Requirement runs into multiple billions of pounds, dwarfing the relatively minor cost of circa £120 million to purchase a Defence enterprise-wide license for the waveform itself.

However, once the necessary investment in hardware has been made to enable a software-defined force, the benefits the whole

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[1] *Technical debt is a concept in programming that reflects the extra work required when developers choose an easy short-term solution over the best long-term approach. Like financial debt, it incurs interest in the form of increased maintenance costs and complexity over time.*

[2] *Without gateways or guards such as the Land Deployed Gateway.*

[3] *A portable waveform can be deployed on multiple different hardware solutions, often from different vendors, in contrast to the Bowman waveforms which are hardwired into the radio equipment.*

[4] *The Bowman Network Adaptor Unit (BNAU).*

of Defence can realise are massive. First and foremost, competitive advantage in lethality against a peer opponent can be maintained with millions of pounds of investment in software rather than billions of pounds of hardware, and delivered into service in a timeframe measured in weeks and months, rather than years and decades.

Beyond the obvious cost, time and performance benefits of enabling a force defined in software rather than hardware, there are significant other virtues that can be unlocked; harnessing the innovation of our people and avoiding experimental fratricide.

POSITIVE IMPACTS OF RECRUITMENT AND RETENTION

We recruit some of the most imaginative, innovative and digitally aware officers and soldiers available in the UK career marketplace, who are then often both surprised and disappointed to find themselves working with command, control, communications, computers and intelligence equipment entering its third decade in service, mounted in armoured vehicles older than their grandparents.[5]

Not only does the age of the equipment stifle innovation, but so do the commercial relationships in place from our legacy contractual mechanisms. Frequently, significant aspects of our capability are proprietary to a single vendor, meaning that the system effectively operates as a black box; our people cannot either see or modify the inner workings of the system.

When our people are given the opportunity to work with more open systems, operating on defined standards they have the freedoms to manipulate and adapt, their innovation and imagination shines through. Examples include Project Eve with the Royal Marines Future Commando Force and Project Capstone Coherence 4 with the Experimental Training Group using the CAIN-X architecture intended for use by 16 Air Assault Brigade Combat Team.

In both cases vocational signallers and operational users found novel ways to employ and adapt the technology available to them, increasing lethality by finding new means of working and fighting, rather than being constrained by our existing technology. Arguably, both organisations have been able to achieve much more through 'learning by doing' in a relatively short timeframe measured in months, compared to the years' long concept and assessment phases traditionally associated with the current equipment programme.

For every increase in lethality, a commensurate boost to both recruiting[6] and retention[7] can also be realised, as our current and potential future soldiers and officers are enthused and excited about using current generation hardware and software, and having the opportunity to directly influence innovations and enhancements that enter service in the near rather than very long term.

EXPERIMENTAL FRATRICIDE

It is understandable that when commanders at all levels experience the relatively glacial pace of delivery within the core equipment programme, they seek alternative approaches to delivery capability and enhancements during the tenure of their appointment. Most often this is under the banner of experimentation; delivering at small scale, focusing on the equipment Defence Line of Development and often deliberately neglecting longer term support to focus on immediate delivery.

This approach also neatly side steps most of the complex and time-consuming scrutiny and approvals hurdles required when delivering at scale, while also allowing solutions to be deployed with security risk balance cases rather than going through the full secure by design process.

But experimentation is not without cost, direct and indirect. All forms of funding ultimately come from the same overall control total, and every pound spent on experimentation diverts money from the core equipment programme. This can foster innovation and acceleration, but also risks creating a doom loop; the equipment programme is slow to

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[5] *Though the FV436 was upgraded to the Mk3 standard around 2006, the original vehicle entered service in the 1960s.*

[6] *A study by the Royal Signals Workforce Plans team identified "availability of modern equipment" as the initiative likely to have the single most positive impact on inflow.*

[7] *A recent visit to a Royal Signals Regular Unit by the Chief of the General Staff Briefing Team highlighted criticism of "Defence's ability to procure and field equipment in an efficient and timely manner, particularly in the cyber and communications field".*

deliver, causing formations to seek to innovate themselves through experimentation money, multiple experiments denude the equipment programme of money causing further delays, encouraging formations to further lean on experimentation to deliver.

Despite this, we cannot understate the value of experimentation, and we must do everything we can not to stifle innovation from our outstanding people at all levels. Rather, we need to keep innovation and experimentation within exploitable arcs, avoid duplication and waste of resource, and always ensure that we have a viable path to inform and improve the equipment programme.

PROJECT IRIS

Over the last three years, comprehensive reviews of our requirements, relationships with industry, funding and approvals processes have taken place, in parallel with honest reflections on lessons identified and learning from experience over the course of the Land Environment Tactical Communications and Information Systems programme. This was known as Project Iris, co-sponsored by Director Information, Director Futures and the Land Environment Tactical Communications and Information Systems senior responsible owner.

Iris was informed by engagements with industry, key allies and partners across Government, NATO and wider, as well as being shaped by lessons from the conflict in Ukraine, the peer electronic warfare threats, current obsolescence and availability challenges for in-service systems and the Land Operating Concept. Iris part one framed the problems that we face with our traditional requirement setting, acquisition strategies and relationships with industry, while part two sought to outline practical principles and approaches to deliver more effectively in the future.

The findings and recommendations of project Iris have been endorsed by both the Land and Joint Requirements Oversight Committees and will guide our next steps. The next sections will expand on four of the key principles; one size doesn't fit all, incremental and iterative delivery, security by function, and a standards-based approach.

ONCE SIZE DOESN'T FIT ALL

BCIP fundamentally provides the same hardware and software solution to every user, regardless of function, role or specialisation. This approach led to expensive requirements, such as the need to operate in a saltwater or Arctic environment, being incorporated into all aspects of the solution, despite only being essential for Royal Marines users.

Different formations and users operate in different threat environments and conduct different functions. While there are advantages to having some common standards and toolsets, to achieve economies of scale or simplify training, it is neither broadly beneficial nor financially sensible to continue to deploy a monolithic system. Instead, the hardware and software releases for each formation and role can be tailored and iterated according to their needs. Interoperability can be maintained through the adoption and enforcement of common standards, such as waveforms, rather than every user having a radio purchased from the same vendor.

INCREMENTAL AND ITERATIVE

The transition from current capability to future command, control, communications, computers and intelligence in one

"BCIP fundamentally provides the same hardware and software solution to every user, regardless of function, role or specialisation. This approach led to expensive requirements, such as the need to operate in a saltwater or Arctic environment, being incorporated into all aspects of the solution, despite only being essential for Royal Marines users."

comprehensive solution and fielding plan is not achievable. Allied partners have taken a staged approach to conversion, all beginning with light forces first. This approach will provide the quickest route to prove technology, adapt doctrine and learn quickly with the least complexity and demonstrate the role that command, control, communications, computers and intelligence transformation can deliver to the Chief of the General Staff's intent. We will adopt a formation-by-formation approach, beginning with 16 Air Assault Brigade Combat Team, then step through our other light force formations. Project Cain is the first phase of this approach and will leverage existing Ministry of Defence intellectual property developed by the Commando Force. These transformations will include personnel, platforms and command posts to enable the transition to future command, control, communications, computers and intelligence capability at pace. The development of suitable solutions for armoured formations will be conducted concurrently and delivered at the latter end of Bowman service, hence the continued need for Bowman investment. Once converted to future command, control, communications, computers and intelligence, the design will be iteratively developed with our industry partners to maintain persistent relevance.

SECURITY BY FUNCTION

The UK is an outlier within NATO by operating at UK Secret across all tactical echelons. This creates increased challenges with interoperability and drives an element of increased cost into the equipment programme. Future solutions will pivot to operating predominantly at Official Sensitive, known as Secure But Unclassified in the US Army, utilising AES-256 commercial cryptography at battlegroup and below. Planning at brigade and above will most likely remain at Secret Releasable, as well as specialist functions at lower tactical echelons. New gateways will be delivered to enable appropriate information exchange between security domains.

STANDARDS BASED

By adopting common standards for waveforms, data types and cryptography interoperability within the force can be maintained without having to purchase common hardware for all users. For example, the vast majority of modern tactical waveforms are portable across the hardware available from multiple vendors. Not only does this enable the incremental and iterative approach outlined above, it allows the majority of hardware purchases to become off the shelf commodity items, rather than bespoke 'UK specials'. This allows for greater competition, increasing value for the taxpayer, and reduced logistic support costs shared across a much wider user base beyond the UK alone.

> **"We will need to adjust our risk appetite; the solution will not always work first time... The alternative is to remain locked into multi-decade, multi-billion pound equipment replacement projects."**

Overseen by the newly appointed Chief Technology Officer, the Information Design Authority is at the heart of digital transformation and the move to 'digital by default'. The Army's success is dependent on delivering coherent, integrated, flexible and resilient capabilities and it is digital and data that binds these together. The Information Design Authority acts as the 'Digital Sheriff' directing and arbitrating over the standards, patterns and protocols chosen and employed by the Army. It will work closely with the single Services and Defence Digital to ensure our digital investments align with strategy and best practice.

SUPPORTING CHANGES REQUIRED

In order to successfully deliver the next generation of tactical communications and information services effectively, some broader cultural changes will be required across the enterprise, focused on risk appetite, finance and governance.

Defence has often fallen foul of trying to deliver too much change within a single bound of a digital programme. For example, the jump from Clansman, a voice-centric, largely insecure analogue radio system to Bowman, a digital, data-centric, secret by default system with automatic position reporting and battle management applications. The transition was far from smooth and caused reputational damage with the user community that persists today.

Instead, we should focus on getting the minimum deployable product into the hands of the users much more quickly, then iterating forward to work up from the 60 to 80 per cent 'good enough' solution towards the complete solution. Not only is this much faster and cheaper, it is far more likely to deliver a user-focused solution more appropriate to their needs.

We will need to adjust our risk appetite to enable this; the solution will not always work first time, and we may have to roll back to previous iterations on occasion. The alternative is to remain locked into multi-decade, multi-billion pound equipment replacement projects.

Similar changes will be required in the financial control process. Though the incremental approach has the potential to smooth off annualised budgets, meaning fewer huge spikes in capital expenditure as whole fleets of systems approach out of service dates, sustaining iteration of the solutions once in service will also require significant investment. The scrutiny community will need to trust that, even though the full technical solution won't be known when approval is sought, the adoption and enforcement of standards will be able to deliver both coherence and value for money for the taxpayer.

Finally, our governance processes will need to adapt to bring users much closer into the decisions around performance, cost and time, rather than highly detailed user and system requirements documents written years ago delivering decades into the future. A much more collaborative relationship with multiple partners across industry is also needed, rather than the monolithic prime contracts that have been the default in the past.

CONCLUSIONS

BCIP, though still an extremely capable system, has built up significant technical debt over the three decades of its service life and, in its current guise, can't be adapted at the pace of relevance to counter emerging threats and increase lethality. Investment in a more modern digital network, underpinned by defined standards and in collaboration with industry partners, will allow us to double lethality by 2027, and triple it by 2030.

Though the initial investment required for next generation hardware is significant, the subsequent maintenance of competitive advantage can be achieved with relatively small spends on software components, delivered in weeks and months rather than decades, and have a positive impact on recruitment and retention.

Project Iris, endorsed by both the Land and Joint Requirements Oversight Committees in 2024, outlines the incremental and iterative approach for the future, underpinned by the adoption and enforcement of common standards across the land environment under the new Information Design Authority. To ensure success an element of cultural change is necessary across the enterprise, adjusting our risk appetite, governance and financial processes to embrace minimum deployable products that are further iterated and improved once in service.

ATTACK OF THE DRONES: LESSONS FROM UKRAINE

AUTHOR

Illya Sekirin is a Ukrainian volunteer UAS pilot who has flown drone combat missions in the Kharkiv and Kherson regions of Ukraine. He holds a degree in cybernetics and also works as an interpreter for English-speaking volunteer units operating in Ukraine, and on translation assignments for the Ukrainian General Staff.

"The battlefield is a scene of constant chaos. The winner will be the one who controls that chaos, both his own and the enemy's."
– Napoleon Bonaparte

THROUGHOUT military history, opposing armed forces have strived to gain a competitive edge by finding and then successfully exploiting a technological advantage. The Macedonian phalanx, the Mongol mounted archers, the English longbow – these innovations allowed the nations that possessed them to dominate the wars of their time.

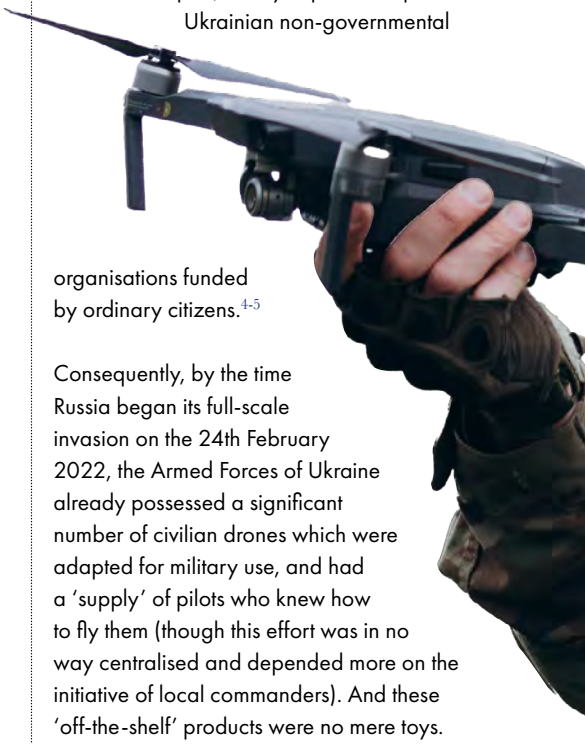
The invention of a military technology in itself is not sufficient, however; its perfection and adaptation at tactical, operational and strategic levels are what matter. A good case in point is the tank. Invented during World War I and used primarily in an infantry support role with modest results, it became the primary weapon of the Blitzkrieg only after the Germans finessed its design and created large mechanised formations capable of deep offensive operations, and adapted their doctrine and logistics accordingly.[1]

The drone is the new tank. While invented some time ago, it continues to evolve technologically and is ubiquitous on the battlefields of Ukraine. As the former Commander-in-Chief of the Armed Forces of Ukraine, General Valerii Zaluzhnyi, put it "we see everything the enemy is doing and they see everything we are doing".[2] The proliferation in the use of unmanned aircraft systems (UASs) and the 'transparency' afforded by them has made amassing sufficient artillery, infantry and armoured forces to breach frontline fortifications problematic and indirectly led to attritional warfare and significant strategic challenges for future war conduct. So how did all of this come about?

THE QUIET REVOLUTION: FROM CONSUMER PRODUCTS TO KILLER WEAPONS

The crossover of technologies from civilian to military use, and vice versa, is common. Take for example, the internal combustion engine, which was realised on civvy street but made the development of tanks possible.[3] Drones have followed in their forebears proverbial tracks in this respect. Since Russia's annexation of the Crimea in 2014 and the resulting war in Donbas, the chronically underfunded Ukrainian military has depended heavily on private donations for many of its supplies, including medicine, winter clothes, food, tents, transportation vehicles and... civilian, mainly multirotor-style, drones.

Over time those in uniform found new ways of using the latter for intelligence, surveillance, target acquisition and reconnaissance; artillery fire correction; and battle damage assessment purposes. Locally made fixed-wing UASs were also developed, mostly in partnership with Ukrainian non-governmental organisations funded by ordinary citizens.[4-5]



Consequently, by the time Russia began its full-scale invasion on the 24th February 2022, the Armed Forces of Ukraine already possessed a significant number of civilian drones which were adapted for military use, and had a 'supply' of pilots who knew how to fly them (though this effort was in no way centralised and depended more on the initiative of local commanders). And these 'off-the-shelf' products were no mere toys. Indeed, such has been the rate of evolution of consumer drones that their technical specifications,[6] particularly in terms of quality of video feed and low radar cross-section, exceed those of many military-only UASs. In practical terms, the consumer drone could get much closer to the enemy and provide a more detailed look at what he's doing than conventional sensors would allow.

More specifically, the widely available DJI Mavic 3 (which would be classified as a Group 1 UAS according to US military standards)[7] is one of the most popular capabilities being used in the Russia-Ukraine war.[8] As the author of this article can testify having piloted the drone over the battlefields, the Mavic offers excellent video feed transmission despite

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[1] *Heinz Guderian, Panzer Leader (Da Capo Press, 2002), 39-46.*

[2] *Valery Zaluzhny, "Ukraine's Commander-in-Chief on the Breakthrough He Needs to Beat Russia," The Economist, 1 November 2023, accessed 1 January 2024.*

[3] *B.J.G. van der Kooij, The Invention of the Internal Combustion Engine (2021).*

[4] *National Hero of Ukraine: Army SOS (in Ukrainian), accessed 1 January 2024.*

[5] *Come Back Alive: About the Foundation, accessed 1 January 2024.*

[6] *DJI: DJI Mavic 3: Specs, accessed 1 January 2024.*

[7] *Army Techniques Publication (ATP) 3-01.81, Counter-Unmanned Aircraft Systems Techniques (Washington, DC: U.S. Government Publishing Office [GPO], August 2023), para. 1-4, table 1-1.*

[8] *Paul Mozur and Valerie Hopkins, "Ukraine's War of Drones Runs Into an Obstacle: China," New York Times, 30 September 2023, accessed 1 January 2024.*

measuring in at just 347.5 by 283mm[9] and being ten times smaller than the Orlan-10[10] – Russia's main reconnaissance drone. It also boasts a significantly lower sound profile than its combustion engine propelled Russian counterpart thanks to being battery powered. Perhaps as importantly when comparing capabilities, the DJI Mavic 3 will set you back a relatively paltry $2,000 on Amazon[11], compared with a price tag of between $87,000 and $120,000 for an Orlan.[12]

CONSUMER DRONES ADD ATTACK CAPABILITIES

Soon after Russia's full-scale invasion, Ukrainian pioneers began adding bomb dropping capabilities to their multirotor drones – attaching anti-personnel fragmentation ammunition, most often 30mm VOG-17s or, preferably, 40mm M430A1 grenades[13] with 3D-printed tailfins added to them for improved accuracy.[14] Given the relatively small kinetic impact of these explosives, their use was generally limited to attacking small groups of enemy soldiers[15] or detonating and destroying small ammunition depots near the frontlines,[16] rather than targeting the enemy's armoured assets.

However, as the hostilities evolved, so too did the striking power of Ukraine's aerial threat thanks to the employment of first-person view (FPV) drones as kamikaze weapons.[17] Adapting either off-the-shelf drones or, more often, UASs assembled in Ukraine from consumer-rated parts, these FPVs were equipped with RPG-7 rounds for armoured targets and 82mm mortar[18] or thermobaric rounds for dugouts and trenches.[19] With significantly more explosive power than fragmentation grenades, FPV drones were able to attack tanks, armoured vehicles and

[9] *Ibid.*

[10] *Airforce Technology: Orlan-10 Uncrewed Aerial Vehicle (UAV), accessed 1 January 2024.*

[11] *Amazon: DJI Mavic 3, accessed 1 January 2024.*

[12] *RUSI: The Orlan Complex, accessed 1 January 2024.*

[13] *Mykhailo Zhyrokhov, "Drones of the Frontline: Strategic and Civilian Drones in Action," Mind, 11 April 2023, accessed 1 January 2024.*

[14] *"How Ukrainians Modify Civilian Drones for Military Use," The Economist, 8 May 2023.*

[15] *"Ukrainian Drones Drop Bombs on Russian Frontline Soldiers," The Sun, 12 Nov 2022.*

[16] *"Ammunition Depot Disguised as a Garbage Dump Is Completely Destroyed," United24, 18 May 2023.*

[17] *"Defense Intelligence Purchases 1000 FPV Kamikaze Drones," Militarnyi, 20 January 2023.*

[18] *Ibid.*

[19] *"Pilots of the 'Adam' Group Told How FPV Drones Work at the Front and Described Their Needs" (in Ukrainian), TSN, 1 November 2023.*

fortified battle positions as far as 22 kilometres away, leading to some Russian commanders imposing a 10 kilometre no-tank zone behind the front.[20] FPV drones (also known as loitering munitions) have become so effective that they, at a cost of around $350 to $450 per asset,[21] can now be described as the Ukrainian army's principal anti-tank weapon.[22]

BEYOND CONSUMER DRONES

The Armed Forces of Ukraine's drone arsenal also includes an array of longer-range fixed-wing UASs (Leleka-100s, Furias, Skifs, Valkyrjas and Sharks) that provide a range of up to 40-200 kilometres and can be used in conjunction with US-donated M142 HIMARS.[23] These UASs are often developed and paid for by non-governmental organisations,[24] as the military procurement process can be extremely bureaucratic and slow.[25] As a result, only a very limited number of longer-range military-grade drones reach the frontlines. The author of this article only once witnessed the deployment of a Leleka-100 in his area of operations in the Kharkiv region, and it was shot down on its first mission, most likely by a Russian Tor surface-to-air missile system.

"First-person view drones (also known as loitering munitions) have become so effective that they, at a cost of around $350 to $450 per asset,can now be described as the Ukrainian army's principal anti-tank weapon."

An even larger and more powerful UAS that was prominent at the beginning of the war – the Turkish-made Bayraktar TB2 – found its use significantly curtailed as it became evident that it was vulnerable to Russia's surface-to-air missiles.[26] According to Oryx, an independent defence analysis website, at least 24 Ukrainian TB2s have been destroyed thus far.[27] Summarising the Bayraktar's effectiveness, Volodymyr Valiukh, a Ukrainian colonel, said: "For the TB2, I don't want to use the word useless, but it is hard to find situations where to use them."[28]

COUNTER-UNMANNED AIRCRAFT SYSTEMS

History tells us that as soon as humans develop an attacking weapon, they also discover the means to combat it. And so it goes with UASs in the form of counter-unmanned aircraft systems (C-UASs).

The Ukrainian army uses the same defensive C-UAS activities as recommended by the US Army for its forces. These include passive (camouflage and concealment, deception, dispersion, displacement, and hardening and protective construction)[29] and active methods, chief among the latter being electromagnetic warfare (radio frequency jamming, GPS jamming/spoofing) and high-volume machine gun fire.[30]

Like the Russians (who have a separate branch of their armed forces for electromagnetic warfare),[31] the Ukrainians put a special emphasis on electromagnetic warfare.[32] Particularly craved-for among frontline troops are so-called 'anti-drone guns' or hand-held C-UAS jamming devices that bring down enemy drones by blocking their satellite navigation and communication systems using electromagnetic waves.[33] The most popular models are the Lithuanian-made Skywiper Electronic Drone Mitigation 4 System[34]and Ukrainian-produced KVSG-6.[35]

RADICAL THINKING REQUIRED

If the reader accepts the arguments presented in this article that UASs are a game changer of 21st century warfare, then militaries need to consider a complete overhaul of their doctrine, organisational structures, tactics, strategy and logistics. While distributing sufficient quantities of modern UASs and C-UAS systems to lower-echelon army units is absolutely essential, the full potential of the drone is best realised through the formation of a new separate branch, just as tanks were organised into the Armored Force in the US Army in 1940.[36]

The creation of a force of UAS and electromagnetic warfare systems is, therefore, a sensible next step for militaries. In addition to drones, the force would need to be augmented by support units (engineers, drone-coordinated mobile artillery, etc.) to enable it to locate and destroy enemy forces through massed UAS offensive actions; conduct anti-access/area denial activities against enemy UASs; and work in close cooperation with army aviation, infantry, armour and artillery units (combined arms operations).

The kinetic action of the force would primarily be executed by large 'mosquito' fleets of small UASs, and – if enemy air and missile defences permitted – larger UASs directed by intelligence, surveillance, target acquisition and reconnaissance and battle damage assessment drones. These 'command' drones, aided by signal retransmission UASs to counter enemy electromagnetic warfare activities, would orchestrate attacks by large volumes of munitions-dropping UASs and kamikaze drones, with the help of specialised, yet-to-be-designed software based on artificial intelligence algorithms. In the absence of such technology, massed attacks would require remote human piloting.

