

Approaching Land Warfare in the Twenty-first Century

Niklas Nilsson and Mikael Weissmann

Approaching Land Warfare

International politics has become ever more volatile in the last decade, increasing the risk of large-scale military violence. Yet the precise character of future wars will depend on a range of factors that relate to adversaries, allies, technology, geographical scope, and multiple domains of warfighting. Few would question that land forces will also be important in the foreseeable future. Recent wars in Ukraine, Syria, Mali, Yemen, and Nagorno-Karabakh have shown that land forces remain a crucial feature of warfare. However, as the battlefield transforms, so do the mission, purpose, and utilization of land forces. Indeed, the future conduct of land warfare is subject to serious and important questions in the face of large and complex challenges and security threats.

Indeed, the last two decades have seen far-reaching changes in land force employment. In particular, the counterinsurgency missions in Iraq and Afghanistan implied a wholly different operational reality for armies, in terms of adversaries, equipment availability, and tactics, compared to the type of large-scale land war anticipated during the Cold War. In Europe following the 2014 annexation of Crimea, armies have begun to adapt to the task of defending against a peer-adversary, and this change undoubtedly has far-reaching consequences, not only for the required size of land forces, but also for battle-planning methods. Although the reinvention of Cold War tactical concepts may seem obvious, these must be adapted to the current and future realities of, for example, technological complexity, a fragmented and potentially geographically dispersed battlefield, and increasingly lethal, precise, and long-distance weapons systems.

Taking aim at the evolving role of land forces, this volume pays particular attention to the changes that have taken place in the art of commanding

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and executing combat and the role of rapid technological innovation and information dissemination in shaping warfare. Whilst looking forward, the volume also considers it pertinent to revisit established military theory and thinking (some of it neglected in recent years) with lessons learned from contemporary land warfare.

When analysing the state of the field and current trends in land warfare, a number of central themes emerge that will undoubtedly be crucial in the thinking, concepts, and practice of land warfare in the years to come. The role of manoeuvre warfare, command, and military theory are among these. Will manoeuvre warfare maintain its status as the supreme method of land warfare, or will it fade into the background in favour of other, emerging methods of force employment? To what extent is classic and contemporary military theory pertinent for interpreting and describing the realities of current and expected future combat? What method of command will be most suited to future Western tactics and operations? In particular, how is mission command, a key component of manoeuvre warfare, likely to evolve in the future? What should twenty-first-century combat logistics look like?

Emerging technologies are transforming warfare. The technological innovations expected to play increasingly important roles on future battlefields include artificial intelligence, sensors, unmanned air and ground systems, and cyber capabilities. These technologies are currently evolving at a rapid pace and will need to be integrated with evolving land forces' tactical practices, whilst they may also prompt the development of countermeasures by peer adversaries. Further, the environment in which armies fight may see a considerable change in the future. In particular, urban environments have been predicted to play an enlarged role in future wars, not least due to advances in target location and long-distance fire capabilities, which may diminish the chances of survival of land forces in open terrain. Nevertheless, armies will need to prepare for a range of different operational environments. If armies, particularly in the European context, are presently undergoing a decisive re-transformation into territorial defence forces after decades of primarily solving expeditionary tasks overseas, deployment in expeditionary operations will remain a distinct possibility. There is also a need to extend multi-domain capabilities and interoperability.

Discussions of future wars often focus on technological developments. However, we should not lose sight of the fact that war is a fundamentally human endeavour, and that its character will be shaped by the actions of the people fighting it. Psychological, cultural, and social issues need to remain at the centre of any discussion of land warfare. Among other things, the

cohesion of military units is a critical factor in the ability of units to function under the extreme pressures of combat, as is the need for an efficient medical support system.

The present volume explores the issues described above from a thematic and an empirical perspective. It provides various perspectives on key contemporary developments in land warfare, but also presents case studies on land tactics and operations in different national contexts. In the latter case, several actors of military importance for the foreseeable future—the USA, the United Kingdom, France, Israel, China, and Russia—are at focus. Thus, a consideration of their respective approaches to land tactics will be instructive. This volume also includes a chapter covering trends in the land warfare capability of Poland and the Visegrád Group since the end of the Cold War. But first, let us briefly consider the evolution of land warfare.