In addition to organic kinetic action, drone attacks would be supported by UAS-directed artillery fires, or – if gaining control of terrain is the objective – used to help coordinate ground assault forces in real time. Enemy electromagnetic warfare and other C-UAS systems would need to be suppressed with specifically-designed drones and other

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[20] *"Trenches and Tech on Ukraine's Southern Front," The Economist, 29 October 2023, accessed 1 January 2024.*

[21] *Sebastien Roblin, "Drones on the Front Line for Ukraine's Counteroffensive," Inside Unmanned Systems, 19 October 2023, accessed 1 January 2024.*

[22] *Alex Horton and Serhii Korolchuk, "In Ukraine, Explosive DIY Drones Give an Intimate View of Killing", The Washington Post, 4 October 2023.*

[23] *"Ukrainian Intelligence Receives Two Shark Drones," The New Voice of Ukraine, 22 June 2023.*

[24] *"Come Back Alive Signed a Contract for the Purchase of 25 Leleka-100 UAV Complexes for the Needs of the Armed Forces of Ukraine," Come Back Alive, 2 May 2022.*

[25] *"A Gift for Putin. How During the War the State Interferes with the Production of Drones" (in Ukrainian), Ekonomichna Pravda, 22 March 2023.*

[26] *Ellie Cook, "Why Ukraine's Once-Feared Bayraktar Drones Are Becoming Obsolete", Newsweek, 2 November 2023.*

[27] *Oryx: List Of Aircraft Losses During The Russian Invasion Of Ukraine, 20 March 2022.*

[28-30] *Ibid.*

[31] *Ministry of Defence of the Russian Federation: Directorate of the Chief of Electronic Warfare Troops of the Armed Forces of the Russian Federation.*

[32] *Valerii Zaluzhnyi, "Modern Positional Warfare and How to Win in It," The Economist, 1 Nov 2023.*

[33] *Tanmay Kadam, "SkyWiper – Ukraine Flaunts Its Futuristic Counter-Drone Rifle That Can Identify, Track & Disrupt Enemy UAVs," The Eurasian Times, 13 April 2022.*

[34] *Ashish Dangwal, "Ukraine Deploys Thousands of Lithuanian C-UAS Jamming Devices To Counter Russian Drones," 22 September 2023, accessed 1 January 2024.*

[35] *Vsevolod Nekrasov, "They "Land" 99% of Drones: the Story of the Creation of the Ukrainian Anti-Drone Gun" (In Ukrainian), Ekonomichna Pravda, 8 June 2022.*

[36] *Edward J. O'Shaughnessy, Jr, Evolution of the Armored Force, 1920-1940 (Carlisle, PA: U.S. Army War College, 1993).*

special operations to gain UAS superiority over the battlefield.

A precursor of things to come, and a testimony that drone attacks are not the preserve of *Star Wars*-inspired fiction, are massed attacks of FPV drones, which – albeit in an unsystematic fashion – have featured in the Russia-Ukraine war. In one instance, a group of four Russian soldiers, with the help of eight attacking FPV drones, stormed a fortified Ukrainian position held by 13 personnel. Solely as a result of FPV kinetic strikes, the position was captured by the Russians without loss, while seven Ukrainians were killed in action.[37]

OPERATIONAL CONSIDERATIONS AND THE STRATEGIC PERSPECTIVE

While focused on the tactical level, the proposed UAS and electromagnetic warfare force would effect positive change at both the operational and strategic levels.

At the operational level, the ability to see what the enemy is doing (and vice versa) in conflicts with a near-peer adversary makes it very costly to use concentrations of armour and artillery for offensive or defensive actions. This necessitates dispersal and camouflage of visible assets such as tanks, armoured vehicles and artillery pieces. Breakthroughs with large mechanised formations are becoming a thing of the past and static warfare, like the positional stalemate in Ukraine, appears to be the new norm. As a result, the role of the UAS and electromagnetic warfare branch would be particularly useful in breaching enemy fortified positions through the use of massed offensive actions. Such a force could be used, in a combined arms operation, to breach enemy defensive lines (perhaps protected by extensive minefields as is frequently the case in the Russia-Ukraine war) by employing, for example, 40,000 drones that would attack in waves to destroy enemy forces in a frontline area 10 kilometres wide and 20 kilometres deep, with a resulting drone attack density of 200 UASs per square kilometre. This drone attack would simultaneously provide accurate covering fire to friendly mine-clearing vehicles and advancing mechanised infantry units tasked with capturing the area. Through the resulting breach of the frontline, conventional manoeuvre forces could then enter to gain the operational initiative. Rough calculations indicate that such a massed UAS attack is perfectly feasible. If the price of an average attack drone is presumed to be $500, 40,000 drones would cost $20 million, which is roughly equivalent to the price of just two M1 Abrams tanks.[38] 40,000 UASs would also constitute only 0.8 per cent of worldwide consumer drone shipments (five million units were shipped in 2020[39]), suggesting that production and supply issues would not be an issue.

At the national-strategic level, in a confrontation with an authoritarian adversary like Russia or China (capable of manning large conventional armies with a high tolerance of personnel losses), a well-functioning UAS and electromagnetic warfare force would provide the advantage of being able to inflict substantial casualties on the enemy while exposing friendly forces to minimal risk. Furthermore, UASs can be designed to function in chemical, biological, radiological and nuclear-contaminated environments, which could pose as a deterrent to an enemy using such weapons.

PROCUREMENT OF SYSTEMS

Because drones are weapons systems experiencing dramatic technological progress, a special procurement framework would also need to be established to:

- Expedite design and development cycles to provide cost-effective military-grade UASs and C-UASs;
- Provide a flexible and supply-shock-resilient production system with large scalability potential. Like any new military technology, UAS teething problems could emerge, so an efficient feedback loop between industry and Service personnel needs to be established.

For drones to be a true source of relative advantage, militaries must evolve to maximise the potential of warfare's new 'tank'. The approaches outlined in this article are the author's attempt to table an outside-the-box solution. They were designed with the Armed Forces of Ukraine in mind but are equally applicable to the British Army or any other military that wants to be relevant in the dawning era of the drones.

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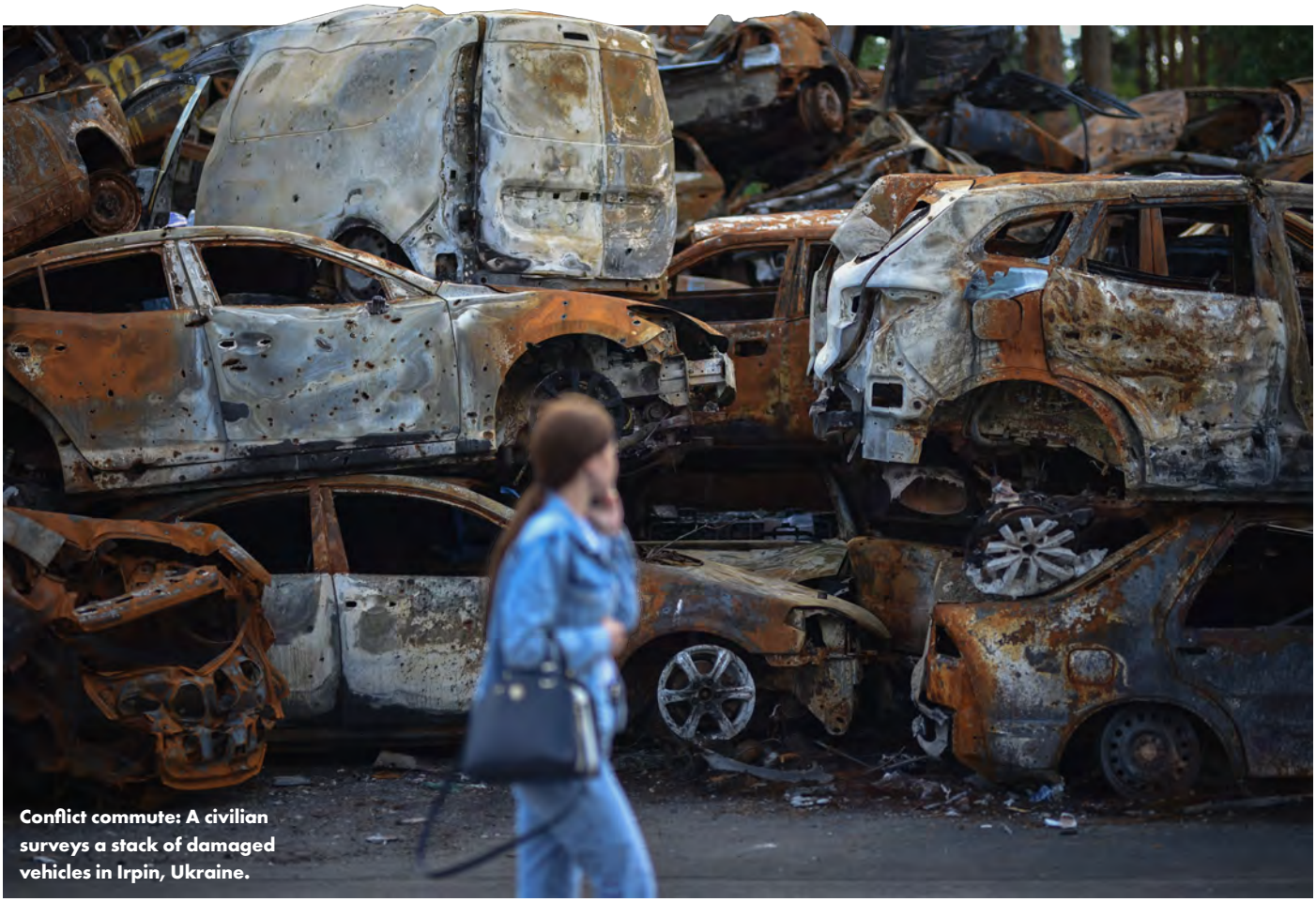
[37] *"A New Practice of Using FPV Drones by the Enemy During Assaults on the Example of the Priyutny District" (in Ukrainian), Deep State, 6 November 2023.*

[38] *Tara Copp and Lolita Baldor, "What Are M1 Abrams Tanks and How Will They Help Ukraine?" NBC Washington, 26 January 2023.*

[39] *Statista: Consumer Drone Unit Shipments Worldwide from 2020 to 2030, 13 April 2022.*



Conflict commute: A civilian surveys a stack of damaged vehicles in Irpin, Ukraine.

CIVILIAN DEFENCE? YOU NEED AN APP FOR THAT

AUTHOR

John Gordon Sennett is a US citizen who served in the US Army Reserves and Marine Corps and has been living in Kyiv since 2020. Alongside his wife, Natasha, he is co-author of *Accidental Ukrainians – The Battle of Kyiv and Beyond*.

AS was the experience for so many across Ukraine, for the Sennett household the 24th February 2022 began to a soundtrack of dull thuds. And, given the preceding weeks' disturbing drumbeat of media organisations reporting the build-up of Russian forces on the border, we quickly discerned our morning alarm call was not thunder. The noise from our Embassy was also loud and clear – they wanted us to leave immediately – but seeing the lines of traffic and caring for a dog with stage four cancer, we decided to wait it out. This article addresses how, in light of our decision to remain in Ukraine, we kept abreast of troop movements and incoming missile and drone attacks, and is intended to provide an insight as to how militaries can keep non-combatants informed in future conflicts and, in turn, reduce civilian casualties.

Our primary source of information in the first few days of Russia's full-scale invasion was major news outlets, which meant that details of troop movements, air assaults and other actions did not reach us until 24-48 hours after the event. In short, too late to be of meaningful use. We were, however, aware that the situation at the borders was deteriorating and that our transportation options were becoming severely limited. Kyiv's main train station was packed with people, pets and baggage. There were strict curfews in place, fighting was active within 20 kilometres of the city and, at one point, Russian military vehicles entered the Obolon District and were making their way toward the capital's administrative centre.

Overall, things did not look good, but we did not feel our predicament was as yet desperate. We had sufficient food to last three-to-four weeks, enough water for seven days and knew the location of a water station should we need more.

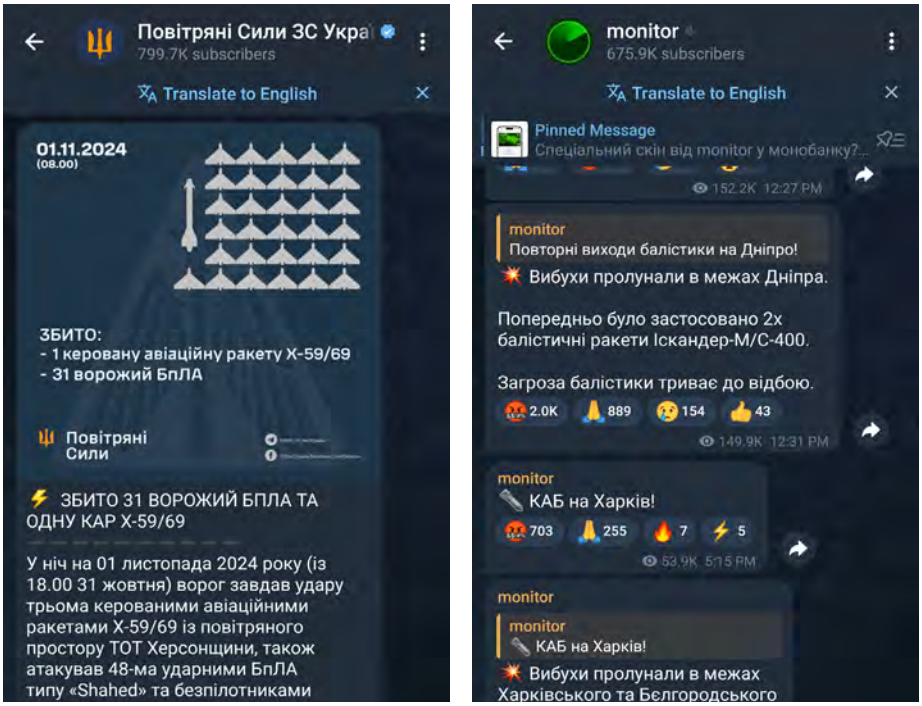
It also helped that my wife was fluent in English, Russian and Belarusian and – at that time – had a basic knowledge of Ukrainian. She received a tip about various Telegram channels that were becoming active and providing real-time information. Using a feature on my phone to translate updates

on the social media and instant messaging app, I dug deeper, cross referencing posts to ascertain how consistent the information was and eliminating those channels that were unreliable or did not provide the detail desired.

By day ten of the invasion, we were barely checking the majority of the mainstream foreign media. Our focus was on appraising the tactical situation and – having tried to sign up for Ukraine's Territorial Defense Forces on the 27th February only to be told they were out of weapons – surviving. Given our respective backgrounds, we were perhaps better equipped to do these things than the average non-combatant. Natasha is the daughter of a former Soviet officer and consequently grew up in a military household and I have served as both a US Army reservist and, briefly, full-time Marine. While such a background does not ensure an individual's wellbeing, it can make you more adept at facing some of the realities of war. Reflecting on this point and noting that conflict looks as though it will be a feature of the European continent for some time to come, it would be wise for nations to explore the merits of civil defence training initiatives. This may dent security budgets, but should the worst happen, non-combatants would be far better prepared to endure and support a war effort and better attuned to assessing threat levels.

Experience and intuition are, however, no substitute for reliable, real-time tactical information on which civilians can make decisions. Such sources became harder to 'hear' amidst the noise of disinformation and misinformation which quickly propagated on Telegram as the weeks passed. It was clear that a number of channels were started and controlled by Russians, but the picture was also skewed by accounts vying for popularity (in a bid to secure revenue or potential future income streams). Sensationalism was particularly rife during the battle of Kyiv (25th February - 2nd April, 2022). There were few 'official' government channels to review to begin with, but these did come later and have proved helpful in that many are focused on events pertinent to particular neighbourhoods. Similarly, Ukrainian military accounts were developed to warn of incoming air strikes.

The full-scale invasion of Ukraine has underlined the reach of social media as a force for good but also highlighted how susceptible it is to manipulation. Telegram has become its own battleground and is used by both Russia and Ukraine as a tool of influence and means of sharing propaganda. There are certainly lessons to be learnt for militaries as to how best to communicate with non-combatant



Social support: The screenshots above are from the author's phone and show the official Telegram channel of the Ukrainian Air Force (left) and the War_Monitor account, which tracks drones, missiles and glide bombs and details where they have struck or been shot down.

populations to (for those wishing to adhere to the rules of the Geneva Convention) reduce civilian casualties.

Technology's march and around-the-clock connectivity mean civil defence now encompasses so much more than it did historically. It is also nuanced with different approaches required for those fighting on home soil and expeditionary forces operating in enemy territory. Civil defence communication is perhaps easier to conduct when the infrastructure is your own but is no less prone to interference, while militaries acting beyond their own borders must exercise extreme caution to ensure friendly forces are not put at any unnecessary risk. Both situations require careful coordination but a common challenge for armed forces is determining how much information to give, to who and when. Sharing too much publicly can reduce the potential tactical gains of a military engaged in positional warfare (as was arguably the case during the Ukrainian counter-offensive in 2023), whilst too little can create a vacuum for unregulated channels to exploit and provide the enemy with the ability to disrupt operations and place non-combatants in harm's way.

A blueprint for future good practice would see militaries and intelligence and national defence agencies signposting trustworthy sources of information to non-combatants and measures put in place to prevent those channels from being infiltrated. Civil defence communication coordinators and disseminators – vetted and trained in advance for utilisation – should also be considered. Noting that any information disseminated through current capabilities can be assumed to leak, opportunities afforded by advances in artificial intelligence need to be tracked for possible adoption. The ability to limit, refine and tailor messaging for predetermined audiences is a probable next chapter.

In the present, cyber warfare already demands a whole new field of development for force readiness. NATO nations should now be fine-tuning policies, practices and training for information dissemination. Official channels should be being developed and tested, and consideration given to developing bespoke apps for release in the event of hostilities.

For non-combatants, knowledge can be akin to survival, so a balance needs to be struck between safeguarding civilian populations and giving away the proverbial farm. The challenge is significant, but Ukraine has demonstrated along several stretches of its frontlines that, even in the information age, 'radio silence' can be adhered to and used to deliver that all-important element of surprise on the battlefield without compromising the safety of non-combatants.

Tactical information for decision-making has always been a commodity in conflict but modern connectivity means there are many more consumers to consider, and if war does come to villages, towns and cities, civilian audiences cannot be an afterthought.

AUTHOR

Major Tim Hearne has previously been posted to the Infantry Battle School as a platoon commanders' instructor and, more recently, as the Chief instructor. He is now the Chief of Staff of 7th Light Mechanised Brigade Combat Team.

"We don't rise to the level of our expectations; we fall to the level of our training."
– Archilochus, Greek poet and soldier

THE Infantry Battle School (IBS) in Brecon is well established in the minds of many in the British Army having been intrinsically linked to the last 80 years of development and operations. However, in a period of history which again sees the strategic focus shifting to warfighting at scale on land – defined and directed by Op Mobilise, How We Fight 2026 and the Chief of the General Staff's call to accelerate modernisation – the IBS' role in the future should not be assumed. This is especially important as the Field Army seeks to modernise and operationalise through the Land Training System (LTS), with training remaining the key deciding factor for combat for a professional force.[1]

The author will argue that the Battle School is a concept, not just an organisation, and that this concept is the centre of future training for the British Army. This concept is relevant to training an army for large scale warfare, moving away from the post campaigning period and can be the solution to training the next generation for combined arms manoeuvre. It is also fundamental to the LTS as it lays the foundation to credible and standardised warfighting skills across the Field Army. The concept will also allow quick and broad changes to be made and ensure new doctrine and capabilities can be taught quickly – a model that is likely to be needed by forces committed to any campaign.

The IBS has recently undergone an 'optimisation' change plan, which followed on from the pre-Covid 'IBS 2020' concept.[2] Both programmes aimed to transition from the Op Entirety campaigning model and refine and operationalise infantry trade training towards warfighting. For IBS in 2024, this was done through contemporary modules and integrating all battle courses for a final exercise (Combined Warrior), which offered a foundation for pan Land Warfare Centre growth. Also, there was an effort to increase combined arms understanding at the earliest phases for junior commanders that was put into practice by integrating capabilities during a field exercise. These approaches are simple but nested in the Battle School concept: realistic and adaptable standardised warfighting modules and a demanding operational-focused final exercise which delivers professional dismounted close combat capability ready to return to the Field Army. Such a model also delivers commanders that understand how to integrate capabilities on the modern battlefield.

THE BATTLE SCHOOL IN HISTORY

To offer some context to both the concept and organisation of the Battle School, there is a series of events that must be understood. First,

[1] *King, Anthony. The Combat Soldier. (Oxford University Press, 2013).*

the last three months of the First World War have long been regarded as the high point of the British Army's warfighting proficiency. The period saw the Service evolve from a small professional force, undergo mass recruitment and conscription, learn lessons from the war's mid-point and use modern tactics and technology to win on the Western Front.[3] The first battle school was set up in the rear areas in the last few weeks of the war in 1918.[4]

What followed was a hiatus in military evolution as a consequence of demobilisation and underfunding as the land force returned to imperial garrison duties. This theme feels familiar today and there are comparisons with the interwar period and the situation in Europe following Russia's invasion of Ukraine. It was the period after the British Army's evacuation from Dunkirk that the first battle school concept and requirement was established in a significant way. There is also an enduring theme of defining the infantry's role in the modern combined arms battle. The early iteration of the battle school sought to enhance the infantry's role outside of "garrison" and "support" duties that were expected even in wartime, and attempted to professionalise it away from being an "unskilled general purpose labour force".[5] The battle school movement grew momentum within this context.

After Dunkirk, and to support the mobilisation of another citizen army and to try and develop the capability from the lessons learnt in the 1940 French campaign, several commanders (notably General Sir Bernard Paget of Home Command and General Alexander of I Corps) set up a central battle school at Barnard Castle and then field division battle schools. The movement was personified by Major Lionel Wigram, who had been "disheartened by the archaic training the infantry was still being given, based on drills more appropriate to Waterloo than the German blitzkrieg".[6] The desire, therefore, was to standardise and disseminate warfighting skills and tactics and was aimed at officers and non-commissioned officers who could be trained quickly and then return to their units. The intent was also to make doctrine "intellectually easily digestible".[7] This 'battle training', which included skills such as tank hunting and bunker assaults, was seen as an alternative to the peacetime model of "square-bashing".[8]

A battle school was subsequently centralised at Warminster, and the site in Dering Lines, Brecon, was later developed on the back of the Parachute Regiment non-commissioned officer training centre. The IBS is the result of the merger of both the battle school concept and the non-commissioned officer training centres, and trains the majority of progressing infantry commanders every year.

BATTLE DRILLS

In parallel to the battle school concept was the creation of battle drills as a tactical foundation. The best recent definition is from the US Army as "standardized collective actions made in response to common battle occurrences".[9] This emphasis may seem unusual to the modern British Army, but the creation of standardised drills at the section, platoon and company level were designed to speed up reaction and thinking and to reduce planning and orders when faced with a relatively simple tactical problem. It should be widely observed that warfighting drills allow for a common understanding and tactical framework which in turn "applied in the right circumstances", "gain speed and flexibility".[10] These 'drills' have complemented the battle school concept well as they can be

Entrenching skills: Soldiers navigate a trench systems at the Infantry Battle School in Brecon, Mid-Wales.
Courtesy of Soldier Magazine © Crown copyright

[2] *IBS 2020 described by Col Shaun Chandler in BAR 176 "Reviving Infantry Trade Training".*

[3] *Both the success of the last 100 days of the First World War plus the lethargy of the interwar period has recently been discussed in "Victory into Defeat" (Dannatt, Lord Richard and Lyman, Robert. 2023. Osprey publishing).*

[4] *Harrison Place, Timothy. Military Training in the British Army 1940-1944. (Frank Cass, 2000).*

[5] *Harrison Place Timothy. Battle Drill and the British Army. (2000 War in History 2007).*

[6] *theguardian.com. Sir Denis Forman, a contemporary of Lionel Wigram, was heavily influenced by the Battle School concept with details even being included in his obituary and his Wartime memoir.*

[7] *Harrison Place, Timothy. Military Training in the British Army 1940-1944. (Frank Cass, 2000).*

[8] *lionelwigrammemorialtrust.org A history study of Major Lionel Wigram.*

[9] *US Army ATP 3-21.8*

[10] *Storr, Jim. Battlegroup! Hellon and Company, 2021.*

taught centrally, and therefore adapted and distributed quickly.

THE BATTLE SCHOOL CONCEPT – WHAT AND WHY

Some of the historical context explains what and why the battle school model has been needed: mass, tempo, standardisation, new tactics and an operationally efficient training model. These areas should be explored and reinforced. However, it is worth highlighting some criticism which should be understood for caution. Some of the observations in the Second World War suggested that centralising the battle school and battle drills would stifle innovation and initiative in other areas of the Army, and that the drills were too simplistic for warfighting tactics. Of course, the counter – and arguably the reality – was that the model allowed a baseline of tactical understanding which, at best, provided a framework of thought to be developed and at worst, a basic set of skills inexperienced troops and commanders could apply to common tactical problems. Wigram argued that this was about flexible application, that "fieldcraft is not taught by rules of conduct" and the aim was for commanders to "understand and apply principles" and "push on if he (sic) possibly can" with a bias for action.[11] There is also no guarantee that better training solutions will be available, as time, resources and the standard of training audience are finite. This is as prevalent today as it was in 1940 when training time was at a premium. Wartime commanders also suggested that there were "too many courses" as troops forming in England were reallocated to routine and supporting tasks rather than conducting training together.[12] The benefits of the model should therefore win the argument by minimising time away from unit but having centralised training interventions to build overall capability.

STANDARDISATION OF TACTICS

At scale, land forces require a standard application of tactics.

> "[The] Infantry Battle School... can now be the nucleus of a land battle school concept, focusing on dismounted close combat commanders and delivering the most modern and realistic training and setting the standard for the British Army."

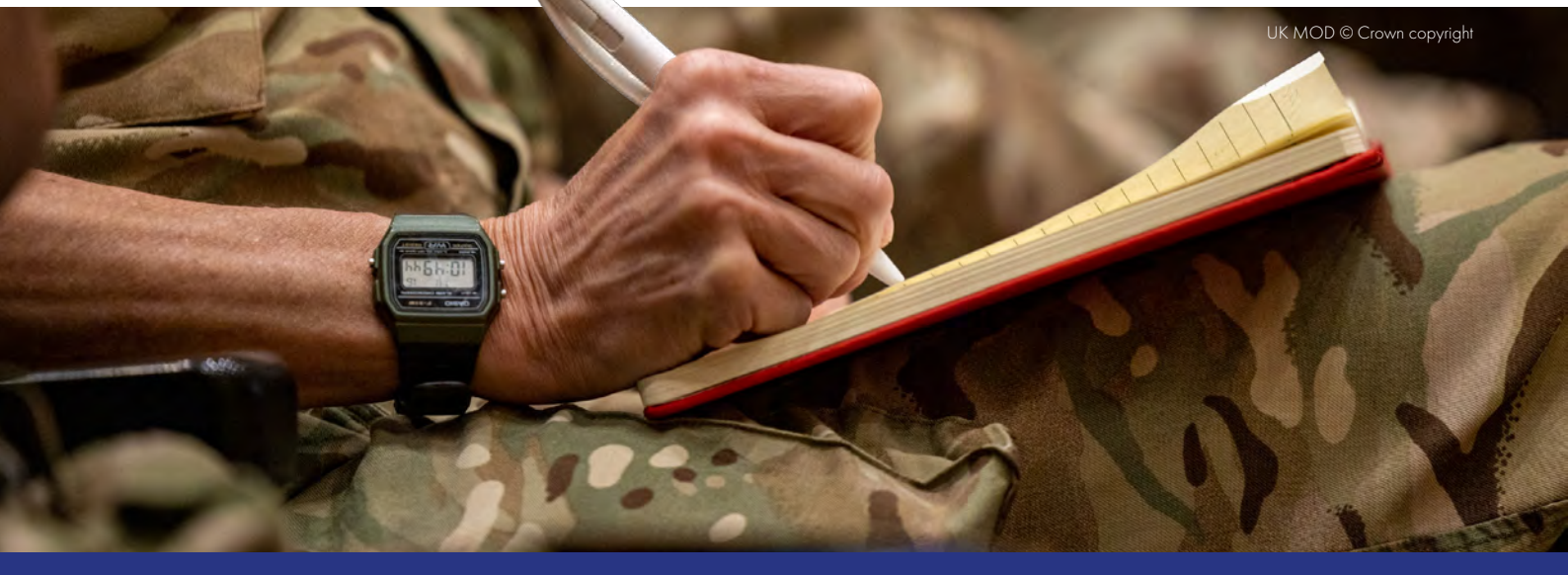
That is of course what doctrine is for, but battle training is designed to articulate what is written to what is delivered by sections, platoons and companies and their commanders. These tactics can therefore be standardised but also developed as warfare changes. The battle school's original intent was to "standardise tactical practises", "recognised by all".[13] In this way, land forces can be truly interchangeable and interoperable and protect against 'fads' and 'gimmicks' and learn quickly and at scale. The quality of training can also be assured and instructed at source, through the battle school, even if the model is designed to send commanders back to deliver distributed training in the Field Army, as per both the wartime and current model. What is also being produced is the most excellent instructor cohort, either to exponentially grow the Army if needed or return to their units in leadership roles.

OPERATIONALISED TRAINING

Battle school training is efficient as it focuses on training in the field. There is risk with this, and more time allocated to foundation theory, repetition and simulation can enhance the quality of learning, but the main effort of battle lessons needs to be battle exercises in the most realistic conditions. The basis of the wartime model was teaching a number of drills which prioritised offensive action and fire and movement.[14] However, these battle drills and tactics must continuously develop with a clear warfare development learning cycle. For example, the current IBS syllabus is teaching anti-armour ambush, withdrawal, defence and CBRN [chemical, biological, radiological and nuclear] as an obvious part of the contemporary infantry concept of employment. These elements also have similarities to the modern US Army tactical syllabus, which focuses on adaptable drills to apply to different scenarios.[15] Training for war also means combined arms training and by combining during a field training exercise, the whole training pathway can be operationalised and tested to ensure it is fit for purpose and will deliver what is needed. Training appropriate combat elements together so that the experience and mutual understanding is as good as possible at an early stage, rather than training in isolation and combining later. Even with this expanded syllabus, today's infantry battle courses are brutally lean and intense, although not quite the previous century's three-week model.

CHALLENGING COMMAND TRAINING

Battle training is physically testing. It is based in the field, with operational scaling of kit, under all conditions. It puts all trainees under the realistic stress of combat conditions and privileges battlefield simulation and inoculation. The wartime model maximised live fire effect but also used explosives, fire and smoke, water obstacles and other elements to expose soldiers to battle conditions.[16] It was also command focused and allowed those training to lead and control the battlefield so that they could be tested and learn through experience. Like the wartime model, the aim continues to be "showing the men (sic) what battle was like, what they were supposed to do in it and, crucially, by breeding confidence that their fighting job was both important and achievable".[17] It can also be argued that although the battle school concept focuses on the physical and conceptual elements of fighting power, battle inoculation and realism for commanders plays an important part in maintaining and improving morale and



UK MOD © Crown copyright

Combat classroom: Troops on an Infantry Battle School-run platoon commanders' battle course receive tuition on urban operations.
Courtesy of Soldier Magazine © Crown copyright

confidence and best prepares those who will bear the brunt of close combat.[18] There is also a sound argument that the common experience and mutual understanding gained through common drills is critical to providing cohesion to a fighting force.[19]

SO WHAT?

The first battle school was credited by some to offer a "modern revolution in infantry training".[20] IBS is not the original battle school but can now be the nucleus of a land battle school concept, focusing on dismounted close combat commanders, delivering the most modern and realistic training, and setting the standard for the British Army through a warfighting syllabus. This is the same model that was designed in the Second World War. More reassuring, it reflects how the Armed Forces of Ukraine are adapting, mobilising and training their forces for operations, and finding the balance between scale and standardisation while attempting to be as streamlined and efficient as possible. The battle school is about training for war and is designed to have a place within the zeitgeist of pre-war expectancy so that when the war comes you know how to fight, where to command in the fight, how you will cope in the fight and most importantly... how to win.

There is tension in the design. The current infantry model links employment and tactical training with promotion, which ensures tactical upskilling at the right point in an individual's career and makes course performance vitally important. This is useful as an incentive but also challenges the training design: fair and appropriate assessment which delivers a high standard, developing modern tactics and, possibly, a divergence in traditional qualities. The other tension is standardisation – if the battle school concept can truly standardise at source, then what is trained and taught must be correct.

The LTS will operationalise warfighting training. The battle school concept, with IBS as the lead, will continue to train and test the commanders – who will deliver tactical training back in their units – and formations through a common tactical framework which can be adapted to operational need. Perhaps, there has not previously been an obvious connection with combined arms tactics. There is an important new challenge of teaching both the context and doctrine to those in the close battle: the importance of artillery support and targeting as a professional skill, the inter-dependency between armour and dismounts, types of engineer support, and the list goes on.

The battle school concept is not the answer to the whole of the Field Army's training challenges, there must be freedom and ownership outside of centralised training and the ability to adapt, innovate and feedback. However, it is a key building block in developing an operationalised training system fit for the next war.

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[11] *Wigram, Lionel. Infantry Battle School 1941 (reprinted in 2005 by John Bodsworth books).*

[12] *Harrison Place, Timothy. Military Training in the British Army 1940-1944. (Frank Cass, 2000).*

[13] *King, Anthony. The Combat Soldier. (Oxford University Press, 2013).*

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[15] *taskandpurpose.com. The US Army commentary, "task and purpose" recently asked "how well do you know the Army's 14 Battle drills" which included DCC and MCC tactics, CBRN and reaction to the Enemy.*

[16] *war-experience.org/battle-school-training. The Second World War experience centre.*

[17] *Harrison, Place. Battle Drill and the British Army (2000 War in History 2007).*

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[19] *King, Anthony. The Combat Soldier. (Oxford University Press, 2013).*

[20] *Forman, Denis. To Reason Why. (Andre Deutsch, 1991).*

THE *ART* OF DEFENCE

AUTHOR

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ON the 6th November 1972 detailed orders were issued by HQ United Kingdom Land Forces for the removal of major national art treasures from London, including items from the Royal Collection, in the event of a nuclear attack. The codeword 'Methodical' was given to this operation. Lessons for evacuating significant works of art from the capital during the Second World War had been adapted and expanded for re-use during the Cold War, which also saw considerations for collections in both Cardiff and Edinburgh. Given that the international security context has shifted back towards competition and potential state-on-state conflict, perhaps now is the time to reconsider how artworks can be safeguarded and integrated within homeland defence.

MUSEUMS UNDER ATTACK

Museums are an easy target in warfare – both in terms of deliberate targeting and collateral damage. They contain the collective memory of a society and exhibit the cultural identity of a people; museums also reflect how we wish to understand and present the past. It is for these reasons that aggressors have sought to attack them, with historic examples including:

- **The Königsberg City Museum, which contained an exhibit on Immanuel Kant (a German philosopher and one of the central Enlightenment thinkers during the 18th century), was destroyed in August 1944 by Bomber Command during an attack on Königsberg in the final weeks of the Second World War;**

- The destruction of artefacts in Mosul Museum became publicly known on 26th February 2015, when the group known as the Islamic State of Iraq and the Levant released a video showing their desecration;

- **Kherson Art Museum was looted by Russian troops during the occupation of its host city in 2022. A short time before the city was liberated by Ukrainian forces, the collection was moved to the Central Museum of Taurida in Simferopol in Russian-occupied Crimea;**

■ The IT 8-bit computer museum was destroyed in 2022 during the Siege of Mariupol, and;

■ **The Al Qarara Cultural Museum, near Khan Yunis in the Gaza Strip, was destroyed by Israeli forces in October 2023.**

More recently, on 4th September 2024, reports were emerging of mass looting at the National Museum of Sudan in Khartoum amid the country's ongoing civil war and humanitarian crisis. Satellite images showed evidence of a "large-scale looting and smuggling operation" by the Rapid Support Forces paramilitary force at the museum, with some artefacts trafficked to South Sudan.[1] Thirteen days later, material from the National Museum was appearing on eBay – though some were subsequently removed from sale.[2] The United Nations Educational, Scientific and Cultural Organization (UNESCO) implemented emergency measures in five archaeological museums in Sudan: Kerma, Gebel Barkal, El Damer, Red Sea and Sinnar where the collections "were packed, safe havens prepared and more than 1,700 objects [were] inventoried and digitized".[3] UNESCO's intervention came too late for Sudan's National Museum, which was then in an area under direct Rapid Support Forces control.[4] It is likely that as a result of its hold of the museum, the force is generating capital through the sale of stolen antiquities.

The looting of Sudan's National Museum, coupled with that undertaken by Russian forces in Ukraine – particularly at Kherson Museum in 2023 – and accusations of looting in Gaza by Israeli forces since October 2023 has shown, once again, the vulnerability of museums to attack in the absence of adequate preparation.[5]

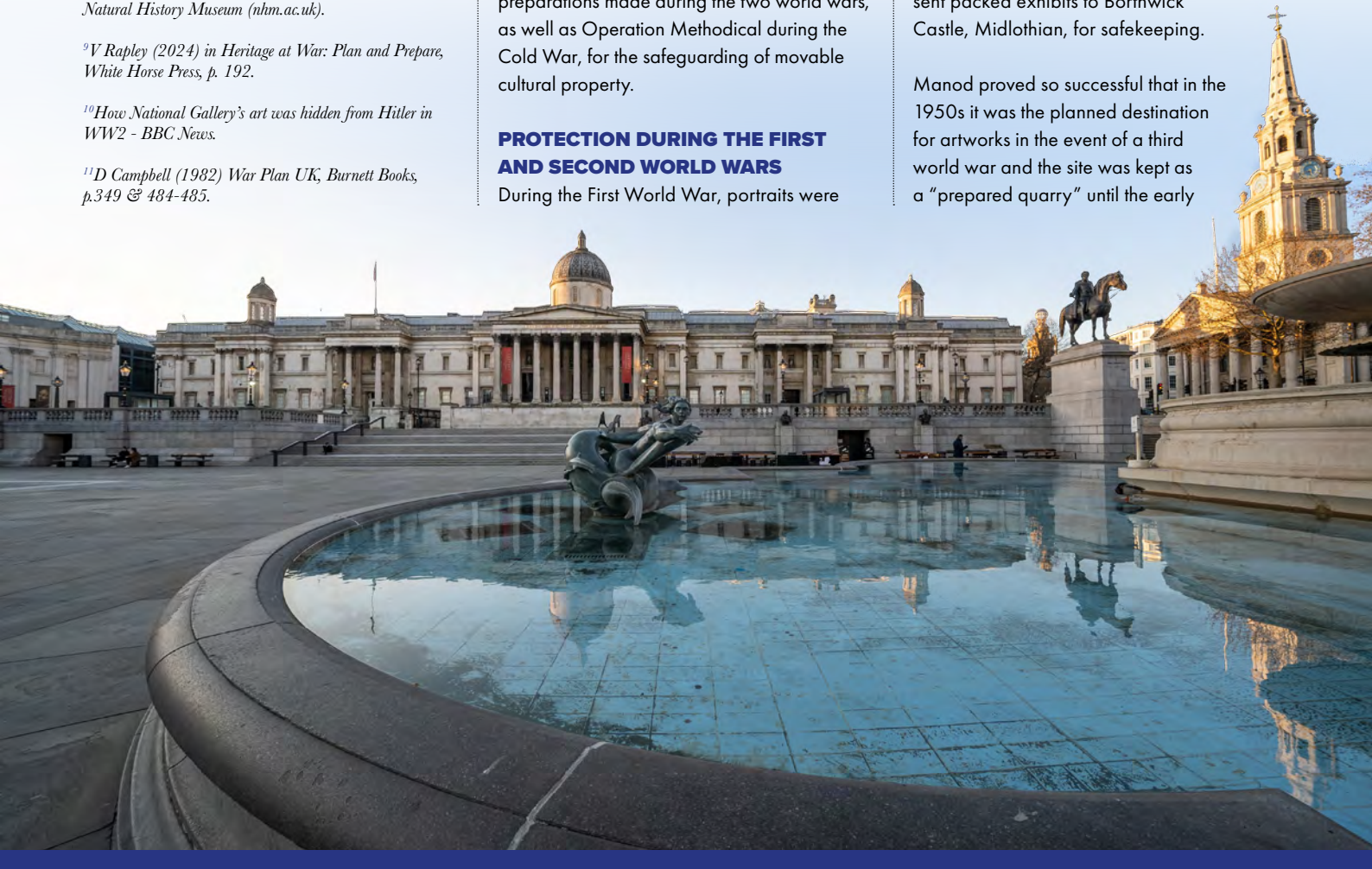
This poses immediate questions for institutions in the UK for the security of our own art collections. In the event of an attack, so helpfully modelled by Tsargrad's Telegram channel in September 2024, which broadcast a simulated 750 kiloton nuclear detonation over London,[6] the UK can look back to preparations made during the two world wars, as well as Operation Methodical during the Cold War, for the safeguarding of movable cultural property.

PROTECTION DURING THE FIRST AND SECOND WORLD WARS

During the First World War, portraits were taken off the walls of the National Portrait Gallery and stored in its basement, with others stashed in Aldwych Underground station (which was taken out of use in 1914) and in stations of the Post Office Railway Company – a small underground train system used for delivering mail throughout London. By January 1918, as bombing in the capital had increased, some 500 additional portraits were packed and sent to the National Library of Wales, Aberystwyth.[7]

Following this experience, London museums prepared comprehensive evacuation plans in the 1930s. A large proportion of the Natural History Museum's exhibits had been evacuated to country houses before the war, although some sandbagged skeletons remained in their display cases.[8] For the Victoria and Albert Museum (V&A), plans included utilising disused sections of the London Underground railway network, such as Brompton Road and Aldwych stations, for storing objects. Additional arrangements were made with property owners in the countryside, such as Montacute House in Somerset (now a National Trust property) and at Westwood Quarry in Wiltshire, to provide safe storage.[9] Manod Slate Quarry (with a capacity of 1500m^2) at Blaenau Ffestiniog, Gwynedd, was used by the National Gallery for wartime storage.[10] Westwood was also used to store artefacts from the British Museum.[11] The Royal Scottish Museum (now the National Museum of Scotland, Edinburgh) sent packed exhibits to Borthwick Castle, Midlothian, for safekeeping.

Manod proved so successful that in the 1950s it was the planned destination for artworks in the event of a third world war and the site was kept as a "prepared quarry" until the early



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[1] *Reports of 'large-scale looting' at Sudan National Museum - Museums Association.*

[2] *War-torn Sudan's priceless treasures put up for sale on eBay (thetimes.com).*

[3] *UNESCO takes measures to protect Sudan's war threatened heritage – Altaghyeer NewsPaper.*

[4] *Tens of thousands of artefacts looted from Sudan museum, says official, Sudan, The Guardian.*

[5] *Israeli Damage to Archives, Libraries, and Museums in Gaza, October 2023–January 2024 – Librarians and Archivists with Palestine (librarianswithpalestine.org).*

[6] *Pro-Putin TV channel simulates devastating nuclear strike on London, World News, Metro News.*

[7] *Evacuating the portraits - National Portrait Gallery (npg.org.uk).*

[8] *The Museum in the First and Second World Wars | Natural History Museum (nhm.ac.uk).*

[9] *V Rapley (2024) in Heritage at War: Plan and Prepare, White Horse Press, p. 192.*

[10] *How National Gallery's art was hidden from Hitler in WW2 - BBC News.*

[11] *D Campbell (1982) War Plan UK, Burnett Books, p.349 & 484-485.*

1980s.[12] The utility of Westward Quarry was once again recognised in a review of major underground depots, while in Scotland art treasures would go to Newbattle Abbey, Midlothian.

OPERATION METHODICAL

In 1960, the US deployed PGM-19 Jupiter medium-range nuclear missiles in Italy and Turkey and Soviet ground forces shot down an American U2 spy-plane and detained its pilot, Gary Powers. British and Commonwealth forces were fighting communist guerillas in Malaya while the National Liberation Front, a nationalist communist insurgency, was formed in South Vietnam. The West came to know the National Liberation Front as the Viet Cong. In addition, US President Eisenhower endorsed a CIA plan to overthrow the Castro regime in Cuba by supporting Cuban exiles – giving rise to the Bay of Pigs invasion in 1961 and ultimately the Cuban Missile Crisis of 1962.

Amid this extremely tense period during the Cold War – when the world came closest to nuclear war – the National Gallery in London wrote to the Treasury asking for £400 for a "dress rehearsal" of a plan to evacuate works of art in case of a nuclear attack. The plan was "to pack up some pictures not at present on display in Trafalgar Square and send them up by rail to Manod". The Treasury thought this idea "preposterous" and, in any case, the evacuation of paintings would be secondary to the authorised evacuation of the population.[13]

In July 1961, the Ministry of Works – as the Department responsible for the artworks themselves – sought to clarify matters with the Treasury by asking whether plans for the safety of the artworks should be developed in conjunction with the Ministry of Transport, or whether the Treasury was "prepared to write them off". The Treasury relented.[14] Thus began Operation Goya, later renamed Operation Methodical. In November 1961, an inter-departmental group met up with the directors of the five museums from which objects would be evacuated: the National Gallery, the Tate Gallery, the British Museum, the V&A and the Wallace Collection, together with the Keeper of Public Records. By the time the Cuban Missile Crisis started in October 1962, a draft plan had been developed which would see 12 vans from the Ministry of Transport, each with a driver and two soldiers, dispatched to the museums and Buckingham Palace (for the Royal Collection). The objects, which would have been selected by the directors, would be driven to Manod quarry and Westwood Quarry. The routes were to be worked out in detail by the Ministry of Transport "so as to avoid areas which might be subject to nuclear attack".[15]

"Amid this extremely tense period during the Cold War – when the world came closest to nuclear war – the National Gallery in London wrote to the Treasury asking for £400 for a 'dress rehearsal' of a plan to evacuate works of art in case of a nuclear attack... the Treasury thought this idea 'preposterous'."

However, in considering the need to evacuate the artworks, Government officials warned of the need to keep pictures on display "for national morale reasons", noting the concern that the removal of the nation's best-loved artworks would trigger an exodus from London and other cities. To avoid sparking panic, Operation Methodical was to be put into action only when ministers were actively considering readying the country for nuclear war.[16]

In May 1972, the ground-breaking Strategic Arms Limitation Talks (SALT I) signalled the beginning of a détente between the US and USSR through the Anti-Ballistic Missile Treaty. This was intended to reduce the pressures to build more weapons to maintain deterrence. Nevertheless, the threat of nuclear attack remained high and the Government had drawn-up a list of 106 cities, towns and military bases as "probable nuclear targets".[17]

Six months later, in November 1972, detailed orders were issued by HQ UK Land Forces for the Army to remove major national art treasures from London, including material from the Royal Collection, in the event of a nuclear attack on the UK under the existing Operation Methodical. Detailed arrangements were made for the artworks to be loaded into vehicles at the national institutions and for them to be transported to places of safety. HQ London District was to provide three armed detachments to act as protection escorts during the loading, transit and unloading. The information was issued on a need-to-know basis.[18]

Destinations remained largely as planned during the Second World War: Manod Quarry, Gwynedd (for the National Gallery, National Portrait Gallery, Tate Gallery and

Royal Collection) and Westwood Quarry, Wiltshire (for the British Museum, Public Record Office, Guildhall Library and Museum, V&A and Wallace Collection). Museum staff were to drive the vehicles containing the artwork; military escorts were to travel independently.

On receipt of the codeword 'Methodical Stage 1' from HQ Land Forces, troops detailed for the operation were brought to a six-hour state of readiness. On receipt of the codeword "Methodical Stage 2", the escorts were to report within six hours to their allocated museum or gallery, where loading would commence. If it proved impossible to reach the planned destinations, the artworks were to be deposited at Elmore Court, Gloucestershire (for Manod) and Stonor House, Henley-on-Thames (for Westwood). For service support, the military escorts were to be armed with 50 rounds of ammunition and were to carry three days of rations. Vehicles were to load sufficient fuel for a round-trip and the escorts were to be issued seven days advance pay to cover emergencies. Orders for the use of lethal force were provided.

While the codeword Methodical was restricted, its meaning was classified as secret. It is not clear if Op Methodical was ever rehearsed in the 1970s, but the principle of the evacuation of major art treasures (led by civil authorities) from London, Cardiff and latterly Edinburgh continued throughout the Cold War.

NEW SAFEGUARDING MEASURES

Systems and infrastructure for the UK to defend against and survive a nuclear attack, and to recover, were dismantled in stages after the end of the Cold War but it was the repeal of the Civil Defence Act 1948, and its replacement by the Civil Contingencies Act 2004, which saw the effective end to Cold War planning by the Cabinet Office. This was a logical response to an international security environment in which the threat had shifted from armed attack by a hostile state to one of international terrorism and state failure.

However, a fundamental element of the 1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict ('the 1954 Convention'; ratified by the UK in 2017) enables States Parties to prepare, in times of peace, for the safeguarding of cultural property against the foreseeable effects of armed conflict by taking appropriate measures (Article 3). Such measures can include the identification of refuges intended to shelter cultural material (Article 8). In addition, Article 5 of the Second Protocol to the 1954 Convention enables preparatory measures to be made for the safe removal of movable cultural property. In ratifying the 1954 Convention, the UK Government issued implementation guidelines in November 2017 which recognise the preparatory measures suggested in the Second Protocol but places responsibility for implementation on existing owners, guardians or trustees of relevant properties.[19]

Within current geopolitical instability, the security context has shifted back towards competition and potential state-on-state conflict. Some commentators have considered that we are either on the brink of World War Three or that we have actually been fighting the Third World War for some time.[20] General Sir Roly Walker, Chief of the General Staff, said in July 2024 that the UK and its allies had to be ready "to deter or fight a war in three years".[21] While there is no explicit reference to the protection of works of art in the Civil Contingencies Act 2004, the Defence Council may confer powers in relation to property to the Armed Forces (Section 22(3)(m)).