This chapter is structured as follows. First, the development of land warfare is briefly outlined, before key current and future challenges in the operational environment are examined. In the following section, the future character of war and the transformation of the battlefield is addressed. Thereafter, the structure of the volume and its chapters are outlined.

Development of Land Warfare

Some authors have described the evolution of warfare as a generational development in five steps. These generational leaps begin with a first generation of ancient warfare between massed land formations. Second-generation warfare denotes the emergence of modern tactics due to the early development of firearms and later indirect fire. Third-generation warfare was enabled by technological innovations facilitating speed and manoeuvrability, permitting the utilization of indirect methods and tactics aiming to surprise, shock, and collapse—rather than annihilate—opposing forces. Fourth-generation warfare denotes a change in the character of war after the end of Cold War superpower competition, including a de-monopolization of state-controlled military force and a blurring of the boundaries between combatants and civilians. Fifth-generation warfare, finally, shifts the focus from kinetic force to the informational environment, where narratives and perceptions take centre stage, enabled by emerging technologies such as artificial intelligence, automation, and robotics.¹

¹ William S. Lind and Gregory A. Thiele, *4th Generation Warfare Handbook* (Kouvola: Castalia House, 2015); Daniel H. Abbott, *The Handbook of Fifth Generation Warfare* (Ann Arbor: Nimble Books, 2010).

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The twentieth century saw a rapid evolution of warfare, fuelled by tactics and concepts developed during, between, and after the two world wars. The First World War induced the development of modern tactics, including defence in depth and infiltration techniques, necessary to avoid the massive destructive capacity of industrial-era artillery, the stagnation of direct tactical approaches into fortified trench lines, and devastating attrition warfare. These new conditions sought flexibility in offensive and defensive warfare, whilst dispersion and mobility would limit exposure to indirect enemy fire. In modern warfare, a premium was put on both offensive and defensive combat, based on cover, dispersion, small-unit independent manoeuvre, suppressive fire, and presenting the opponent with insoluble dilemmas through combined weapons integration.²

Whereas these innovations granted tactical successes, it rarely proved possible to exploit the advances made into strategic victories. Thus, in the interwar period, and particularly in the Soviet Union, the development of operational art and the operational level of war formed as a means for the large-scale coordination of tactics in pursuit of strategic aims. During the Second World War, Germany exploited the potential of mobile armoured units with concepts for operational-level mobile warfare and operational defence in depth.³

These concepts developed further during the Cold War, as the rival superpowers prepared to fight a massive war on the European continent. It was particularly the Soviet numerical advantage in terms of land forces, which grew over time, that prompted the US army to introduce the AirLand Battle doctrine in 1982. The doctrine later developed into the manoeuvre warfare concept that constituted an operational solution to the strategic problem presented by the large numerical superiority of the opponent, the Soviet Union, in the operational theatre. Manoeuvre warfare aimed to offset this disadvantage by fighting across the depth of the operational area, relying on speed, movement, and combined weapons to create unexpected and perilous dilemmas for the opponent by means of warfare across the opponent's whole formation and attacks against weak points. The concept thus rewards tactical prowess and speed rather than material resources, mass, and tolerance for attrition.⁴

² Stephen D. Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton and Oxford: Princeton University Press, 2004).

³ Christopher Tuck, 'Modern Land Warfare', in *Understanding Modern Warfare*, edited by David Jordan, James D. Kiras, David J. Lonsdale, Ian Speller, Christopher Tuck, and C. Dale Walton 2nd edn (Cambridge: Cambridge University Press, 2016).

⁴ Richard Lock-Pullan, 'How to Rethink War: Conceptual Innovation and AirLand Battle Doctrine', *Journal of Strategic Studies* 28, 4 (2005): 679–702.