As part of national preparations for conflict, the Cultural Ministries of the Home Nations – in conjunction with their relevant statutory advisory bodies, the national museums and the respective national trusts, and with Defence assistance – might consider scoping plans for the evacuation of movable works of art and identify suitable refuges for the shelter of cultural property. Under the terms of the 1954 Convention, if such artefacts are integrated within homeland defence they may be placed under special protection and safeguarded from attack. Only in this way can we be confident that significant works of art have a chance of survival to be enjoyed by future generations.

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[12]*33 photos of priceless artworks hidden inside Snowdonia quarry decades ago - North Wales Live (dailypost.co.uk).*

[13-15]*TNA, Ref: T 227/2038*

[16]*Revealed: nuclear bunker plan for old masters, UK news, The Guardian.*

[17]*UK government's secret list of 'probable nuclear targets' in 1970s released, Nuclear weapons, The Guardian.*

[18]*TNA, Ref: DEFE 24/2784/2.*

[19]*Protection of cultural property in the event of armed conflict - gov.uk.*

[20]*M Dunkley et al (2024) in Heritage at War: Plan and Prepare, White Horse Press, p.2.*

[21]*Army chief says UK must double its lethality or be prepared for war in 2027, British Army, The Guardian.*

MILITARY DECEPTION: PAST LIES AND FUTURE FALSEHOODS

AUTHOR

Captain Rob Abernethy commissioned into the Royal Logistic Corps in 2017, and as a staff officer has supported the deception planning on various exercises with 1 (UK) Division and 3 (UK) Division.

DECEPTION is a key force multiplier in military operations, albeit one that is often misunderstood. The past 20 years of counterinsurgency have offered little scope for implementing deception, but the Army's rediscovery of conventional warfighting has seen a resurgence of interest in its role. Furthermore, the conflict in Ukraine has shown conclusively that deception is of continued relevance in modern war, even in a highly-connected environment where sensors are practically ubiquitous. However, it is the author's opinion that many officers remain stuck in a 'World War II mindset' when it comes to deception, frequently thinking in terms of the decoys and inflatable tanks that are enduring images of the planning for D-Day. These methods of deception, while not irrelevant in the modern world, are obviously of less utility in an era when 75 per cent of the world's population owns a smartphone. Using two examples from World War II – Operations Husky and Overlord – this article will seek to put historic acts of deception in their proper context and offer lessons as to how deception may be implemented in warfare today.

NATO PRINCIPLES OF DECEPTION

Deception is defined by NATO as measures designed to mislead the enemy by manipulation, distortion or falsification of evidence to induce them to react in a manner prejudicial to their interests. It is complementary to operations security, which seeks to deny the enemy knowledge of the dispositions, capabilities and intentions of friendly forces.[1] If operations security denies information to the enemy, deception seeks to fill that void with information tailored for their consumption. To succeed, deception must:[2]

- **Create a behavioural response.** Deception must focus on creating a desired behaviour, which must meet the commander's intent.

- **Reinforce existing beliefs.** Understand what the adversary is predisposed to believe and disbelieve. It is easier to reinforce a belief than change it, and difficult to convince of something they would ordinarily reject.

- **Target the decision-maker.** The decision-

[1] *NATO, Allied Joint Publication 10.1 – Allied Joint Doctrine for Information Operations, Edition A, Version 1, January 2023, pp. 35-36.*

[2] *NATO, Allied Joint Publication 3.10.2 – Allied Joint Doctrine for Operations Security and Deception, Edition A, Version 2, March 2020, pp. 6-7.*

maker must be able to detect deceptive events, process them and act upon them. The decision-maker may be at the tactical, operational or strategic level.

■ **Be credible, consistent, verifiable and executable.** Deception must be credible and believable in the minds of the enemy; consistent with the narrative of the operation and with the strategic communications framework; verifiable by their collection assets; verifiable by friendly forces' collection assets; and executable over the time period available.

■ **Take multiple approaches.** Creating effects through joint action (manoeuvre, fires, information and civil-military cooperation) will ensure an integrated approach. The greater the number of channels used, the more credible the deception.

■ **Conceal the real and reveal the false.** Draw attention away from real dispositions and intentions, while simultaneously attracting attention to false intentions. Alternatives require the adversary to evaluate them.

We will examine the two historical examples from World War II using these six principles as an analysis framework.

OPERATION HUSKY

Operation Husky was the codename for the Allied invasion of Sicily on 9th July 1943. To conceal Allied intentions, as well as the movements and objectives of the 160,000 troops and 3,200 ships assembled for the invasion, a major deception effort was launched. Codenamed Operation Barclay, it was led in the Mediterranean by 'A' Force, commanded by the cross-dressing bon vivant Colonel Dudley Clarke.[3] Clarke proposed to make the Germans believe that the Allies planned to liberate Greece, linking up with the Soviets and bringing Turkey into the war. Within Barclay were several subordinate operations:[4]

■ **Operation Waterfall.** The creation of the fictitious 'British Twelfth Army' in Cyrenaica, supposedly postured for the invasion of Greece via Crete.

■ **Operation Brimstone.** A fake invasion of Corsica and Sardinia as a preparatory to an invasion of southern France, notionally intended to draw German troops away from Greece. This would conceal the real assembly of troops and ships and the bombing of airfields on Sicily for Husky.

■ **Operation Mincemeat.** Fake documents were planted on a corpse that presented Greece and Sardinia as the targets for Husky and Brimstone. The body was floated into neutral Spain in the expectation that the documents would be passed on to local German intelligence attachés.

Clarke's method was what would now be described as ambiguity-reducing deception. "The only purpose of any deception," he said in 1942, "is to make one's opponent act in a manner calculated to assist one's plans. In other words, to make him do something."[5]

The behavioural response sought by these operations was for the Germans to divert scarce resources away from Sicily, facilitating the Allied invasion.

The Abwehr[6] was not ignorant of the threat to Sicily. However, the Allied deception plans presented plausible alternatives that helped reinforce the Germans' existing beliefs: Operation Brimstone would also threaten Northern Italy and the Oberkommando der Wehrmacht[7] foresaw an Allied descent on Rome from Sardinia, with simultaneous attacks on southern France. Furthermore, Operation Waterfall confirmed Adolf Hitler's long-term fear that the Balkans were a weak spot on Germany's southern flank. The Germans feared the possibility of Allied lodgement in Greece that could threaten strategic resources in the Balkans – this region was the source of 50 per cent of Germany's oil, 60 per cent of its bauxite and all of its chrome.[8]

In a deception of this scale, Hitler was the key decision-maker. To the end of the war, he remained obsessed with retaining control of strategic resources, possessing a "congenital obsession with the Balkans".[9] Furthermore,

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[3] *Hutton, Robert, The Illusionist: The True Story of the Man Who Fooled Hitler (London: Weidenfeld & Nicholson, 2024), pp. 266-7*

[4] *Macintyre, Ben, Operation Mincemeat: The True Spy Story that Changed the Course of World War II (London: Bloomsbury, 2010), pp. 33-37*

[5] *Hutton, 2024, p. 166.*

[6] *German military intelligence.*

[7] *Oberkommando der Wehrmacht, 'Armed Forces High Command', notionally the supreme command of the German Armed Forces during World War II, in practice often bypassed by Hitler.*

[8-9] *Macintyre, 2010, pp. 260-61.*

the Operation Mincemeat documents were regarded as completely reliable by the Abwehr because they provided desperately-needed clarity where there was none. Its agents had been completely compromised by the Double Cross System, and as the war turned against Germany, paranoia reigned, with no one wishing to put their name to a conclusion that might be wrong.[10] In this context, it is easy to understand why the Mincemeat documents were considered absolutely reliable: they had nothing else, and it appeared to be a spectacular coup. Between March and July 1943, ten additional German divisions were sent to reinforce Greece and the Balkans, while only two were sent to Sicily.[11]

A deception operation cannot be credible unless it demonstrates capability along with intent. Operation Barclay appeared credible to the Germans because of mass. If they believed that the Allies could strike anywhere, then this was because the Allies did have the resources to strike at a time and place of their choosing. In truth, the Allies had only sufficient landing craft to conduct one major amphibious landing at a time, but their command of the sea allowed them to threaten a landing anywhere in the Mediterranean.[12]

The success of Barclay was dependent on multiple approaches: Operation Mincemeat would not have been credible had it not been reinforced by manoeuvre, signals and fires. The Special Operations Executive conducted a major sabotage campaign against German communications in Greece codenamed Operation Animals.[13] Commandos conducted night-time reconnaissance of the supposed target beaches in Sardinia and Crete, deliberately leaving evidence of their presence. Intensive aerial reconnaissance of the deceptive targets was carried out. The fake British Twelfth Army in Cyrenaica assembled dummy landing craft, airfields and tanks, which were defended from aerial reconnaissance with genuine anti-aircraft guns and fighters.[14] Greek, Turkish, Bulgarian and Romanian interpreters were recruited. Drachmas were bought on the Cairo foreign exchange, and bundles of currency stamped with 'Greece', 'France' and 'Bulgaria' were distributed, some of which were then deliberately 'lost'. Maps of Greece were distributed, and Algerian fishermen were quizzed on their knowledge of Sardinian waters.[15]

This joint action had the effect of "concealing the real and revealing the false". Aircraft flying across Africa were ordered to use their radios only while flying east, while maintaining strict radio silence while flying west, to create the impression that more planes were heading towards assembly areas in eastern Africa than were coming back.[16] The command post of the Twelfth Army, based in Cairo, made heavy use of radio, while Husky's actual headquarters in Tunis communicated by landline wherever possible. Finally, the Barclay deception was maintained by normal operations security precautions that remain as essential as they are unglamorous: maps of Sicily were strictly controlled, mail was censored and troops were not briefed on their destinations until their transports were at sea.[17]

The man who never was: Major William Martin was a persona invented by British Military Intelligence for Op Mincemeat.

> **"The Operation Mincemeat documents were regarded as completely reliable by the Abwehr because they provided desperately-needed clarity where there was none... paranoia reigned, with no one wishing to put their name to a conclusion that might be wrong."**

In summary, the Barclay deception plan succeeded because it presented plausible alternatives to an invasion of Sicily that were resourced with both kinetic and non-kinetic effects. Threats to the Balkans and Sardinia reinforced the Germans' existing fears about attacks on strategic resources or the loss of Italy, even when they were initially inclined to regard Sicily as the obvious target. Critically, the Allies had the resources to make the deception plan credible: subsequent deception plans in 1943, such as Operation Cockade, which sought to draw German resources out of the Mediterranean by simulating an invasion threat to France, did not offer a plausible threat – for example, the supposed landing sites were outside the range of Allied air cover – and so did not get a reaction.[18]

OPERATION OVERLORD

The deception plan in support of Operation Overlord, codenamed Operation Bodyguard, was coordinated by the London Controlling Section and led by Colonel Johnny Bevan.[19] Bevan's approach focused on ambiguity-enhancing deception, presenting the enemy with multiple possibilities to obscure the true main effort.[20] As with Barclay, there were numerous subordinate operations within Operation Bodyguard:

- **Operation Fortitude North.** The assembly of the fictitious 'British Fourth Army' in Scotland to simulate an invasion of Norway that would threaten to separate Nazi Germany from critical supplies of Swedish iron ore.[21]

- **Operation Fortitude South.** The assembly of the fictitious 'First United States Army Group' in the south-east of England, to suggest that the Allied main effort would be towards the Pas-de-Calais.[22]

- **Operation Zeppelin.** The Mediterranean element of Bodyguard, Zeppelin maintained the possibility of a threat to the Balkans or to the south of France.[23]

- **Operation Graffham.** A series of diplomatic overtures made to neutral Sweden, notionally intended to achieve Swedish support for an Allied invasion of Norway.[24]

Bevan's intent was to "persuade the enemy to dispose his forces in areas where they can cause the least interference with Operations Overlord and Anvil,"[25] and "deceive the

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[10] *Hastings, Max, The Secret War: Spies, Codes, and Guerrillas, 1939-1945 (London: William Collins, 2015), pp. 468-71.*

[11] *Downing, Taylor, The Army That Never Was: D-Day and the Great Deception (London: Icon Books, 2024), p. 82.*

[12] *Macintyre, 2010, p. 283.*

[13] *Macintyre, 2010, pp. 280-81.*

[14-15] *Hutton, 2024, pp. 267-8.*

[16] *Hutton, 2024, p, 268.*

[17] *Macintyre, 2010, pp. 279-80.*

[18] *Overy, Richard, Blood and Ruins: The Great Imperial War, 1931-1945 (London: Allen Lane, 2021), p. 513.*

[19] *Downing, 2024, p. 61.*

[20] *Hutton, 2024, pp. 252-4.*

[21] *Downing, 2024, pp. 159-61.*

[22] *Overy, 2021, p. 514.*

[23] *Hutton, 2024, p. 295.*

[24] *Downing, 2024, p. 168.*

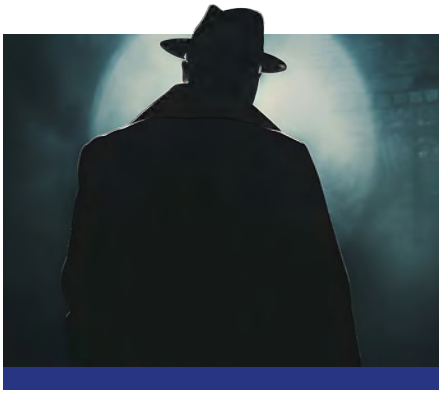
[25] *The invasion of southern France to follow the landings in Normandy, later renamed Operation Dragoon.*

enemy as to the strength, timing, and objective of Overlord and Anvil".[26] The behavioural response was to fix German troops in peripheral theatres where they could not reinforce Normandy.

The Fortitude South plan reinforced the Germans' existing beliefs by presenting the real build-up as a subsidiary effort, with the Normandy landings being a preliminary to draw German troops away from the Pas-de-Calais before a landing there by the First United States Army Group.[27] The Germans believed that an attack on Calais would allow the Allies to bring the maximum concentration of airpower to bear over the narrowest part of the English Channel and quickly seize a large port.[28] Fortitude South ensured that, well into July 1944, they retained 22 divisions in the Pas-de-Calais in the belief that the First United States Army Group was waiting for German reserves to be drawn towards Normandy before launching its own cross-Channel assault.[29]

Hitler remained the ultimate decision-maker. Fortitude North and Graffham were calculated to appeal to his obsession with strategic resources: 12 divisions were garrisoned in Norway to guard Germany's links to Swedish iron ore. British defence attachés in Stockholm held conspicuous meetings that were notionally intended to gain Swedish support for an invasion of Norway. Hitler subsequently ordered two additional divisions to reinforce Norway.[30] Zeppelin, meanwhile, built on the previous year's successes: Dudley Clarke assessed that 35 German divisions had been fixed in the Mediterranean, of which 25 were in the Balkans. In June 1944, only one of the ten divisions on France's south coast moved north to support the defence in Normandy.[31]

Nowhere is the importance of mass in making a deception credible more apparent than in Operation Bodyguard. Like Barlcay, Bodyguard could only succeed because the Allies did have the hard power to plausibly threaten an invasion anywhere along hundreds of miles of coastline.[32] An unappreciated success of the Abwehr in 1944 was that it had successfully located 27 of 38 Allied divisions in the UK, but drastically inflated its estimate of Allied strength by counting over 40 'ghost' divisions, bringing their estimate to a total of 79 Allied divisions.[33] The fake divisions of Bodyguard combined with the Allies' very real airpower to solidify the deception in the Germans' minds: early in 1944, the two senior German commanders in the west, Field Marshals Gerd von Rundstedt and Erwin Rommel, concluded that the Allies were most likely to land at the Pas-de-



"[Op] Bodyguard was supported by an extensive disinformation campaign conducted through the Double Cross System: Roman Czerniawski, codenamed 'Brutus', posed as a disaffected Polish liaison officer to the First United States Army Group, and together with the Serbian lawyer Dušan Popov ('Tricycle'), fed the Abwehr information that created their massively inflated estimate of Allied strength."

Calais. By the end of April, however, they increasingly believed that Normandy would be the target. At that point, Fortitude South began in earnest.[34] In addition to physical and electronic deceptions, the operation was supported by an air campaign codenamed Quicksilver IV.[35] Eleven airfields and 19 railway junctions were attacked in the Pas-de-Calais, compared to only four attacks on each in the Normandy area. By the end of May, Hitler, the Oberkommando der Wehrmacht and Rundstedt believed that the Allied bombing patterns, combined with Fortitude South, indicated that their main effort would be towards Calais. Only Rommel held out in the belief that Normandy was the target, and this disagreement led to the fateful decision by Hitler to divide Panzer Group West, ensuring that the Germans were unable to mass forces to respond to the invasion on the 6th June.[36]

The resources at the Allies' disposal are evident in the sheer number of approaches they were able to take to implement Bodyguard. Integrated action was practiced to the highest degree. In addition to diplomatic routes, Bodyguard was supported by an extensive disinformation campaign conducted through the Double Cross System: Roman Czerniawski, codenamed 'Brutus', posed as a disaffected Polish liaison officer to the First United States Army Group, and together with the Serbian lawyer Dušan Popov ('Tricycle'), fed the Abwehr information that created their massively inflated estimate of Allied strength. The legendary Spanish double agent Juan Pujol García ('Garbo') maintained the deception long after D-Day by convincing the Germans that the First United States Army Group was still postured for an invasion of the Pas-de-Calais.[37] Physical and electronic deceptions, codenamed Operation Quicksilver, lent credibility to the double agents' messages: film crews from Shepperton Studios created the inflatable tanks, fake landing craft and dummy aircraft as part of Operations Quicksilver I and III,[38] which convinced the Abwehr that the Allies had the capacity to transport 16 divisions when they could in fact land five.[39] Quicksilver II comprised the radio games to create a realistic pattern of life for the First United States Army Group.[40] Quicksilver IV was the air campaign. Quicksilver V and VI entailed false embarkation preparations, fake railway marshalling yards and simulations of port lighting to continue to draw German attention to the south-east.[41] Finally, Bodyguard was supported by the tricks that have become defining stories of British wartime deception: the notional importance of the First United States Army Group was emphasised with a visit by King George VI.[42] In Operation Copperhead, M.E. Clifton James, an actor who bore a striking resemblance to General Montgomery, was conspicuously paraded in Gibraltar to support the Zeppelin plan.[43]

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[26] *Downing, 2024, pp. 112-3.*

[27] *Overy, 2021, p. 514.*

[28] *Caddick-Adams, Peter, Sand and Steel: A New History of D-Day (London: Hutchinson, 2019), pp. 879-86.*

[29] *Overy, 2021, pp. 515-6.*

[30] *Downing, 2024, pp. 160-9.*

[31] *Hutton, 2024, p. 296.*

[32] *Hastings, 2015, pp. 483-4.*

[33] *Zaloga, Steven J., Atlas of the European Campaign: 1944-45 (Oxford: Osprey, 2018), p. 18.*

[34] *Downing, 2024, pp. 193-4.*

[35] *Caddick-Adams, 2019, p. 298.*

[36] *Downing, 2024, pp. 199-201.*

[37] *Caddick-Adams, 2019, pp. 873-6.*

[38] *Caddick-Adams, 2019, pp. 298-301.*

[39] *Downing, 2024, p. 197.*

[40] *Caddick-Adams 2019, p. 880.*

[41] *Downing, 2024, pp. 174-5.*

[42] *Downing, 2024, p. 139.*

[43] *Downing, 2024, pp. 184-6.*

The sheer scale of the real invasion preparations was such that the ability to "conceal the real" was somewhat limited. Nevertheless, operations security precautions remained paramount: the assaulting formations were not briefed on their destinations until 1st June. The entire south of England was declared a military zone, and once briefed, troops were confined to camp. The extent to which Bodyguard had "revealed the false" was such that many on the Allied side were surprised that their destination would be Normandy and not the Pas-de-Calais.[44]

The importance of presenting a plausible alternative to a landing in Normandy was the key to Operation Bodyguard, which confirmed the Germans' existing beliefs to the point that they still believed that a landing in the Pas-de-Calais was possible for well over a month after D-Day. This was resourced, not simply through fields of inflatable tanks, but through integrated action that extended up to the highest levels of state, encompassing British diplomats to neutral countries and the King himself.

IMPLICATIONS FOR MODERN WARFARE

The great deceptions of World War II were conducted by armies in a state of total war, with vast resources available to them. Ruses like the First United States Army Group were reinforced by real kinetic effects, and had real troops assigned to them to give life to fake formations. It was mass that allowed these deceptions to be credible. Better intelligence gathering by the Germans might have led them to realise that they had massively overestimated Allied strength. Nevertheless, overestimating the enemy's strength is an understandable error in a time of total war. This should not be relied upon in a contemporary conflict: our adversaries are aware of our current strengths and what this means for our ability to conduct operations. They will not be fooled by fake armies that suggest multiple possibilities for attacks when we are only capable of achieving one or two. In modern deception, if a fake unit is to be created, then a real one must be totally concealed elsewhere.

Operations security is therefore paramount. In this context, the sixth NATO Principle of Deception – conceal the real and reveal the false – is the most important. The natural pattern of life of a unit has become ever-more complex, with signatures coming from all manner of sources: even in a unit ordered to practice strict emissions control, there is likely to be at least one soldier who disobeys the PED [processing, exploitation and dissemination] policy.[45] Future operations will require these signatures to be reduced to the absolute minimum to "conceal the real". This also has implications for "revealing the false": in future, decoys and radio transmitters to emit false signals will have to be accompanied by a handful of mobile phones to simulate pattern of life.

Both examples illustrate the importance of multiple approaches to deception. Bodyguard reveals the importance of integrating diplomacy and strategic intelligence. The tendency has been to focus on clever wheezes like Copperhead or Mincemeat at the expense of less-glamorous supporting work. Deception will not succeed unless it is thoroughly supported by, not just the warfighting functions of manoeuvre, fires, sustainment and special operations, but also the staff functions of personnel administration, supply, training, finance and civil-military cooperation.

The Russo-Ukrainian War has shown the continued relevance of operational-scale deception: the 2022 Kharkiv counter-offensive was supported by a deception plan that fulfilled virtually all the NATO principles. There were two possible axes for a Ukrainian counter-offensive in 2022, Kharkiv or Kherson. Of these, an attack on Kherson appeared the most credible to the Russians, as it was their only bridgehead over the River Dnipro and was the only regional capital to have been captured during the initial invasion. The Ukrainian Government reinforced this existing belief by repeatedly signalling that Kherson would be their main effort, conducting planning with multiple approaches, including partisan activity, fires, signals, decoys and media engagement. This, along with only limited commitments of heavy armour to Kharkiv Oblast, concealed the real main effort while amplifying the false Kherson effort. The behavioural response of this deception plan was that the Russians concentrated their forces to defend Kherson and dismissed Ukrainian attacks around Kharkiv as a feint, ultimately allowing the Ukrainians to liberate 500 settlements and 12,000 square kilometres of territory in Kharkiv Oblast.[46]

The modern battlespace is far richer in sensors than those of 1943-44, and not all of these are military. This proliferation of sensors makes deception even more important as a means of force protection. Ukraine has shown the continued utility of the decoy, not to create entire fake formations, but to protect real units by drawing fire. Ukrainian industry has successfully produced thousands of cheap decoys of Ukrainian and Western-supplied equipment to correct the significant overmatch in fires between the Russian and Ukrainian armies. For example, a real M777 howitzer costs $3.7 million. The M777 decoy produced by the Ukrainian company Metinvest costs under $1,000 and is made of old sewer pipes.[47] Russia has repeatedly claimed the destruction of HIMARS rocket systems, but only in March 2024 was a HIMARS actually confirmed destroyed by the Ukrainian Ministry of Defence.[48] The decoy is also a means of exhausting expensive enemy capabilities: a decoy of an IRIS-T surface-to-air missile system is believed to have been destroyed in late January 2024 by an Iskander ballistic missile. In other words, a $3 million missile was wasted to destroy a $10,000 decoy.[49] Deception of this nature should not be seen as the sole preserve of operational headquarters: units down to the lowest tactical level should embrace decoys and dummy positions constructed using local resources as a means of force protection.

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[44] *Hutton, 2024, pp. 297-302.*

[45] *Identifying the mobile phone signature of a unit regardless of what PED policy it has been ordered to follow might be an interesting experiment to conduct on Salisbury Plain or BATUS.*

[46] *Dylan, Huw, et al., 'The Kherson Ruse: Ukraine and the Art of Military Deception', Modern War Institute, 10 December 2022.*

[47] *Bell, Melissa, et al., 'True to life but without the price tag: The decoy weapons Ukraine wants Russia to destroy', CNN, 12 September 2023.*

[48] *Axe, David, 'After Two Years of Trying, the Russians Finally Destroyed a Ukrainian HIMARS', Forbes, 5 March 2024.*

[49] *Panella, Chris, 'Ukraine made realistic decoys of radars and missile systems and may even have tricked the Russians into taking a shot at one', Business Insider, 2 February 2024.*

STRATEGIC LOGISTICS... A NEW TRAIN OF THOUGHT

AUTHOR

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THE return of large-scale conventional war and the resurgence of a Russian conventional threat has illustrated the sine-qua-non of resilience planning for national security. Two central lessons from the Russia-Ukraine war must shape the strategic thinking of the UK and its NATO allies.

The first lesson identified relates to the Clausewitzian frameworks of the nature and character of war. Whilst the nature of war remains unchanged the character of war has evolved. This evolution, which has materialised within the sixth (information) and seventh (autonomous) military revolutions, has led to a rapid increase in the speed and mobility of warfare. The change is a result of the technological advances in weaponry, the increasing integration of artificial intelligence and the rising level of maturity of C4ISR [Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance].[1] Therefore the future operating environment will be highly mobile and feature rapidly changing battlefield realities and increasing lethality. To prevail, speed, agility, mobility and dispersion will be indispensable to securing a strategic advantage.

A second lesson that the conflict has made clear to uniformed practitioners and the public alike is that logistics is the backbone of any military operation. It has reminded the wider audience that logistics is the essential lever to achieve strategic military objectives and ultimately to realise political objectives. What the ongoing fighting has also revealed is that it is evident that European NATO nations would currently struggle to replicate the logistics effort seen in the Russia-Ukraine war[2] as they do not retain the capabilities and capacity required for the sheer volume of materiel and people necessary to support agile combined arms operations.

To ensure its resilience the UK must take decisive steps to address these lessons. At the heart of this approach must be the integration of speed, agility and dispersion into logistics strategy. And further sustainability of the resilience system must be assured by integrating risk and threat management tools to monitor and mitigate – as an example – cyber disruptions, environmental hazards, public disorder and wider hybrid threats.

Strategic logistics as a framework encompasses wider government, whole nation support and national industry readiness. This includes the nation's critical infrastructure, and more importantly the UK's

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[1] *Lisovyi, O "The Changing Character of War," PPT Briefing, National Defence University of Ukraine.*

[2] *Lange, N (2023) "How to beat Russia." Globsec.*

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Soldiers at sea: The Queen Elizabeth 2 (QE2) cruise liner was requisitioned to transport troops to the Falkland Islands in 1982.

transport infrastructure. By incorporating transport infrastructure into strategic logistics planning, the UK can secure the capacity, flexibility and resilience necessary to support rapid mobilisation.

An investigation into the possible frameworks to accomplish this is rather complicated due to the UK's highly privatised landscape. Thus we can learn a lot about today's capabilities by studying the last time that the UK was involved in a conventional conflict that took place before the shift towards privatisation. The Falklands War, therefore, provides a suitable case study as it was fought when the nation's transport infrastructure was not a mosaic of private and foreign ownership.

LOGISTICAL INNOVATION DURING THE FALKLANDS WAR

The foci of military logistics on the strategic level is the national capacity to support defence. It requires a whole society endeavour – encompassing both private and public sector resources – and the contribution of everyone from lorry drivers and individual soldiers to government officials. This capacity dictates the speed and ability of the armed force to deploy and sustain an operation. As Privratsky nicely put it: "Military mobility is determined by the comprehensive readiness of a nation's transport network, depots and ports to respond to crisis within the timeframe necessary."[3]

Privratsky drew this lesson in the context of the Falklands War in the 1980s, during which privatisation through Margaret Thatcher's neoliberal economic approach had not yet had its full effect on industry.

The war in 1982 is often celebrated for its logistical achievements, but beneath the surface of success lay significant challenges. The conflict exposed the Armed Forces' inadequate transport capabilities, which inhibited rapid movement of personnel, vehicles and materiel on the home bank and deployment to the far bank. Private sector support substantially enabled logistics for all Services from the depot to the battlefield, and this provision was critical to facilitating deployment, sustainment and ultimately victory.[4]

"The war in 1982 is often celebrated for its logistical achievements, but beneath the surface of success lay significant challenges. The conflict exposed the Armed Forces' inadequate transport capabilities, which inhibited rapid movement of personnel, vehicles and materiel on the home bank and deployment to the far bank."

After the Naval Staff Advisory Group deemed the sealift capabilities inadequate, it convened meetings with commercial ship owners to create a pathway for support.[5]

This led to the requisition of P&O ferries as roll-on roll-off vessels, fuel tankers assisting the transport of supplies and container ships supporting as aircraft or water transport support.[6] This 'force multiplier' was of paramount importance and without it the rapid deployment at scale and sustainment of forces to the afar Falkland Islands would have been profoundly inhibited.

Less efficient was the railway support afforded by British Rail. Due to a lack of government contingency planning, the lead time to providing rolling stock was seven days. Much of the leg work that British Rail was not able to facilitate in the initial deployment stage was supported by commercial haulage companies.[7] Commercial truckers and trucks moved substantial amounts of goods and travelled significant distances.

While celebrated as a triumph of cooperation between the military and private sector, the Falklands War also exposed significant gaps in the UK's strategic mobility. The reliance on what Privratsky coined as "last-minute mobility" ultimately underscores the requirement for a strategised integration of commercial infrastructure and industry into national defence and military logistics planning to increase agility, speed and the ability to disperse.

PRIVATISATION OF UK INFRASTRUCTURE

To understand how to integrate these factors into the UK's strategic logistics thinking one must briefly trace the history of privatisation and then consider the current landscape.

The large-scale tilt towards privatisation began in earnest under Thatcher's Conservative Government with an ideological shift towards

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[3] *Privratsky, K (2014) "Logistics in the Falklands War" Pen & Sword Military, Chapter 12.*

[4] *Bell, R (2012) "The Falkland islands campaign of 1982 and British joint forces operations" Joint Forces Quarterly, Issue 67 (4).*

[5] *Tustin, W.J. (1984) "The Logistics of the Falklands War – Part I" The Army Quarterly and Defence Journal Vol 114 (3), p. 295-301.*

[6] *Villar, R. (1984) "Merchant Ships at War: The Falklands Experience. Conway Maritime Press, p.8-12.*

[7] *Privratsky, K (2014).*

free-market principles. Key industries such as British Airways (1987) and British Rail (1994-1997) were privatised or franchised in forms of concessions. This led to the transfer of ownership of assets in certain cases, for example rolling stock was sold by flotation and the shipping industry increasingly reflagged its ships to more convenient countries. The extent of private ownership has increased ever since. Some might be shocked to learn the extent to which the UK's infrastructure is currently owned by foreign companies, foreign states or foreign state-owned companies. For example, three-quarters of Britain's rail capabilities are operating under foreign ownership, including ownership by the German and Dutch national rail companies. A look at the running of seaports and airports tells a similar story. Heathrow is owned by a consortium led by Spanish infrastructure company Ferrovial. Gatwick, which previously had operated as RAF Gatwick during World War II, is now partially owned by a Global Infrastructure Partners consortium made up of companies from Abu Dhabi, Australia, the US, South Korea and France. In the maritime sector, the Port of Felixstowe is owned by CK Hutchison Holdings – a Hong Kong-based and Cayman Island-registered multinational conglomerate corporation. And P&O ferries, which was heavily used during the Falklands War, is owned by DP World, a logistics company based in Dubai that five years ago announced the reflagging of the British fleet from Dover to Limassol, Cyprus.

The outsourcing of competencies to commercial and private providers is not limited to the transport sector. As the military adapted to new strategic and technological realities, it followed suit by increasingly outsourcing key capabilities to contractors. It shifted away from manpower-heavy forces towards a 'core-competency' model, focusing on smaller, specialised forces structured to generate maximum firepower and operational effectiveness through technological superiority. Doctrine dictating military expertise and logistics was strategised based on the long-term involvement of the UK's forces in counter-insurgency and stabilisation operations.[8] However, the emphasis on lean forces comes at a cost: many military support functions, from logistics to maintenance, are outsourced to private contractors. Outsourcing has therefore also permeated military thinking and made private sector support indispensable and an integral part of any deployment.

When viewed in tandem with the privatisation of transport infrastructure, the UK's increasing reliance on the private sector for military operations presents significant challenges to both defence's ability to act and, ultimately, national resilience.

TRIPARTITE OF RESILIENCE: AGILITY, SPEED AND DISPERSION

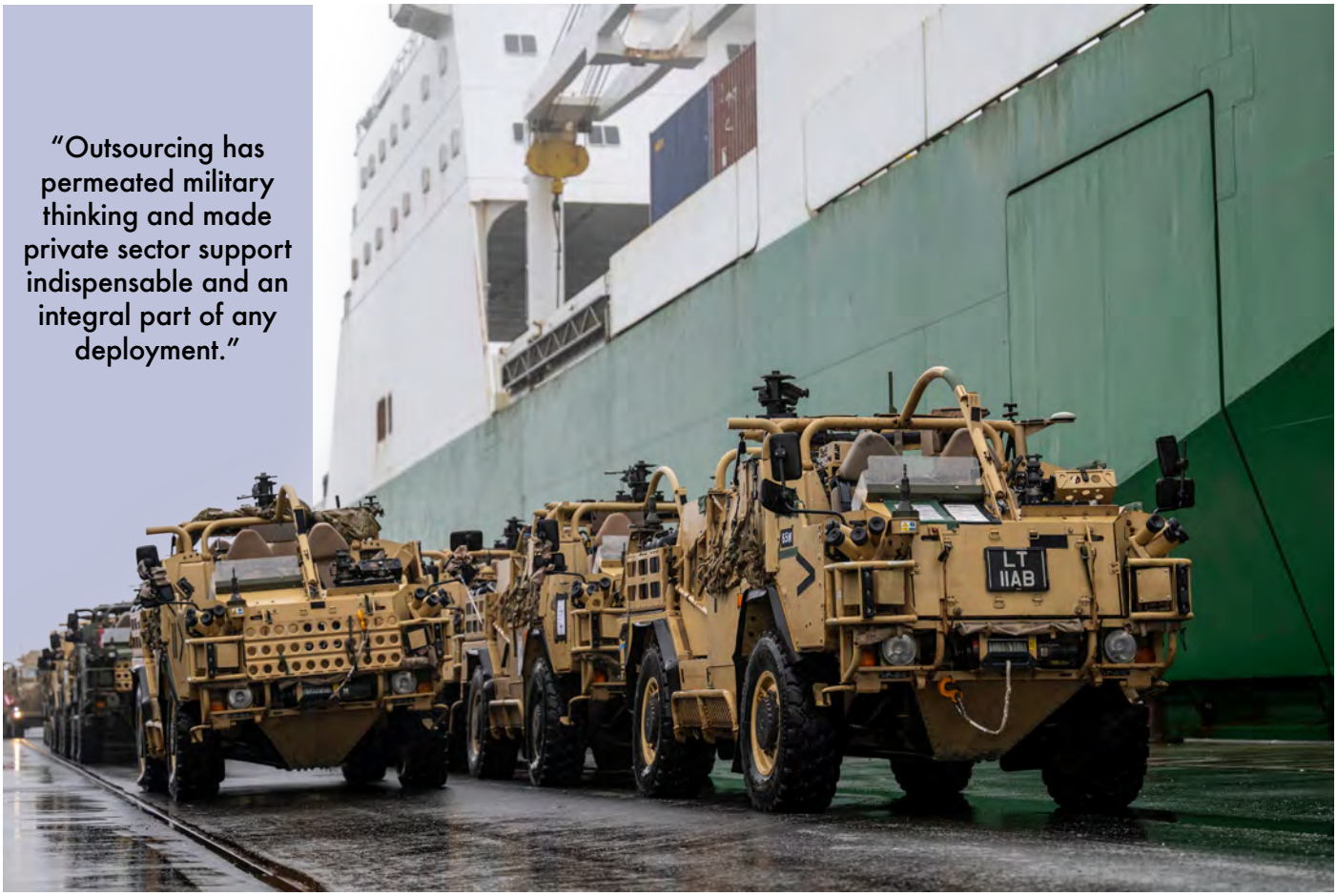
This realisation creates a requirement for a rethink in strategic logistics to integrate agility, dispersion and speed, as without them the military's readiness and resilience is greatly abridged.

Agility. Defence logistics must be agile to allow for coordinated, scalable and seamless movement across the country and to the far bank. This demands access to a comprehensive transport network, including private railways, roads, ports and airports. Peer and near-peer adversaries can operate across domains, including cyber, and therefore have the means to remotely weaken our infrastructure and military facilities. So it is vital that we are adaptable and agile if our transport capabilities or infrastructure are attacked or degraded.

Speed. Defence must be able to move at speed, to rapidly transport forces and surge materiel to any location necessary. Without speed, there is risk of losing strategic advantages and hence one must ensure access to all available commercial transport assets to increase capacity.

[8] *Barry, B. et al. (2023) "The Future of NATO's European Land Forces: Plans, Challenges, Prospects", International Institute for Strategic Studies.*

"Outsourcing has permeated military thinking and made private sector support indispensable and an integral part of any deployment."



Dispersion. Defence must incorporate dispersal into its strategic logistics thinking to increase resilience of resources and forces in the event of adversarial activity. Dispersal mitigates vulnerabilities and reduces risk of concentrated losses.

Integrating all three factors requires availability of a plethora of transport resources and infrastructure, which must be supported by commercial and private organisations. However, there are hindrances to the access to the transport network that arise from private ownership. A central factor to consider is the commercial interest of the provider that could lead them to prioritise profitability and shareholder interest over defence support. Strategic foresight must therefore be assured within doctrine and strategy to guarantee assured access and cohered operations. This necessitates whole nation thinking, legislative changes and policy development.

BENCHMARKING BEST PRACTICES FROM NATO ALLIES

There is benefit in examining models or legislative levers implemented by other nations. Especially interesting is Germany, as it is the turntable and central hub of NATO force movement. The country recently published its *Framework Guidelines for Overall Defence*, which tackles issues such as provision of equipment, services and access to the transport infrastructure. It declared that industry must provide vehicles, depot machinery and IT infrastructure for military purposes if defence requires it.[9] More concrete are legislative powers such as the Transport Services Act that assures that transport services are available to defence in the event that its own logistics capabilities are not sufficient to meet demands that arise due to support to operations.[10] Germany's model offers a blueprint for the UK to explore how policy might ensure that transport and infrastructure remain accessible to defence in emergencies.

Similarly interesting is Estonia's development of a database of a range of civilian vehicles that can be requisitioned if required.[11] This proactive contingency planning is integral for awareness of the number and location of specialised civilian assets available. This not only increases resilience by assuring access to commercial assets, but it also enhances the available data for detailed contingency planning, by allowing for more refined resource allocation and testing.

Lastly, Norway has greatly increased its civil-military transport integration by signing agreements with commercial maritime logistics companies to support in areas of

transport and harbour services.[12] Whilst the previous German example tackles access to public roads and railways this Norwegian model assures extra capacity provided by privately used enterprises. Ultimately this widens the accessible network of capacity even further. Moreover, Norway has several legislative tools at its disposal to enhance military logistics. Notably, the Requisitions Act, which grants military authorities the power to "requisition whatever is necessary for military forces and associated institutions" (Requisition Act of June 29, 1951, No. 19).[13] Additionally, the Requisition of Vessels Act allows the King to re-role any vessels owned by Norwegian citizens, residents or shipowners operating within Norway (Act of December 19, 1952, No. 2).[14] These provide great examples of how to reduce the financial burden on government whilst still increasing readiness and resilience. Unlike commercial contracts that typically require upfront payments or ongoing fees, these legislative levers allow Norway's armed forces to access necessary resources without incurring significant costs prior to the usage of the assets.

TOWARD A RESILIENT LOGISTICS FRAMEWORK

It is evident that there must be a refresh of strategic logistics strategy in order to implement the lessons on agility, speed and dispersion. Moreover, it seems a statement of the obvious that resilience planning within the refresh must lay out a framework to assure wider logistics capacity by integrating commercial and private transport infrastructure. It is pertinent for this strategic restructuring to leverage the insights about the successes and limitations from the Falklands. They highlight the strategic value of commercial infrastructure support as it provides additional capabilities, whilst in tandem drawing focus to the challenges caused by "last-minute mobility".

Important to note is that with the increasing rate of foreign or multinational ownership of the UK's transport infrastructure, the ability to ensure the seamless integration of the network is a challenging task. Defence must act in order to circumvent the issues caused by the non-strategised private support and to realise the indispensable benefits from commercial private industry support. There is value in studying the legislative frameworks and levers enacted by NATO allies as possible blueprints for recalibrating the strategic logistics capabilities. In conclusion, through the formulation of enabling regulatory frameworks that assure access to commercial transport infrastructure, defence can bolster its logistics capabilities and ensure agility, speed and dispersal. Ultimately this strengthens the UK's resilience, deterrence and defence capabilities and its capacity to support NATO and its allies in an era of rapid and unpredictable conflict.

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[9] *Bundesministerium des Innern und für Heimat (2024) Rahmenrichtlinien für die Gesamtverteidigung -Gesamtverteidigungsrichtlinien – (RRGV).*

[10] *Bundesministerium der Justiz (2004) "Gesetz zur Sicherung von Verkehrsleistungen" (Verkehrsleistungsgesetz – VerkLG).*

[11] *Zymanski P. (2020), "New ideas for total defence – Comprehensive security in Finland and Estonia". OSW Report, Centre for Eastern Studies, OSW, Warsaw, Poland.*

[12] *Norwegian Ministry of Defence (2018), "Support and Cooperation", p. 34.*

[13] *Ibid, p.37.*

[14] *Ibid, p.38.*

ARRESTED (FORCE) DEVELOPMENT

AUTHOR

William F. Owen (Wilf) served for 12 years in the British Army in regular and reserve infantry and intelligence units. He co-founded and is the editor of *Military Strategy Magazine*. His book, *Euclid's Army: Preparing Land Forces for Warfare Today* (Howgate Publishing), is due for release in January.

THE best way to prepare an army for warfare is an understudied subject in international relations and security studies literature. What follows is not about 'fixing the British Army' but, for the sake of the readership, we will use some British Army-specific issues to explain the observations better.

Discussions in force development and, thus, how to better prepare an army for war can only occur within a framework of equipment, training and organisation. Assuming that is agreed, it is completely pointless to reference abstract concepts such as 'confronting Russia' unless you can exactly frame that discussion in equipment, training and organisation. If Russia is an existential threat, then equipment, training and organisation, and the commensurate level of funding need to reflect that as it did in the Cold War.

Absent that level of specificity, the government should allocate enough funding for the best land force to secure its security interests. No army can guess or predict what war the government will commit it to – so seeking to predict that is foolish.

It is equally foolish to suggest that the 'future is getting increasingly complex and dangerous' or that 'warfare is transforming'. Both aphorisms merely result in academic literature, delayed decisions and prolonged discussions. There was no time in human history when the future wasn't dangerous and complicated. Warfare is a practical skill, so any transformation should be apparent and predictable based on subject matter expertise.

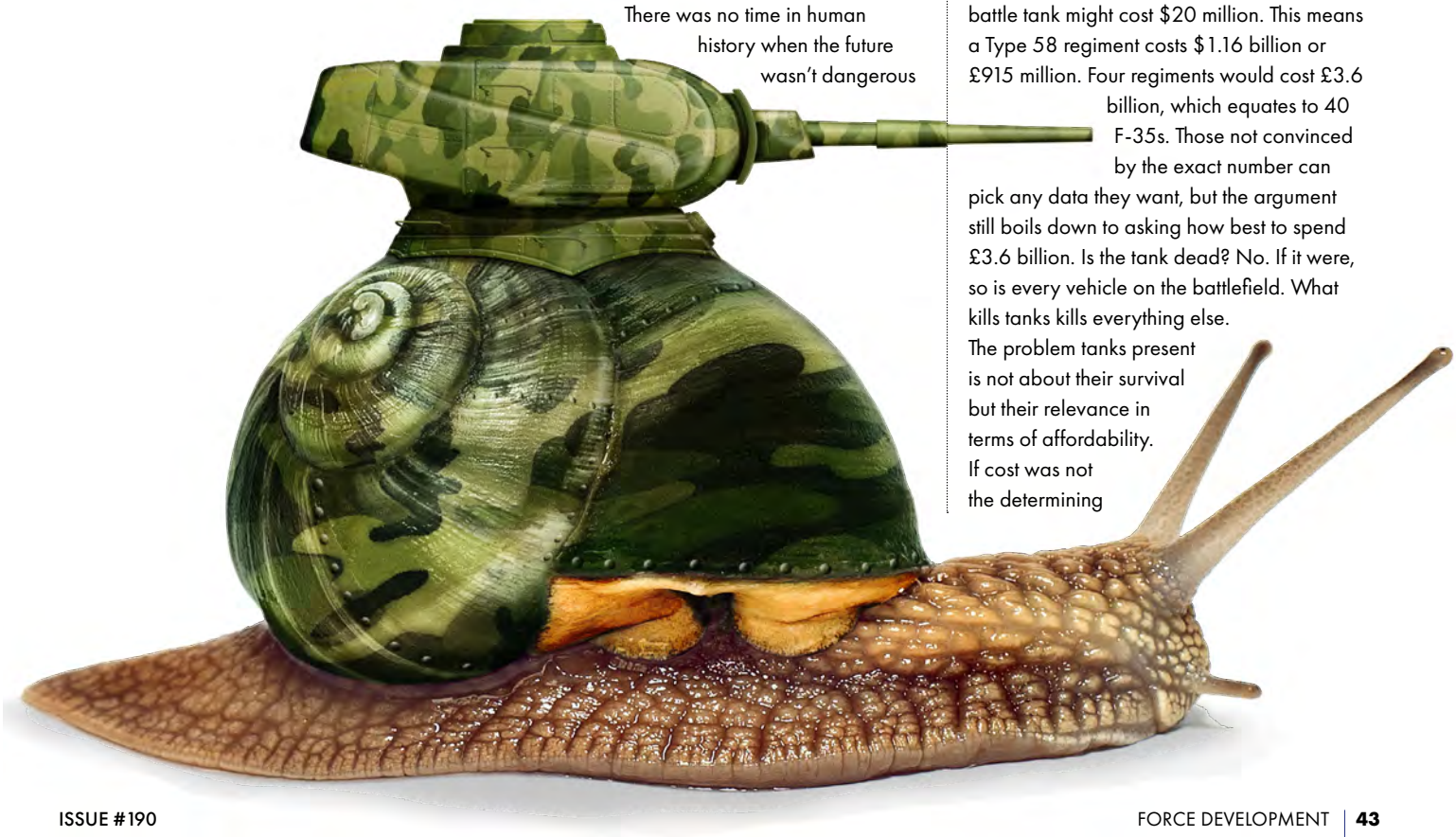
What can be predicted is the equipment, training and organisation that the allocated budget allows. The size of that budget is not a military decision. Thus, the primary task of any force development organisation is to create the best possible force for a given amount of money. Very few nations can predict where, when, why or against whom they will fight. Thus, the aim must be to develop a force equipped, trained and organised to confront various adversaries, including those as, if not more, capable than your force. No force ever starts from scratch, so how to re-equip, re-train and re-organise must be viable from within or in addition to an existing force. The unit should be the focus of this effort.

You can only re-equip with existing equipment based on well-understood extant technology. Failure to do so usually manifests as equipment failing in service, such as the Chieftain's L60 multi-fuel engine.

BUDGET

All force development must be based on real-world cost data framed within an understanding of what constitutes the best balance of investments. For example, a new Leopard 2 main battle tank cost about €29 million in 2023. The average modern main battle tank might cost $20 million. This means a Type 58 regiment costs $1.16 billion or £915 million. Four regiments would cost £3.6 billion, which equates to 40 F-35s. Those not convinced by the exact number can pick any data they want, but the argument still boils down to asking how best to spend £3.6 billion. Is the tank dead? No. If it were, so is every vehicle on the battlefield. What kills tanks kills everything else.

The problem tanks present is not about their survival but their relevance in terms of affordability. If cost was not the determining



factor in creating armies, then an army of 1450 would have contained nothing but men wearing full plate armour, and today's army would simply buy hundreds of main battle tanks and infantry fighting vehicles, regardless of cost. This has never been realistic.

COMMUNICATION IMPLICATIONS

A land force's most important equipment decision is its communications system. Without it, all else is useless. Yet communications and battlefield management systems receive little press attention or even professional debate, mainly because defence commentators and journalists are unaware of the importance of communications for fires, manoeuvres and sustainment. This may not apply to military professionals, but it should seriously concern all charged with any degree of force development. A deep understanding of communications directly reflects how a land force is commanded and, more fundamentally, how a land force fights. Confusion about the communications requirements of a land force might imply a wider confusion about how land forces are commanded and should operate.

As should be obvious, security and freedom of action in the electromagnetic spectrum are critical to modern warfare, as is freedom of air action for both manned and unmanned systems.

Communication capability is critical to all command, control, communications and intelligence, and intelligence, surveillance, target acquisition and reconnaissance, thus fires, offensive support and manoeuvres. It is the spine on which all detection, tracking and precision attacks depend. The ability to detect and kill at range is the main way any land force can defeat massed armour offensive action because air-based or ground sensors can detect and cue precision-guided anti-armour munitions. It is very hard to effectively employ massed armour against a force with robust communications, freedom of air action and adequate non-line-of-sight anti-armour weapons. This also includes using loitering munitions to attack enemy emitters, vehicles or structures. This is nothing new. These are all 20 or more years old capabilities.

Of note, China, North Korea and Iran now have non-line-of-sight-capable radio frequency and fibre optically guided anti-armour weapons. They also have capable unmanned aircraft systems (UASs). Iran even has Shahid '358 missiles' – turbojet-powered anti-air/UAS loitering munitions designed to target Watchkeeper and Predator-type UASs. It is assumed to be capable of 250 knots and 38,000 feet. If it threatens UASs, it will almost certainly threaten attack and

"While Merkava is 37 per cent heavier [than a K2], it is not 37 per cent less mobile or 37 per cent less capable of crossing obstacles unless frozen lakes and wooden bridges are the relevant metrics."

support helicopters. Turbo-prop intelligence, surveillance, target acquisition and reconnaissance and transport platforms may also be vulnerable. Thus, the standard model of a peer or near-peer adversary that adheres to a standard Cold War combined arms model of main battle tanks, infantry fighting vehicles and self-propelled guns may be misleading.

A capable communications system is critical, but the ability to kill enemy UASs, electronic warfare and air defence radar operators and their associated equipment is axiomatic to ensuring you have the required freedom of action to employ both the communications spectrum and air environment.

THE CAPABILITY TRAP

Land forces want the best equipment because they are potentially in a life-and-death struggle to succeed. Capability as an idea is designed to identify the requirement or the equipment that is the best choice. Constructs such as firepower, protection and mobility are used outside their original purpose to provide a hierarchy and framework for that type of discussion. However, a framework that considers cost, weight and complexity raises an entirely new set of questions which can provide an adequate solution because it is more likely to align with the budgetary constraints.

Cost, weight and complexity have strong, coherent connections. In basic terms, while a 65-tonne Leopard 2 might cost $20 million, a 28-30-tonne CV-90/120, with approximately the same gun and equal or better speed and agility, may cost half as much. The argument about which is more 'capable' then dismisses cost as a factor, thus dismissing a whole raft of other factors that could impact training and organisation. Cost and capability are so strongly related as to be indivisible.

Weight is strongly aligned with protection in terms of armoured fighting vehicle design. That seems well understood, but the impact of mass on force design is less well understood. A 56-tonne main battle tank will impact force design to the same extent as a 70-tonne tank. Both will need transporters. Both will have similar equipment support mass in track and engine weight. The 77-tonne Merkava IV and 56-tonne K2 Black Panther have the same basic power packs. All require specialist vehicle-launched bridging equipment and recovery vehicles. Open-source figures suggest their fuel consumption unit is nearly identical, albeit a Merkava needs to hold about 8-9 per cent more fuel first-line, which is trivial given the overall petrol, oil and lubrication requirements for an armoured brigade. Significant weight and sustainment savings manifest only once you get below 35 tonnes.

An active protection system can significantly enable a 35-tonne vehicle, which is why it is critical to the overall capability of any mechanised or armoured force. Active protection systems can now target loitering munitions and 'kamikaze drones' (see pages 20-23), as well as most rocket-propelled grenades or anti-tank guided missiles. Most of all, combat-proven active protection systems are low-weight and cost a percentage of an overall vehicle cost, dependent on mass or the reduced performance and reliability associated with increased passive armour mass.

In the words of Israel Tal, "protection enables all else". That statement was made in full recognition that too much protection can degrade everything else. Still, there is considerable risk in assuming the benefits of reducing protection to see gains in lethality and mobility. Merkava IV and K2 both fire the same ammunition. Differences in stabilisation and fire control have no impact on mass. While Merkava is 37 per cent heavier, it is not 37 per cent less mobile or 37 per cent less capable of crossing obstacles unless frozen lakes and wooden bridges are the relevant metrics. Southern Lebanon has considerably less developed infrastructure than anywhere in Europe and greater terrain type variation. Opinions on Challenger 3 being too heavy because reports of Challenger 2 bogging down in Ukraine are facile at best and don't account for seasonal rainfall and vehicle commander experience. The Golan Heights and Southern Lebanon have annual rainfall like London or parts of Ukraine. Tanks 'designed to fight the Cold War' have been operationally useful across the globe, so the idea that tank design is a product of specific national terrain rather than doctrine doesn't hold water.

Nothing written so far should suggest that one tank is better than the other. Instead, it should suggest a more intelligent debate based on a deeper understanding of the relevant issues.

Cost, weight and complexity better inform that debate than protection, firepower and mobility. Open source suggests that an export Merkava IV is considerably less expensive than a K2 but lacks authoritative real-world data. Assuming each tank is the same price might usefully gain some insights. The defining factor in the capability is often the crew training, regardless of the vehicle. Why debate the specific weight of tanks when how to train a tank crew is the more important conversation?

If decision-makers are overly focused on capability, they are often blinded to more fundamental choices. The capability of 155mm self-propelled and towed guns varies widely. The cost of a 155mm shell might also vary widely, but let us assume £4,500 per round, complete with charges, fuse and barrel life debt. Firing 300 rounds per day equals £1.35 million, so if you want to hold a stock of 30 days of 155mm ammunition, it equates to £40.5 million per gun without storage costs and associated shelf life. Pedants can quibble about exact costs, but the arc of the argument should be clear. Is it time to ditch mass and look at precision? Precision-guided, cluster munitions or sensor-fused munition 155mm ammunition natures have an estimated cost of £25-100,000 per round. Thus, the cost of the actual 155 platform might not be as significant as supposed. Some discussions logically flow from this that cover sovereign ammunition manufacturing capabilities, for example, should close support focus more on 120mm mortars or 70/122/160mm rocket systems? Is the debate between mass and precision a broken construct? Broken or less-than-useful similar debates, such as tracks versus wheels and threat versus capability, might be better understood when cost, weight and complexity frame the choices inherent to those discussions.

The worst aspect of capability, as commonly expressed, is that it focuses on individual equipment choices, such as main battle tanks and infantry fighting vehicles, rather than the aggregate of unit, formation or divisional performance measures.

BAOR – VERY GOOD AND VERY BAD

The spectre of the British Army of the Rhine (1st (British) Corps) has re-emerged over the last decade in connection with a renewed focus on Russia. It has been all too easy for some to suppose that the future British Army should somehow emulate the armoured-type force qualities of 1 BR Corps at the end of the Cold War. There is some merit in this, as 1 BR Corps had a laser-like focus on the threat, and it was always ready to fight, at least on paper, with satisfying surprise deployment exercises mounted at a mere four hours' notice. It trained a lot, and it knew how it would fight, or at least claimed to, with some element of justification. It was mostly a tracked and armoured force built around four divisions. Many units from the British Army of the Rhine were routinely re-roled to conduct Northern Ireland tours. From that perspective, it was a highly capable and flexible force.

The counterpoint was that it was a garrison force which was less than 200 kilometres from its main deployment areas and designed to fight an existential war for 14-30 days before either being overwhelmed, destroyed in a nuclear conflagration or saved by ceasefire. Thus, 1 BR Corps only held enough stocks for a very short intensive war. Modern scholarship by Kenton White at the University of Reading suggests that 1 BR Corps may have never held enough ammunition stocks as a cost-saving measure. When the need arose to deploy an armoured division to Saudi Arabia in 1991, while possible, it was far from easy, and only one division could be sustained out of the Corps area. 1 BR Corps was never intended to be deployable, regenerated or sustained in combat for more than 30 days. Let us suppose the flow down of legacy concepts and doctrines still lingers. In that case, they might significantly retard progress and effective equipment, training and organisational choices in terms of what the correct balance of investments is.

IT'S NOT THAT SIMPLE

Over the last 15 to 20 years, various personalities associated with UK force development have asserted that rifled tank main guns are superior to smooth bores. Additionally, active protection systems do not work, and band tracks' performance is inferior to metal tracks for light and medium vehicles. All such assertions are now proven false. This allegation is anecdotal, but I strongly believe I am not alone in hearing or reading them. The problem is these evidence-free opinions have long-lasting consequences in application. For example, someone might opine that the Boxer armoured personnel carrier should have an unmanned turret with a 30mm cannon. They might further opine that such a requirement is non-discretionary in modern warfare, especially regarding urban operations. Yet the Israel Defense Forces has no cannon-equipped armoured fighting vehicles and 20 years of near-continuous experience operating armour vehicles in urban combat. Who is wrong and who is right? Is the debate really about cannons or culture?

Culture, personality, arms and service rivalry, and self-image widely undermine the logic of force development. While there are many budgetary, legislative, safety and policy obstacles to effective force development, the greatest problem is individuals or cliques unwilling to implement the necessary degree of change. Creating a modern well, equipped, capable force within a limited budget is not beyond the wit of most land forces, given a sufficiently rigorous and objective approach. Still, political institutions and civil servants combined with poor professional military education and poor leadership can complicate the process into stasis beyond that which logic can address.

Warfare primarily concerns ideas, not equipment, so the most fault lies with bad ideas. Ideas will drive choices regarding equipment, training and organisation. By far, the biggest obstacle to better preparing an army for war is those individuals who stand in the way, either intentionally or unintentionally. Building an effective land force within a limited budget is achievable far more simply and quickly than is commonly done. The army or deployable force you don't have is more useless than the less-than-ideal army you can create in 18-36 months. What prevents that is people. People – not technology, the changing character of war or the unknowable future – are the problem.

Ready to rumble: A Challenger main battle tank pictured during a British Army of the Rhine exercise (Iron Hammer) in 1988.

REINVENTING THE WHEEL

"WEEVES, I want to get cracking on doubling fighting power by 2027 so don't bother me with any discipline today... especially if it's anything to do with beards," shouted Colonel Tony Jooster from his adjoining office.

Weeves looked up from his standing desk and sighed. Waiting outside his door was a line of discipline cases and most of them were facial hair related. The majority were because the soldier in question hadn't managed to achieve a 'full beard' in the permitted two weeks. Weeves could spot the minimum 2.5mm length at ten paces.

"Charging you lot for 'uneven growth or coverage' isn't a good use of my time," groaned Weeves. "You, you, and you, get down to the quartermaster's office and his kitten will lick that offending fuzz off your face."

Inundated with hirsute soldiers after the change of policy, Weeves had resorted to printing a copy of *AGAI Volume 2, Chapter 59* to have as a quick reference on his desk. Sadly, the process of printing this had taken far longer than it should have. This was due to the flight of stairs and 25 metres of corridor between his office and the only working printer in the building. Contributory complications also included the printer toner needing to be replaced, the regimental second in command leaving three sheets of posh paper in the tray and Weeves' computer deciding on a whim to amend his settings to A3.

AUTHOR

The Boxer is a serving British Army officer who floats around the Service like a butterfly and whose words *can* sting like a bee.

That left Corporal 'Tracer' Cobham, who was due in front of the CO because his beard was deemed 'un-natural in shade'. Tracer thought his nickname was because he had an orange beard. It actually referred to his tendency to burn out on PT after just 1,200 metres.

"I've not dyed it, sir, it's always been like this, swear on my kids' lives."

Weeves knew Tracer didn't have any kids but time was pressing. "Frankly Tracer, you look better without the beard so mag to grid it and everyone's happy. Okay?"

"No worries, sir."

Weeves could now get after the Chief of the General Staff's mission to double fighting power by 2027. He thought trying to measure the unmeasurable and then doubling it was a tough ask but it had gripped the brigade staff and consequently the commanding officer, although both appeared to think CGS wanted it achieved by next Wednesday.

Keen to show rapid progress, the colonel had arranged a meeting with a mate from his previous role in defence procurement to discuss an exciting autonomous system. Suddenly Dan from Fifth Generation arrived at Weeves' desk. Weeves had expected to escort him into camp. However, Dan had only just left the Army and, having displayed all the human behaviour expected, the soldier on the gate had waved him straight in.

Dan was ushered into the CO's office with Weeves and the RSM and got straight to the pitch. Fifth Generation's fully autonomous, all-terrain supply vehicle would dramatically modernise the battalion's resupply capability by following conventional logistics trucks using radar technology and artificial intelligence. This would significantly reduce the workforce required and integrate technology at every level. What's more Dan could offer rapid acquisition 'at the edge'. Weeves glanced at the RSM, clearly neither of them understood what or where the 'edge' was, but it sounded impressive and he suspected nobody else knew what or where the 'edge' was either.

After that, things moved quickly. The regimental operations officer, known as 'Flapjack' because he either panicked unnecessarily or

passed on tasks he didn't like to others, worked day and night to draft endless versions of a concept of employment. And, in parallel, a working prototype was delivered to prove a close and resilient relationship with industry.

Soon after, Weeves and the RSM were sharing a brew in Weeves' office. The RSM was initially lamenting an upsetting case of vandalism to an Army Empowerment poster in the Sergeants' Mess toilets. Someone had written 'plan twice' over the question 'what would you do with more time for planning?".

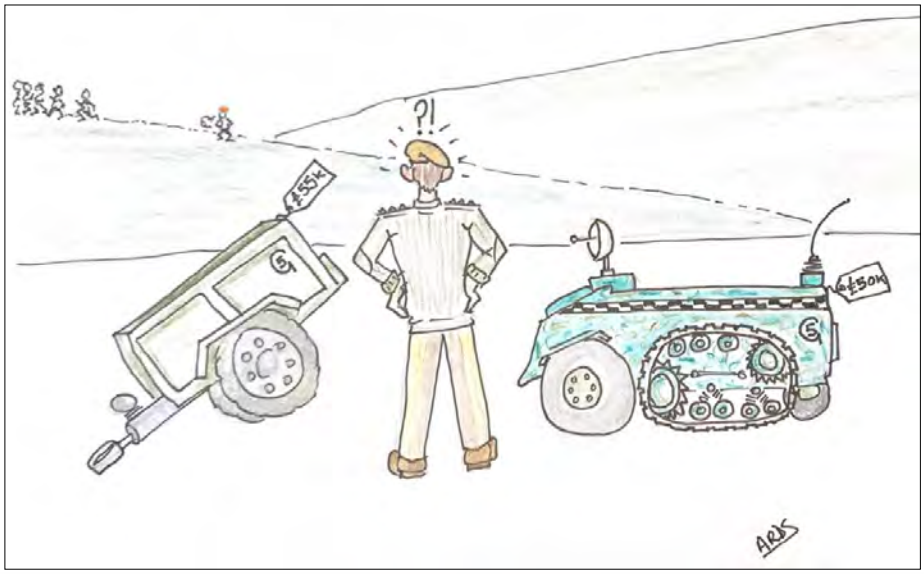
"I have to admit," remarked the RSM, "I was sceptical when I heard about that bit of tech but it really did well on the training area. The lads and lasses smashed it over the hills, day and night, in rain, fog, sleet, snow and the heat and it passed with flying colours."

"Yes, I suppose we have had strange weather here the last few weeks," said Weeves, adding "I thought it had a drama in week one?".

"Well, there was an issue when it misidentified the vehicle to be followed and ended up tailing Sergeant Macleod's wife's car to that new Greek restaurant near the patch, but we told the trials team and they mucked about with the software."

"Spiral development?"

"No, I think it's called *The Real Greek* but anyway the glitch seems to be all sorted now. I heard Army HQ made a huge order so I'm guessing it could be rolled out to the entire Army?"



"Yes, that's right – a real success story for the colonel and the battalion," replied Weeves.

"It's funny, I was chatting about it to Corporal 'Dinger' Ling and he wondered why we'd not just got a trailer."

Weeves dropped his pink wafer into his brew. "We could just use trailers and save all that money. Cheers RSM, I'll get onto Army HQ".

"The colonel's not going to like it," remarked the RSM.

"It's the right thing to do," replied Weeves as he set about emailing the Rapid Acquisition Team's Head RAT. Shortly afterwards, Weeves received the welcome news that rather than an expensive technological solution, a simple trailer would indeed be used. And Fifth Generation was able to deliver it. But because it was a change to the original contract it would cost ten per cent more than the autonomous vehicle.

"I suppose that means my application for a working printer on my floor isn't going to get through," thought Weeves.

But as he trudged back across camp to the only unbroken printer, he reminded himself, "you work for an organisation that drives with its lights on during the day, and turns them off at night".

***The Boxer* will be back...**

WARGAMING'S 'SHARP BLADE'

AUTHOR

James Halstead is an analyst with Vedette Consulting and a researcher of the First and Second World Wars. He recently submitted his PhD thesis on 'Development of the Operational Level in the British and Indian Armies during the Second World War' at Brunel University and has an MA from King's College London.

"The 'principal advantage' of the War Game is the practice which it gives the Officer in deciding what he ought to do in a given situation. It is not enough for the Officer, when he finds himself in the field, that he should have his head full of what is called 'valuable information'; he has to make up his mind what orders he will give, and the more he runs through in his head the doctrines laid down in text-books on tactics, the more he will find himself embarrassed."[1]

THE above are the words of Henry Spenser-Wilkinson, one of the earliest British adopters of wargaming, writing in 1888. This is how the designers of one of the latest tactical wargaming systems designed for the British Army, writing in 2024, describe their own game: "Designed to teach combined arms planning and execution from company to battlegroup, players have noted the value of playing against a 'reactive enemy' and having their 'mental agility properly tested' during the execute phase."

While the language has changed, the sentiment remains the same. Wargaming has consistently demonstrated both continuity, but also considerable agility in supporting the British Army, despite the changing character of war and Britain's position on the world stage.

Wargaming has become increasingly mainstream within British defence over the past decade, but the technique has roots in British Army intellectual culture reaching back to the late 19th century.[3] Wargaming's basic premise and values have remained relevant, but its processes and toolsets have consistently adapted to reflect the changing nature of warfare. The Ministry of Defence has increasingly used wargaming as a methodology to augment training and analysis for its traditional military functions.[4] The recent *Influence Wargaming Handbook*, for example, explained how "wargaming can be used to better represent and explore influence effects across a range of policy, force development, planning, education and training problems".[5]

Wargaming in the modern Army, therefore, is both alive and kicking but there is a lack of understanding both of what wargaming has offered in the past and of its complexities. A better understanding of British historical wargaming will allow us to understand which techniques will continue to apply long into the future, and where we need to add to and adapt the methodology.

This article on the history of British Army wargaming shows both its potent uses as a tool of analysis, and the risks to decision-making that badly designed or incorrectly employed wargames can have upon decision-makers. Wargaming is a sharp blade that can just as easily harm the wielder as its foe.

Understanding the history of wargaming within the British Army of the early 20th century demonstrates that wargaming should remain a part of military routine, as natural as physical training. It also shows why wargaming needs to constantly change, and why wargaming as a methodology is inherently suited to this.

My analysis focuses on the use of wargames for both training and analysis, linking the two subjects and analysing British wargaming holistically over the course of the 20th century.

SPENSER-WILKINSON TO THE FIRST WORLD WAR

Following the development of the Prussian Kriegsspiel, a wargame that proved a potent method of preparation for the Franco-Prussian war, the initial impetus for the introduction of wargaming into the British Army was focused on its perceived training value to officers. Wargaming had been present in civilian societies, such as the Manchester Tactical Society which translated copies of the Prussian Kriegsspiel, since 1839, but it took until 1872 for the War Office to release its own, official translation of the Kriegsspiel. Translations of subsequent versions of the Prussian Kriegsspiel were later made available in Britain in 1884.[6] These were subsequently revised by the War Office into the first War Office-authored

[1] *Captain H. Spenser Wilkinson, 'The Practical Value of the War Game', RUSI Journal 32, no. 143 (1888): 69–88.*

[2] *linkedin.com/posts/vedette-consulting_military-defence-wargame-activity-7243899638133440512-hB_S/?utm_source=share&utm_medium=member_desktop*

[3] *gov.uk/government/news/launch-of-the-defence-experimentation-and-wargaming-hub*

[4] *See, for example, the recent publication of an 'Influence Wargaming' handbook by DSTL: gov.uk/government/news/wargaming-conference-highlights-the-value-of-influence*

[5] *Ministry of Defence, Influence Wargaming Handbook (Shrivenham: Development, Concepts and Doctrine Centre, 2023), p. iii.*

[6] *Christopher Yi-Han Choy, 'British War-Gaming, 1870-1914' (Masters Thesis, London, King's College, 2013), p.15.*

wargame regulations published in 1896.

A series of War Office regulations in 1896, 1909 and 1913 heavily emphasised the training value of wargames. These were focused heavily on specific experiential learning for officers: the 1896 regulations described the "framing of orders" by players as "the most valuable training to be derived from war games".[7] Most games at this time functioned as a sandbox in which to accustom officers to the realities of the modern battlefield from the start. These early regulations established the 'model' around which British wargaming was to be based for the following decades.

Wargames, in their earliest incarnations, did not even stretch to cover the resolution of combat, focusing on the use of the wargame to guide the deployment and guiding of formations. Once formations engaged in battle the regulations directed commanders to switch to a regimental staff exercise to cover all the factors of such an engagement.[8] Regulations limited their use to simulate 'minor tactical' engagements to territorial forces who would not have the same opportunities as their regular British Army colleagues to get out into the field and practice.

Wargaming became a widespread part of the British Army's toolset at the same time. Especially during the first decade of the 20th century, there was broad but inconsistent adoption of wargaming including through Henry Wilson who introduced it into the Camberley Staff College. Following Wilson's tenure, however, wargames reduced in number again at Camberley up until 1910. At the turn of the decade, there was a dramatic surge in use before the First World War where exercises looking at the deployment of a British force to work alongside the Belgian and French armies on the continent were significant elements of Camberley's Senior Division course during 1912 and 1913.[9]

Play pioneers: Field Marshal Sir Henry Hughes Wilson, left, and Lieutenant-General Sir James Moncrieff Grierson (pictured as a colonel). Library of Congress Prints and Photographs collection/Public domain

At the same time the late Victorian and Edwardian Army were beginning to adapt the techniques and regulations prepared for training wargames to the analysis of the military problems which faced the British Empire.

James Grierson's 1905 wargame and Henry Wilson's 1917 wargame bookended two major strategic decisions about deployment of the British Expeditionary Force in France. Both wargames had a huge impact on political and strategic decisions about the deployment of British troops in France, but with very different consequences. They demonstrate the sophistication of the problems which the British Army sought to find answers to through wargaming. Understanding them, however, also offers a place to understand the trade-offs and nuances of using wargames for analytical purposes. Historically, both wargames are misunderstood poorly or not at all. The 1905 wargame, for example, has been praised for allowing Britain "to presciently anticipate the Schlieffen plan".[10] This is a reductive perspective and true analysis of the policy context of both games demonstrates much more nuance.

GAME ROLES

Senior decision-makers used both of these games to support decision-making on where they would deploy their troops on the continent to best respond to a German offensive. By the end of 1917, Russia had been knocked out of the war by a combination of internal revolution and battlefield defeat. This freed German military power to concentrate against Britain and France in an offensive in 1918 aimed at defeating them both before the arrival of American troops. Allied strategy was evolving, however, and Italy's recent defeat at Caporetto in late-1917 led to the creation of a Supreme War Council; an inter-allied headquarters located in Versailles that was intended to exert greater control over the conduct of the war on the Western Front. Wilson led the British delegation on the council by late 1917 and attempted to understand this fresh German offensive through a series of analytical wargames. At the core of Wilson's Versailles wargames was the question of where and when Germany would carry out her offensive on the Western Front and, therefore, how the British and French armies should employ their increasingly scarce resources and manpower.

Twelve years previously, in 1905, Major-General Grierson had conducted a similarly-focused wargame: to explore the possibilities of a German invasion through Belgium into France, but more importantly the implications for a British deployment into Belgium. This game analysed the possible deployment and then military performance of a British Expeditionary Force to Belgium in the case of a German attempt to invade France via Belgium. Unlike Wilson's wargame of 1917, Grierson's wargame was carried out in peacetime to assess "the possibility of despatching a British military force to the continent to support the French army in a war against Germany".[11] It was based on a scenario in which a Franco-German war had been underway for several months. Germany had invaded France from Alsace-Lorraine and had been held on the line of French fortresses of Sedan, Verdun, Toul, Epinal and Belfort. This scenario imagined Britain's involvement as a result of Germany seeking to outflank these French defences by moving through Belgium, triggering the mobilisation and despatch of a British Expeditionary Force.

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[7] *Rules for the Conduct of the War-Game on a Map (London: Her Majesty's Stationery Office, 1896), archive.org/details/rulesforconducto00grearich/page/n1/mode/2up?view=theater, p. 3-4*

[8] *General Staff War Office, Training and Manoeuvre Regulations, 1909 (London: Her Majesty's Stationery Office, 1909), p. 33-34.*

[9] *JSCSC, Camberley Reds, Senior Division Syllabus, 1912 and 1913.*

[10] *Ministry of Defence, Influence Wargaming Handbook (Shrivenham: Development, Concepts and Doctrine Centre, 2023), p. 2.*

[11] *William Philpott, 'The General Staff and the Paradoxes of Continental War', in The British General Staff: Reform and Innovation, 1890-1939, ed. David French and Brian Holden Reid (London: Frank Cass, 2002), 95–111, p. 96.*

Both Grierson and Wilson were big exponents of using wargaming to study military problems. While serving in Peshawar, in India, Grierson set up a "military society" to give "officers, warrant officers, and sergeants opportunities of keeping up and increasing their professional knowledge", to be achieved by lectures and the playing of a wargame on alternating weeks.[12] Like earlier British wargaming this was heavily influenced by German practice – the society was based on the 'Berlin model' of such societies.[13] Similarly, Wilson oversaw the institution of wargaming at Camberley Staff College during his tenure as commandant. Both men, during their tenures as Director of Military Operations at the War Office, employed wargaming heavily to explore possible scenarios.[14] Grierson's experience with wargaming in India brings out one more familiar problem: while he had set up the society Grierson also had no doubt that the society would "fall to the ground... when I go".[15] Wargaming was heavily dependent on his enthusiasm for the method as a senior leader with the energy to drive its adoption.

NATURE OF THE GAMES

Both wargames were carried out due to the requirement to make strategic decisions about the deployment of British troops and prioritisation of resources. Both also demonstrate a great amount about the nature and contribution of wargaming has made to decision-making in the British Army.

Analysis to date by wargamers concludes that the 1905 game made a decisive contribution. The Ministry of Defence's *Wargaming Handbook* describes it as "prescient" in its anticipation of a German sweep through Belgium. There remains, however, a need for objective analysis of the wargame's assumptions and conclusions as there is a considerable risk of misrepresentation. In fact, this 'sweep' through Belgium was never a conclusion from the wargame but part of the basic scenario on which it was based. The actual conclusions from the wargame are much more nuanced.

It did demonstrate both the timescales in deploying an expeditionary force to the continent and that France would probably be unable to resist any such attack on its own.[16] However, the 1905 game also led to several erroneous assumptions by both the War Office and British government. Gooch describes the game concluding that Britain would need to speed up the deployment of the British Expeditionary Force; a positive outcome of the game which led to the revision of railway timetables and resources offered to the expeditionary force to support rapid embarkation. However, the game's scenario also entrenched twin beliefs that this invasion would not take place until several months into a European war and that the Germans would advance predominantly south of the Meuse.[17] Rather than solving any problems, this wargame instead demonstrated the 'future paradoxes' that the War Office would have to contend with in future planning for a continental war.[18] Ultimately this game was only the start of a strategic decision-making process for the War Office and produced several positive outcomes. However, the complicated legacy of this game on policy-making demonstrates the risks of relying too heavily on the conclusions of one initial, exploratory, wargame.

Wilson's game has a similarly complicated legacy. Played in late 1917 and early 1918, the British government used the conclusions of this game to drive poor strategic decision-making. Wilson's wargame predicted that the German offensive of 1918 would not start before May or June due to the need to bring forward troops to gain a decisive superiority over the Entente. Wilson's conclusions, however, were flawed in several respects. For one, he, at worst, appears to have ignored figures which anticipated that the British Army would be at least 100,000 men short by April 1918 and at best to have played the politician and 'hedged his bets' by providing a wide range of dates on a likely German attack after playing these wargames.[19] Secondly, Wilson's analysis produced as a result of these games definitively misjudged the location of the German offensive, predicting that it would focus either on the British at Arras or the French at Reims.[20] The problem here was not a failure of wargaming but an incorrect analysis based on these games influenced, quite likely, by political considerations. In fact, a range of wargames were played during this period and these other wargames did, in fact, predict the eventual German course of action. Leo Amery recorded that in January, a wargame played between two of Wilson's subordinates, Studd and Wake, simulated a German attack on the British front south of Arras on a 35-mile front with the centre based on St Quentin, with

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[12] *D.S. MacDiarmid, The Life of Lieutenant-General Sir James Moncrieff Grierson (London: Constable & Company Ltd., 1923), p. 72.*

[13] *Ibid, p. 73.*

[14] *Christopher Yi-Han Choy, 'British War-Gaming, 1870-1914' (Masters Thesis, London, King's College, 2013), p. 23; D.S. Macdiarmid, The Life of Lieutenant-General Sir James Moncrieff Grierson (London: Constable, 1923), p. 87.*

[15] *D.S. MacDiarmid, The Life of Lieutenant-General Sir James Moncrieff Grierson (London: Constable & Company Ltd., 1923), p. 78.*

[16] *Andrew Wilson's The Bomb and the Computer: The History of Professional Wargaming 1780-1968, ed. By John Curry (Bristol: History of Wargaming Project, 2014) Kindle edition, loc. 637*

[17] *John Gooch, The Plans of War: The General Staff and British Military Strategy c. 1900-1916 (London: Routledge & Kegan Paul, 1974), p. 280.*

[18] *William Philpott, 'The General Staff and the Paradoxes of Continental War', in The British General Staff: Reform and Innovation, 1890-1939, ed. David French and Brian Holden Reid (London: Frank Cass, 2002), 95–111, p. 96.*

[19] *John Spencer, 'Soldier-Diplomat: A Reassessment of Sir Henry Wilson's Influence on British Strategy in the Last 18 Months of the Great War' (Wolverhampton, University of Wolverhampton, 2018), p. 277*

[20] *TNA, WO 158/58, SWC 41, Appendix "Z", para. 3; George A.B. Dewar, Sir Douglas Haig's Command: December 19, 1915 to November 11, 1918, Vol. II (London: Constable & Company). Ltd., 1922), p. 76-77.*

the amount of divisions being used correct to within two of the actual number.[21] Even were Amery to have exaggerated the result of this wargame in his account for posterity (and his own agendas), British Expeditionary Force HQ, influenced by their own analysis, also believed that the attack would come in a similar place.[22] It does, however, demonstrate that insufficient attention was paid to the important factors drawn out by these wargames or, indeed, that they were simply missed.

Both of these wargames therefore demonstrate the importance of designing wargames to deliver appropriate analysis, and not over-extrapolation from limited data. Furthermore, in considering these wargames we need to be careful not to see wargames as predictive and interpret the existence of the Studd and Wake wargames' contribution to the analysis in an overly simplistic, if tempting, manner. Both were fought at the beginning of a strategic decision-making process about the appropriate deployment of British troops. Both also carried elements of correct 'prediction'. At least one of Wilson's wargames, if Amery is to be believed, predicted the exact course of action of the German spring offensive but was ignored by Haig in General Headquarters British Expeditionary Force. On the other side, the 1905 wargame's predictions which impacted policy were limited mainly to the basic game scenario. Both were also influenced by dangerous assumptions made in their creation which became baked into strategy. In 1905, Grierson's assumption in the writing of the scenario assumed that an attack through Belgium would only come after German failure on the frontiers. Wilson's wargame, similarly, assumed the Germans would behave logically and with full knowledge of British preparations. As Rawlinson pointed out, these wargames ignored "the human factor" and Rawlinson was insistent that Germany was sure to seek a swift decision as it did not know how quickly American reinforcements would arrive. Even though both games were at the beginning of a strategic process these assumptions became embedded within the process, often as no direct result of the conclusions generated in the game itself. Assumptions that the Germans would wait for their attack through Belgium were embedded in the scenario, while Wilson's attempt to hedge his bets on the date of the German attack only led political decision-makers to use them as evidence that there was a far lower risk on the Western Front than actually existed.

This danger continues into the present day, and only highlights the dangers that assumptions made by policymakers over a game's conclusions can have. Wargaming is a powerful method but it is not predictive or conclusive.

FIRST WORLD WAR TO SECOND WORLD WAR

Following the Great War wargaming dropped in popularity. The War Office's 1923 Training and Manoeuvre Regulations significantly shortened the wargaming sections included in the previous regulations, while the Staff College courses at Camberley included fewer wargames. This continued throughout most of the 1920s until funding pressures sparked a revival. This change is best marked by Field Marshal Milne, then Chief of the Imperial General Staff, who suggested at the 1929 Staff College conference that: "...now that money is short and there seems little likelihood of having manoeuvres in the near future. I suggest to you that there is a way of teaching your higher commanders – by means of the old war game, provided it is well conducted with proper maps."[23]

This marked the beginning of another surge in the popularity of wargaming, the British Army began to embrace wargaming again, and to make substantial adaptations. Both Camberley and Quetta simultaneously increased the quantity of wargaming in their syllabus but both colleges also introduced exercises at Camberley to teach officers in the Senior Division how to design and run wargames.

Methods of wargaming also evolved during the 1930s and 1940s, reflecting the growing importance of airpower on the modern battlefield. Regulations required wargames to involve a specific airpower umpire or, if not, an airpower 'cell' that could rule on the employment of airpower. This evolution continued during the Second World War where the Senior War Course held at Camberley altered the official wargaming regulations for their own wargames. This was because to the directing staff the "elaborate control org[anisation]" dictated by official regulations "often nullified" the advantages of wargaming to students. Wargaming, however, allowed officers to relatively easily adjust rules to suit their requirements. This inter-war period demonstrates the fluctuating interest in wargaming but also hints at the reasons for its eventual re-adoption: low price, flexibility and ability to be shaped to the prevailing conditions of warfare.

Wargaming is, at its core, about people making decisions, and the Western Desert campaign offers several potent examples of where this can actively harm wargames.

While commanding Middle East Command, Field Marshal Claude Auchinleck used wargames widely, often at the army level to prepare both senior officers but also doctrinal concepts for the battlefield. Unfortunately Middle East Command was never quite able to completely leverage its use of wargaming to create a decisive advantage due to the many other problems which the command faced in the period. That they failed to do so was almost entirely down to personnel issues within the command.

Auchinleck used a wargame before his first major offensive in the Middle East, Operation Crusader, to devise and test plans for the offensive, using his own staff to represent the British command, and the two corps commanders commanding the offensive to play the role of the axis forces.[24] This exercise was crucial in creating the plan for Crusader, Auchinleck noted that "as a result of it and after careful consultation with and cross-examination of the commanders immediately concerned, I was able to decide on the broad outline of the plan to be adopted by General Cunningham and to come to a tentative decision as to the earliest possible date on which it might be put into effect".[25] Unfortunately, fate intervened and the plan meticulously devised during this wargame wasn't put into action as was originally conceived because of the deaths of key personnel: XIII Corps commander Vivian

[21] *L.S. Amery, My Political Life, Volume Two: War and Peace, 1914-1929 (London: Hutchinson, 1953), p. 139.*

[22] *George A.B. Dewar, Sir Douglas Haig's Command: December 19, 1915 to November 11, 1918, Vol. II (London: Constable & Company Ltd., 1922) p. 78.*

[23] *TNA, WO 219/74, Report on the Staff Conference held at the Staff College Camberley, 9th to 11th January, 1933, p. 51.*

[24] *John Ryland Library (JRL), MUL 338, Letter from Auchinleck to Dill, 14 September; JRL, MUL 357, Auchinleck to Churchill, 29 September, 1941.*

[25] *JRL, MUL 366, Auchinleck to Dill, 4 October, 1941.*

Pope and three of his key staff officers in an airplane crash shortly after the wargame. Auchinleck wrote on the 13th October that: "The death of Pope, Russell and Unwin was a tragedy and constitutes a considerable set back in our preparations, especially as they had all three taken part in our War Game and so familiarised themselves to no small extent with the problem."[26] Pope's replacement as commander of XXX Corps, Willoughby-Norrie, did not adhere to the plan which Pope had signed off. Instead of fighting the large tank engagement at Gabr Saleh to attrit German armour, he instead pursued a direct thrust on Tobruk.[27] This isn't an issue with wargaming as such but demonstrates the risk of relying on individuals to take the lessons from the game and apply them to the battlefield.

The Western Desert campaign also demonstrates other personnel-related wargaming dynamics. Following Operation Crusader, Middle East Command continued to struggle – Eighth Army's successes during Crusader were rapidly reversed in early 1942. Debates over military conduct and doctrine continued within both Eighth Army and Middle East Command. Auchinleck wanted to prepare for a new offensive, but the tactical and operational problems which Eighth Army had faced continued to haunt him. Much like before Crusader, he prepared for the resumption of offensive operations by testing his operational concepts and plans using wargaming. One concept was of the 'cow-pat': pushing armoured forces deep into enemy territory and establishing a chain of supply bases which would outflank Axis forces, threatening their logistics and forcing them to attack these well-defended bases.[28] This concept was discredited through these wargames, thanks to Richard McCreery, serving as Major-General Royal Armoured Corps adviser at Headquarters Middle East Command and Major-General Francis de Guingand, one

of Auchinleck's staff officers, both of whom strongly opposed the concept. De Guingand noted that the 'cow-pat' theory finally died at a war game in which McCreery – a future Commander of Eighth Army – took part. De Guingand noted that McCreery's "efforts, I think, assisted to some extent by mine as controller of the enemy, did the trick...".[29] Two officers in Auchinleck's headquarters therefore, if we are to believe de Guingand, conspired together to disprove this concept through their execution of a wargame. Wargames are not a neutral medium, therefore, and they rely on the people taking part. This can have unfortunate consequences when something happens to those people, but it can also lead to biased results as the result of subversion of the game itself. Whether the cow-pat concept would have worked is, most certainly, up for debate but for our purposes that doesn't matter – the case demonstrates the dangers of selecting the wrong participants for a game.

Both examples demonstrate just how important the people designing and participating in wargames are. In the Western Desert the two wargames were hindered and twisted mainly by the decisions and impacts of the people taking part in them. It is a reminder that humans and their decisions are central to wargaming and that they need to be carefully considered when designing games. Auchinleck's Crusader game played on this; by casting his subordinate commanders in the role of their opponents, he helped prepare them by making them put themselves in their opponent's shoes, while stress-testing the overall plan for Crusader. The following spring, however, both McCreery and de Guingand subverted a concept development wargame, using their roles as participants in, or umpire over, a game which was intended to test a new concept, rendering its conclusions useless. It is therefore crucial to identify when designing a game: is the game a genuine experiment or is it simply confirming the biases of the game staff or sponsors?

Wargaming continued to evolve after the Second World War. Following 1945, Camberley's syllabus increasingly adapted wargames to model land warfare in a nuclear age. By the 1980s and 1990s this involved the integration of computer simulations (Snow Goose and Claws) into manual wargames.[30] Wargaming was important enough to warrant both the development of wargames through the SO1 Tactical Doctrine who worked closely with the Directorate of Battle Doctrine, culminating with the appointment of an SO1 wargaming at Camberley in 1989.[31] Throughout this period wargaming remained vital to staff education to provide officers the opportunity to practice tactics, to conduct and execute operational staff work, run a headquarters and work in a joint environment.

CONCLUSION

Wargaming has remained a key tool for the British Army to employ in both training and analysis since the early 20th century. It has contributed potent insights to decision-makers, both political and military, but a study of its history also reflects several key risks and dangers related to its poor employment, especially in its analytical use. However, the adaptation and elasticity of wargaming as a technique throughout the period is also made abundantly clear by the rapid evolution of wargaming to changed circumstance and conditions of warfare.

Basic approaches and uses of wargaming have remained the same for much of its history, as demonstrated here, and the idea behind modern wargames such as the Battlegroup Wargaming System, recently commissioned by the Land Warfare Centre to encourage wargaming throughout the Army, would be instantly recognisable to Spenser Wilkinson in 1888. Wargaming in the British Army has a long history and is, evidently, here to stay with a multitude of initiatives in action. However, it is as important to look to the past to understand where it has gone wrong, as it is to look to the future development of wargaming.

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[26] *JRL, MUL 377, Auchinleck to Dill, 13 October, 1941.*

[27] *Vincent Dennis, 'Hero to Zero: An Evaluation of the Leadership of General Sir Alan Cunningham during His African Campaigns of 1941' (PhD Thesis, King's College London, 2020), p. 185.*

[28-29] *Major-General Sir Francis de Guingand, Operation Victory (London: Hodder & Stoughton, 1949), p. 90-92.*

[30] *Simon J. Moody, Imagining Nuclear War in the British Army, 1945-1989 (Oxford: Oxford University Press, 2020), p. 135; Colonel C S Grant, 'Wargames at Camberley', RUSI Journal 138, no. 5 (1993): 38–43, p. 39*

[31] *Simon J. Moody, Imagining Nuclear War in the British Army, 1945-1989 (Oxford: Oxford University Press, 2020), p. 136.*

[32] *Colonel C S Grant, 'Wargames at Camberley', RUSI Journal 138, no. 5 (1993): 38–43, p. 39.*

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TITLE
Heavy and Continuous Sacrifice: New Zealand, her Allies and the Second World War

EDITORS
Peter Cooke and John Crawford

REVIEWER
Major Paul Knight,
SO2 Historical Analysis, Lessons Exploitation Centre, Land Warfare Centre

NEW PERSPECTIVES ON A LONG-STANDING ALLY

Growing global interest in the Pacific sphere – ABCANZ, Five Eyes, AUKUS et al – makes this examination of New Zealand perspectives on coalition operations particularly pertinent.

Heavy and Continuous Sacrifice: New Zealand, her Allies and the Second World War is a collection of 23 essays, which originated from a conference run by the New Zealand Military History Committee. Three of the articles cover air and naval operations, while two examine the impact of operational experiences on the post-war domestic space as viewed by later generations. The remaining 18 chapters can be loosely grouped into six categories: expansion of a small, peacetime military, including capability and conscription; perceptions of the enemy, especially the Afrika Korps and the Japanese; operational experiences; relations with allies – UK, Australia, France and the USA; racial and sexual relations in the Middle East and Japan; and the experience of Jewish refugees. Many of the issues faced by New Zealand in the late-1930s/early-1940s were similar to those experienced by the British Army. A small, underfunded army in a country supportive of Chamberlain's policy of appeasement needed to expand rapidly to support the UK in Europe and defend itself from Japan. New Zealand faced an additional problem that its personnel had gained no military experience since 1918 and those who had were ageing (Chapter 10, *The Best We Have at the Present Time*).

> **"Lieutenant Colonel Peter Wood's chapter, *The Will to Fight*, examines the unprecedented refusal of a platoon to engage with the enemy, and the reasons behind it. This chapter alone should be essential reading for military audiences."**

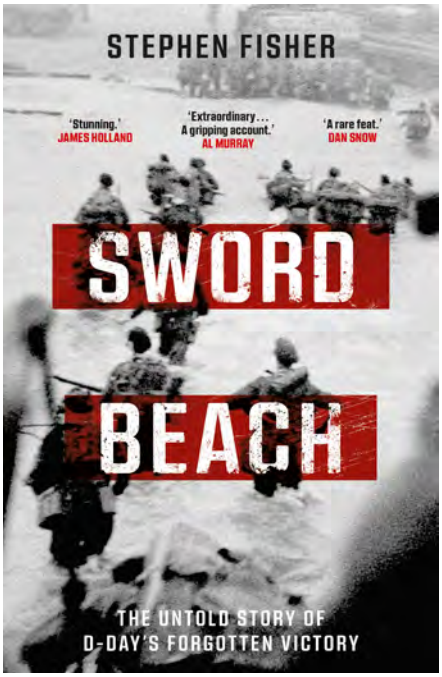
General Bernard Freyberg VC commanded the 2nd (NZ) Division in North Africa and Italy, the only Commonwealth general officer commanding to remain in post for the duration of the Second World War. (The tenure of his British counterpart in North West Europe could average as little as one month.) His command of a national contingent became highly politicised (Chapter 6, *Is it proposed that he is to go on indefinitely?*), as well as a military matter. His division was not to be used as a normal British Army division which could be employed piecemeal, but to be kept as a national entity (Chapter 7, *Auchinleck and Freyberg at War*). This produces interesting parallels with the modern British Army's single armoured division and its employment as part of a larger, US-dominated coalition.

New Zealand's position in the Allied camp changed significantly through the war as its relationship with larger, more populous states shifted. In the First World War, New Zealand was firmly within the Imperial sphere and junior to Australia. In the late-1930s New Zealand adopted a policy independent of Australia (Chapter 2, *Scruffy Younger Brother*), only to fall under US cultural and military dominance (Chapter 16, *American Cousins*). Despite this, New Zealand's then Prime Minister Peter Fraser "moved in the stratospheric premier league", a standing which has not been matched since by any of his successors.

The elements covering New Zealand's operational history in North Africa and Italy are particularly engaging and complement comparable British accounts. They are not without criticism and deep analysis. Lieutenant Colonel Peter Wood's chapter, *The Will to Fight*, for example, examines the unprecedented refusal of a platoon to engage with the enemy, and the reasons behind it. This chapter alone should be essential reading for military audiences.

If there was a difficulty in consuming *Heavy and Continuous Sacrifice*, it was the reviewer's lack of familiarity – despite being married to a Kiwi – with New Zealand domestic politics, and the military and political personalities of the period. This is certainly not a criticism of the title itself, but rather an admission of a lack of a detailed understanding of a significant Commonwealth ally.

ON POINT STORYTELLING



Published by Bantam, Hardback, 496 pages, £25, IBSN 9781787636712

TITLE
Sword Beach: The Untold Story of D-Day's Forgotten Victory

AUTHOR
Stephen Fisher

REVIEWER
Colonel (Retd) Charles Ackroyd

It was to be expected that the 80th anniversary of D-Day would generate a plethora of books on the subject, and readers weren't left disappointed. Some took a refreshingly different approach, such as James Daly's *Proposed Airborne Assaults during Operation Overlord*, whilst others followed the well-trodden path of a broad overview supplemented with familiar photographs and descriptions.

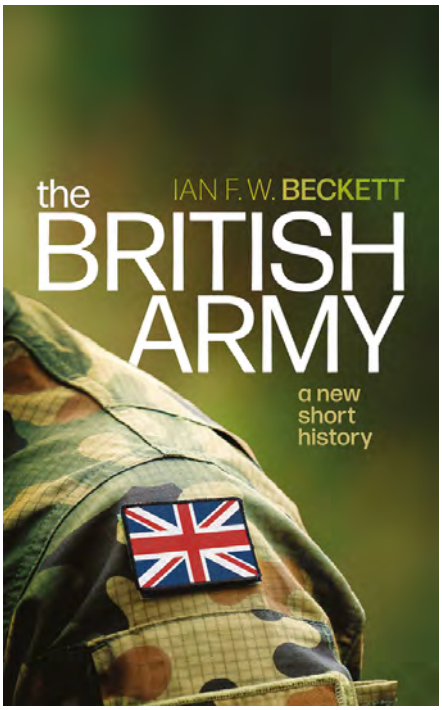
For this reviewer, however, one title stands head and shoulders above the rest – Stephen Fisher's *Sword Beach: The Untold Story of D-Day's Forgotten Victory*. In the preface the author describes the journey that led him to write this, his first book, highlighting how no one had previously written in detail about the events that unfolded on the eponymous beach on the 6th June 1944.

Fisher, an archaeologist with a passion for World War Two concrete, set out to rectify the oversight and his literary debut – the product of several years of painstaking research – delivers on that intent and much more besides. Using hitherto previously unseen primary source material, *Sword Beach* is not just a detailed, step-by-step reference book, but also a skilful blend of facts with vivid human tales of endeavour and tragedy that make it read in parts like a work of fiction. Consequently, Fisher presents a page-turner that leaves the reader both exhausted and well informed about all that occurred in and around the town of Ouistreham and beyond. For example, he reveals how Reverend Derrick Williams took his own life on the morning of the 5th June after delivering a poorly judged sermon and how Sergeant Eric Ibbetson of the East Yorkshire Regiment was killed by the negligent discharge of a weapon below deck on a troopship just prior to landing. The beach itself was heavily defended and contested, a fact which has perhaps not been fully appreciated in the past, and the author leaves one in no doubt about this. His accounts of the acts of heroism by numerous individuals, friend and foe alike, many of whom died as a result, make for compelling reading but it is noteworthy how few of the author's subjects were later recognised for their bravery.

This book will appeal not only to students of military history but also to those with only a passing interest in D-Day. The narrative is fast-paced and engaging, often dramatic and emotive but all the while delivering details and facts. The cross-referencing of sources, both Allied and German, is impressive and in consequence the author dispels many myths that have built up over the years to become an accepted 'truth'.

An outstanding feature of the book is the abundance of annotated aerial photographs, tables and appendices that enhance and underpin the story, and which will serve as a valuable point of reference for the future. Little of the reader's knowledge is taken for granted with frequent footnotes and the inclusion of comparison charts of distances and ranks, although perhaps it would have been useful to have had one relating to weapons and equipment. Further, the bibliography of published sources, war diaries and websites will give the serious reader an invaluable tool for further research.

Fisher's book places him in good company with the likes of James Holland, Dan Snow and Max Hastings, and he is to be congratulated on producing such a fine addition to the numerous histories of what many regard as the UK's greatest event of the 20th century. Moreover, it throws the spotlight firmly on the first 24-hours of the assault and capture of Sword Beach along with the town of Ouistreham, which for too long have been overshadowed by the events on Omaha Beach. It is therefore essential reading and not to be missed.



Published by Oxford University Press, Hardback, 240 pages, ISBN: 9780198871040

TITLE
The British Army: A New Short History

AUTHOR
Ian F. W. Beckett

REVIEWER
Professor Andrew Stewart,
Head of Conflict Research, CHACR

NOT SHORT ON QUALITY

Much of Ian Beckett's excellently written and comprehensively researched 'short history' will be familiar. Read a little closer and it will offer something to even the best informed. This almost appears 'a' – if not necessarily 'the' – capstone of a long career in which study of British military history has meant close reference to the actions of this book's focus. The author is to be congratulated for producing much more than simply a concise addition to the literature; this is a superior foundation for anyone who wants to better understand both this fighting organisation and its link to modern Britain.

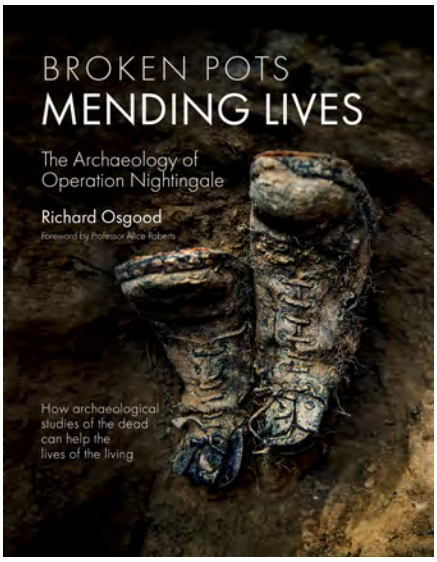
This is as much a cultural and social history than an examination of battles, bullets and bombs which emphasises the diverse links between the military and those whom it protects. The author notes: "An army exists to fight... and the army's story cannot be divorced from those wars and conflicts that have punctuated its evolution." There is "attention... paid to the battlefield" and some mention of the intricacies of fighting, but these are supporting rather than supported, constructed around familiar stories which link together easily. Its five chapters do exactly as the cover claims – delivering a historical examination of the British Army, which from its origins in the 17th century "assisted in the creation of British identity". Amongst the many themes examined within a broad chronological framework, the organisation's structural design is a golden thread told through 350 years of successes and failure.

Without trying to summarise what is already a historical synthesis, the final chapter contemplates the creation of a 'global army'. In this there are actually two armies, one contributing to European security and thinking about high intensity conflict and the other "quasi-imperial" and consumed by a toxic mix of counter-insurgency followed by peace support and stabilisation operations. This allows for further examination of two key recurring ideas. The first that, other than a formative initial 125 years following its creation, along with the two global conflicts of the 20th century, fighting in regular wars has not been the organisation's default activity. Added to this is Beckett's belief that at a popular level there is a lack of awareness as to what the British Army does and the 'where', 'who' and 'why' it has fought during the most recent 80 years of its existence. As he writes in the introduction: "There is a much wider popular sympathy for the army than previously, but this does not fill the ranks; nor does sympathy equate to understanding." This societal ignorance begins at a political level where the last prime minister to have served in the military was Jim Callaghan during the 1970s; there is some apparent anger in the conclusion that there have been many Ministers of Defence who "were less than distinguished, some truly pitiful". The discussion is forceful – the author, for example, would not appear to have much enthusiasm for the "self-righteous Tony Blair" – as evidenced by his description of the fiscal reduction which followed the end of the Cold War and the significant concomitant impacts that have extended beyond simple structural change into culture, identity and ethos. This is all particularly relevant to readers today and current military discussions about reserve and territorial forces.

The final ten pages of the book are devoted to Iraq and Afghanistan and the military and political challenges they presented. As Beckett concludes: "... [both] provided salutary lessons for an army that has not consistently shown itself a learning organisation". It ends with the then Secretary of State for Defence Ben Wallace's reference in 2023 to a "hollowed out and under-funded" army with significant capability gaps as a consequence of almost unlimited support for Ukraine resulting in a size that no longer allows it to match its global ambitions and unable to embrace institutional learning. Of greatest concern is the suggestion that the connection between the organisation and the society it protects might now be irrevocably broken.

With its insightful yet serious tone, the book is also honest in its, at times, disheartening account of how the British Army has evolved into its current form. There is no conclusion as such but one is not really needed. The author makes his case powerfully in the final chapter and with a warning in the last sentence that "future governments might find it exceedingly difficult to go to war when British interests are really at stake". It is up to the individual readers to determine if this is overstated or entirely plausible. The question remains as to the degree to which the organisation truly reflects the society it serves and protects and remains fit for purpose. It can only be hoped that both the recommendations made as part of the current British defence review, and the political actions that follow, help deliver a more obvious answer.

■ *An extended version of this review will be published by the Australian Army Research Centre.*



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ISBN: 9781789259384

TITLE
Broken Pots, Mending Lives: The Archaeology of Operation Nightingale

AUTHOR
Richard Osgood

REVIEWER
Dr Timothy Clack,
Oxford University and CHACR

TO THE GREEN FIELDS BEYOND

The connections between soldiering and archaeology are long-standing, and derive, in part, from the shared features of mapping, fieldwork and large-scale, task-orientated deployment of people and equipment. T.E. Lawrence ('Lawrence of Arabia') was an archaeologist before he was a soldier, and Augustus Pitt-Rivers, whose founding collection was the genesis of the Pitt Rivers Museum, made the opposite transition. In its overview of the origins, growth and merits of Operation Nightingale, *Broken Pots, Mending Lives* makes evident further military-archaeology crossovers linked to recovery, wellbeing and transition.

Operation Nightingale, a Ministry of Defence initiative to assist wounded, injured and sick military personnel and veterans, has been running since 2011. The book's author, Richard Osgood, is a senior archaeologist in the Defence Infrastructure Organisation and runs its archaeology programme. The title is structured around eight chapters, and also includes an introduction, conclusion, further reading and index. The work is accessible to the general reader and production values are high. The contents are illustrated sumptuously in colour throughout helping to tell the story but also bring the trenches, sites and landscapes to life.

The book describes aspects of Operation Nightingale's various deployments to date. The diversity of these – in time and space – is a real highlight. These include: Netheravon (Neolithic); East Chisenbury (Iron Age); Barrow Clump and Avon Camp (Anglo-Saxon); Barton Farm, Winchester (1770s); Burrow Island (1840s); Bullecourt, Normandy (World War I); and Aldbourne Camp (World War 2). The features excavated range from feasting sites, barrows and burial grounds to battlefields, military encampments and a Spitfire crash site. The book describes how participants have engaged not only in survey and excavation but also the analyses of aerial photography, documentary research in archives and experimental archaeology. The latter ranging from pot-making, blacksmithing and preparing ancient foods to the construction of a Bronze Age roundhouse using period materials, tools and methods.

Whilst details on finds and sites are fascinating and considerable, the book offers insights into the wider enterprise and its cathartic value. This includes how, for example, participants enjoyed the relaxed, fun atmosphere and outdoor nature of fieldwork, body and mind became immersed in specific tasks, common focus on activities and time with like-minded people was appreciated, and new skills and learning were developed. It was described how this, in turn, enhanced self-esteem, forged bonds and better-connected participants to their current environment. The book also documents how the initiative has, with considerable success, courted the media adding to the sense of achievement for participants and promoting the Ministry of Defence, its stewardship of the defence estate, which

covers approximately one per cent of the UK mainland, and multifarious knowledge outcomes. There are other 'wins' for defence considered, including providing realistic body recovery and forensic training for the Royal Military Police.

In recent years, it has been vogue in archaeological and historical circles to 'people the past', i.e. offer granular analyses at the scale of the individual. This book does that in spades (for example, in facial reconstructions and skeletal analyses) but it also 'peoples the present'. Anyone who has served recognises the importance of camaraderie, banter and "spinning dits" (sharing anecdotes) in fashioning esprit de corps and these each feature prominently. The book is also interleaved with personal stories from participants. These are affecting but also speak to catharsis.

Many of the participants have suffered from Post-Traumatic Stress Disorder (PTSD), a diagnostic term for the assorted symptoms which certain people experience after a high-threat or stressful episode, such as bouts of intense fear, helplessness, and unwanted intrusive images and thoughts. As well as those with PTSD often being triggered, panicked, hyper-aroused and/ or hyper-vigilant, disruption to social and economic functioning is also often apparent. The ways in which fieldwork has helped participants come to terms with their situations, engage in social interaction, foster long-term relationships, and adapt to, and find peace in, accomplishing tasks make for uplifting reading. It is inspiring to discover, for example, that a number of participants have not only gone on to complete degrees in archaeology but found new careers in the commercial archaeology sector.

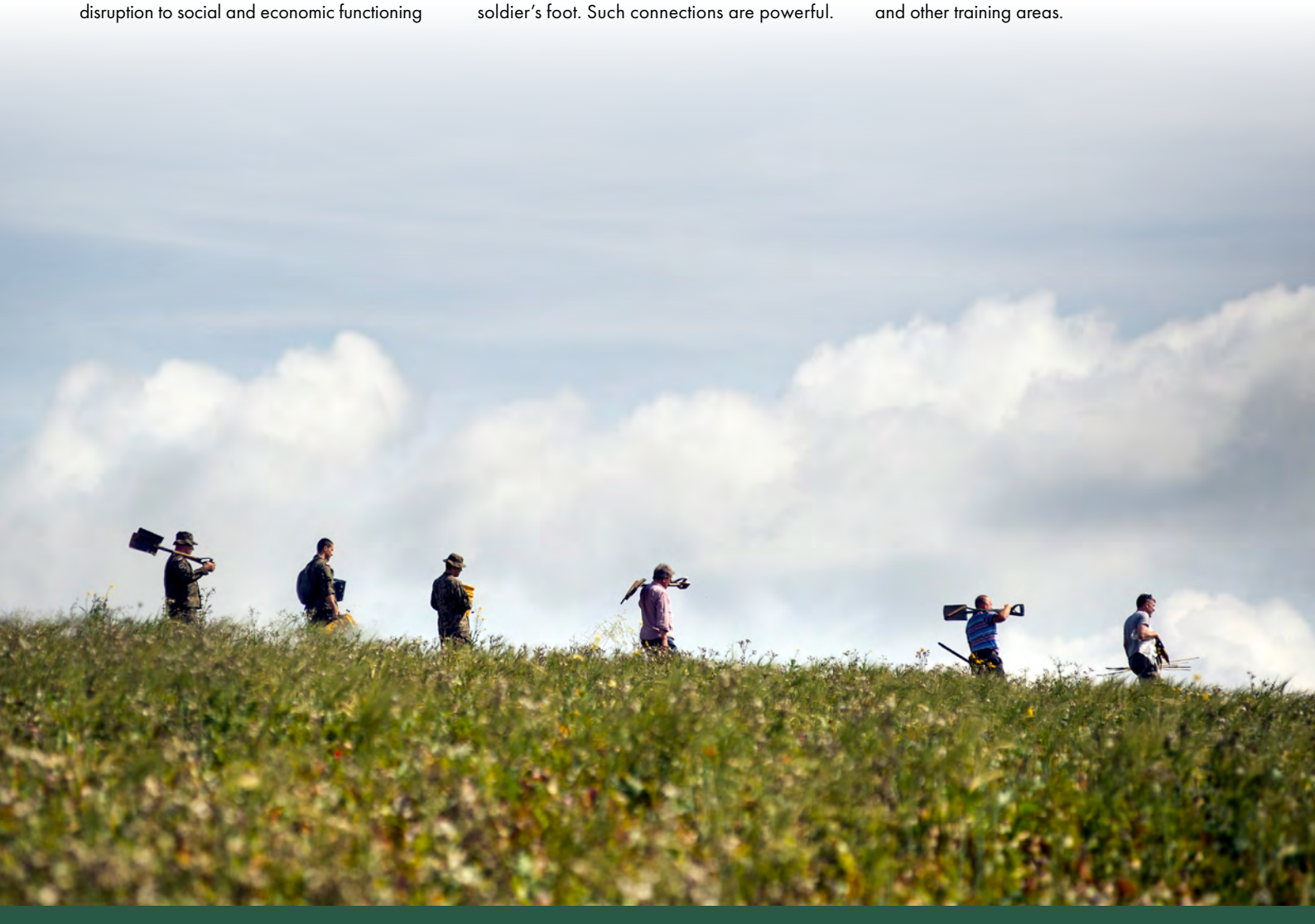
"Some of the described field situations are incredibly poignant. One participant describes his reaction to holding body parts for the first time since the death of soldiers from his unit in Afghanistan."

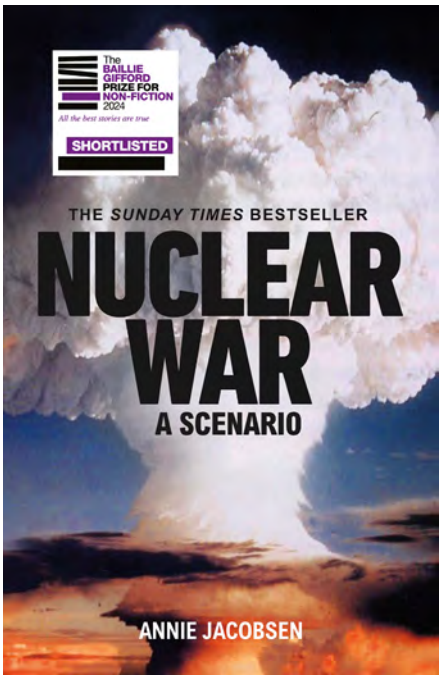
Some of the described field situations are incredibly poignant. One participant, for example, describes his reaction to holding body parts for the first time since the death of soldiers from his unit in Afghanistan. Another, who had lost an eye and leg in an improvised explosive device attack, explained why he volunteered to excavate the remains of a soldier's foot. Such connections are powerful.

As the author writes, the team have "shared the landscapes and also hopes, ambitions and worries".

With escalating societal focus on wellbeing and the modern military concern for Trauma Risk Management, some more background on PTSD might have been helpful for certain readers. PTSD was first diagnosed in 1981, for example, but the symptoms have been recognised for centuries and described variously as 'nostalgia' (Seven Years War), 'irritable heart' (American Civil War), 'shell shock' (World War I), 'funk' (World War II), and 'combat fatigue' (Vietnam War). More detail on the scale and form of the psychiatric support available during the fieldwork and afterwards would also have been welcome. Moreover, how the methodologies, experiences and outcomes of Operation Nightingale compare with similar ventures, such as Breaking Ground Heritage, the Falklands War Mapping Project, Waterloo Uncovered and Wings to the Past, would have been worthwhile.

Overall, the book is a magnificent testament to Operation Nightingale. It will appeal to those interested in the relationship between heritage and conflict, wellbeing of military personnel and veterans, and the history of Salisbury Plain and other training areas.





Published by Transworld, Hardback, 400 pages, £20, ISBN: 9781911709596

TITLE
Nuclear War: A Scenario

AUTHOR
Annie Jacobsen

REVIEWER
Professor Andrew Stewart,
Head of Conflict Research, CHACR

BACK ON THE AGENDA

Nuclear strategy has re-emerged as a topic for discussion, in large part due to Vladimir Putin's implicit – and at times not particularly subtle – threats of possible outcomes to external military support for Ukraine. Red lines have come and gone, most recently in the last week of September during a televised meeting of Russia's Security Council when the Russian leader announced planned doctrinal revisions in which an attack against the country by a non-nuclear power with the "participation or support of a nuclear power" would be seen as a "joint attack on the Russian Federation".

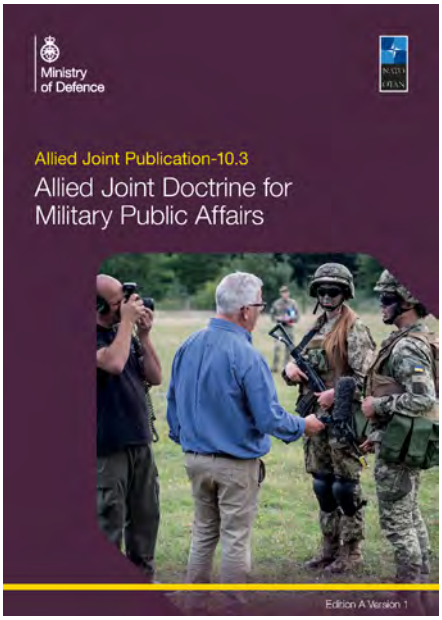
There has been much supportive media rhetoric from Moscow along with drills and tests but red lines have been crossed ever since February 2022 and the full invasion of its neighbour. As a Carnegie expert noted earlier in the year, this nuclear escalation is not new: "Since the start of the fighting in Ukraine, Russia's Defense (sic) Ministry has seen nuclear weapons as the sole obstacle to a war with NATO, while the Foreign Ministry approaches them as just another diplomatic tool." Blackmail, bullying or a more straight-forward coercive instrument which sits as a cornerstone in a finely balanced deterrence construct, the dire warnings have become a regular feature of British tabloid media reports, most often accompanied by a headline involving 'World War 3'. The Sword of Damocles appears freshly sharpened but with little evidence of what, if anything, might blunt its force.

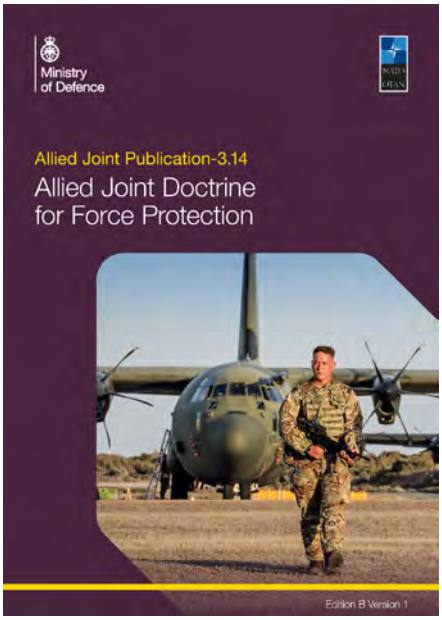
In addition to being a pleasingly easy 'soft' read, Annie Jacobsen's book presents an impressively researched and considered contribution which offers a timely reminder of what this could all actually mean. Certainly, it has continued to create considerable discussion in the United States where it was published in Spring 2024, perhaps best summarised by the leading business magazine *Forbes*, which concluded this "ominous wake-up call" should "be required reading for everyone alive today" (on cursory review, the book and its message have perhaps not achieved the same impact closer to home). For those of us who were participants in the Cold War's final decade, there is the memory of *Threads*, *The Day After* and *By Dawn's Early Light* as powerful reminders of previous bouts of popular discussion about worst case scenarios. With the author's involvement in television writing and production, this updated warning is surely, even now, being adapted to a form which, in the contemporary learning environment, is much more easily absorbed by a far greater audience. For those who are interested, Jacobsen's fascinating interview with the *Bulletin of the Atomic Scientists* provides some explanation as to why *Nuclear War: A Scenario* was written along with valuable additional insights.

It is a book to be read and reflected upon rather than reviewed in minute detail. Suffice to say it is based around a fictitious scenario in which the launch of a nuclear weapon against the United States leads to rapid escalatory responses. Without the deliberately fantastic – although not to say incredible – plot turns of recent military fiction such as *Ghost Fleet* or *2034*, it draws on nearly 50 interviews with military, political and academic practitioners who provide everything the author needs to present a clear, objective and often distinctly unemotional account of how the world destroys itself. Jacobsen writes: "Nuclear war is insane. Every person I interviewed for this book knows this. Every person. The whole premise of using nuclear weapons is madness. It is irrational. Yet here we are." Whether it was Einstein's observation or not, there is no reason to disagree with the claim that 'insanity is doing the same thing repeatedly and expecting different results'. Also recent events appear to have restored an almost impossibly complex strategic environment and a multi-polar rivalry in which multiple actors now have the ultimate deterrent. In this context, it is not difficult to see why there has been so much American interest in Jacobsen's scenario.

Perhaps of more immediate concern, the book has a contribution to offer to a long-running conceptual irritant for the British Army. Within a book being published in 2025 by the CHACR, there is some discussion of the post-Cold War study of how to survive and conduct meaningful military operations on the nuclear battlefield. In both General Sir John Hackett's *The Third World War* and Harold Coyle's *Team Yankee*, conventional fighting in Europe escalates to a point where the climax of both 'futures histories' is not tactical but strategic nuclear interventions. Chemical-biological warfare is a persistent threat in both scenarios, much more so than the tactical weapons which worried British planners in the 1950s and 1960s and are now again dangled by Russian commentators as they discuss how they could be used in Ukraine and elsewhere. An army that aspires to increase its lethality must recognise that its success could lead to an irrational and extreme response, not least by an opponent that views victory and defeat in a nuanced fashion.

DOCTRINE





Doctrine publications are to guide military operations and inform professional military education as you progress through your career. Since the last issue of *The British Army Review* was published, two revised Allied Joint Doctrine publications have been promulgated.

Allied Joint Publication-10.3, *Allied Joint Doctrine for Military Public Affairs (Edition A, Version 1)* was published in October 2024 and describes military public affairs and how it is applied within the conduct (analysis, planning, execution and assessment) of the NATO Alliance campaign themes. It builds on the principles described in *AJP-10, Allied Joint Doctrine for Strategic Communication*. The publication describes the aspects and principles of military public affairs including roles, responsibilities, capabilities, applications, opportunities and limitations. While it focuses on the operational level, it also has utility at the strategic and tactical levels. *AJP-10.3* is intended primarily as guidance for NATO commanders and their staff. However, the doctrine is instructive to, and provides a useful framework for operations conducted by a coalition of NATO members, partners and non-NATO nations. It also provides a reference for NATO and non-NATO civilians.

Allied Joint Publication-3.14, *Allied Joint Doctrine for Force Protection (Edition B, Version 1)* was published in October 2024. It describes the fundamental aspects of force protection and provides guidance to commanders and their staff on the planning and implementation of force protection, primarily at the joint operational level, but it can be used at any level. This publication is intended primarily as guidance for NATO commanders and their staff, however, it may also be instructive to those planning for activities being carried out by a coalition of NATO member states, partners and non-NATO nations. It also provides a reference for non-military actors.

Changes to the command of the Joint Doctrine organisation

Under Strategic Command's transformation programme the Development, Concepts and Doctrine Centre (DCDC) has undergone major changes, with part of the former organisation evolving into Defence Futures and the Joint Doctrine team moving under the command of the newly redesignated Integrated Warfare Centre (formerly Joint Warfare). This move has the purpose of 'integrating support to campaigns and Joint Commanders' in a more direct and interoperable way. The former DCDC Doctrine team has been renamed the IWC Joint Doctrine team, but has remained at MoD Shrivenham to enable synergy and collaboration with the Defence Futures Concepts and Strategic Foresight teams.

All former DCDC publications and associated products will remain accessible via the existing digital platforms on defnet, GOV.UK and Defence Gateway.

MUST READ...

The latest edition of *Ares & Athena*, the occasional papers of the Centre for Historical Analysis and Conflict Research, looks at the changing character of the conceptual component of fighting power, through the specific lens of command and control.

"In force development circles in the UK and, widely, elsewhere, it is often argued that professional competence, both in generals and in their staffs, will be enhanced by the obvious benefits of well-designed artificial intelligence (AI). Perhaps a general's intuition alone need no longer be the deciding factor? The delivery of faster, better filtered and sorted, relevant data can change the OODA [Observe, Orient, Decide and Act]-loop turning-circles very much in favour of those who hold the AI upper hand. Thus, human 'coup d'oeil' can be hugely enhanced by machine 'coup d'AI'. But, in the discussion of the relative merits of AI and the human factors involved in military command and decision making, a distinction needs to be drawn concerning the differences between the roles and realities of information and intelligence, instinct and intuition."

chacr.org.uk/media/ares-athena

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