The concept of Revolution in Military Affairs (RMA) originated in Soviet military theorist Nikolai Ogarkov's work on military–technical revolutions, in the 1970s and 1980s, and made its way into Western military thinking above all through the work of Andrew Marshall, head of the Office of Net Assessment.⁵ The concept nevertheless became highly influential among Western military powers following the overwhelming US victory in the 1991 Gulf War. Although technological innovations have always been an important aspect in defence planning, the Gulf War pioneered an understanding that technology enabled a completely new type of warfare. This idea made a major breakthrough in the USA and among other Western military powers during the 1990s. The main argument of RMA claims that progress, not least in computer technology and sensor systems, enables an unprecedented degree of coordination of military strikes through, for example, network-centric warfare, target identification, and precision bombing. The different parts of the military force may be integrated through a 'system of systems', where digitized command systems, coupled with supreme reconnaissance and situational awareness and long distance precision strike capabilities, would allow the achievement of war objectives with attacks against critical vulnerabilities and minimal losses to the attacking side. In the 1990s, several thinkers presumed these developments would eliminate the Clausewitzian 'fog of war', the unpredictability of battle and frictions that counteract effective planning and command, leading RMA advocates to question many of the 'eternal truths' which had formed the basis of operational thinking since the Second World War.⁶

The RMA concept was in large part discredited following conflicts during the 1990s. The succession wars in former Yugoslavia and the post-Soviet countries, as well as in sub-Saharan Africa, suggested that warfare in the post-Cold War world order had reverted to pre-modern features of tribal competition for territory and resources, where violence targeted civilians more often than enemy combatants. Moreover, the major US and NATO engagements at the turn of the century, in Kosovo, Afghanistan, and Iraq, vividly demonstrated the limitations of technological advantage and surgical precision strikes as means for achieving conclusive victory.⁷

⁵ Stephen P. Rosen, 'The Impact of the Office of Net Assessment on the American Military in the Matter of the Revolution in Military Affairs', *Journal of Strategic Studies* 33, 4 (2010): 469–482.

⁶ Dima Adamsky and Kjell I. Bjerga, 'Introduction to the Information-Technology Revolution in Military Affairs', *Journal of Strategic Studies* 33, 4 (2010): 463–468; Eliot A. Cohen, 'Change and Transformation in Military Affairs', *Journal of Strategic Studies* 27, 3 (2004): 395–407; Benjamin M. Jensen, 'The Role of Ideas in Defense Planning: Revisiting the Revolution in Military Affairs', *Defence Studies* 18, 3 (2018): 302–317.

⁷ Mary Kaldor, *New and Old Wars*, 3rd edn (Cambridge: Polity, 2012); Patrick A. Mello, 'Review Article: In Search of New Wars: The Debate about a Transformation of War', *European Journal of International*

These developments have underscored the enduring significance of land operations across the conflict spectrum. At the same time, the conduct of land operations has become increasingly complex. The NATO Allied Joint Doctrine for Land Operations highlights the multiple functions that land forces serve aside from combat; they operate among civilian populations and infrastructure, in an increasingly intense and mediatized information environment and are often key to enabling the activities of other agencies in the framework of a comprehensive approach. Aside from combat, they have a strong symbolic importance, since deployment signals long-term political-strategic commitment.⁸ Moreover, the increasing emphasis on integration and synergies across warfighting domains has acquired new heights of ambition, particularly with the US Army's Multi-Domain Operations concept, which envisions the ability to coordinate effects beyond joint land-air-sea operations to also include space and cyberspace as warfighting domains, and emphasizes the electromagnetic spectrum and information environment as key dimensions of modern warfare.⁹

Taken together, the future battlefield envisioned is one where land forces are simultaneously expected to maintain the capability to perform a wide variety of tasks, ranging from peacetime activities to high-intensity warfare, placing a premium on proficiency in manoeuvre warfare and the exercise of mission command.¹⁰ They must simultaneously positively manage relations with civilian populations in complex conflict environments, adopt and utilize high-technological systems for communication, reconnaissance, and kinetic effect, retain the capacity to operate without these systems if needed, and contribute to extensive joint operations with other services, agencies, allies, and partners. It is no exaggeration that the future of land warfare, and the demands placed on land forces, will become ever more daunting as we approach the mid-twenty-first century. So, what are the key challenges in the current and future operational environment?

Relations 16, 2 (2010): 297–309; Edward Newman, 'The "New Wars" Debate: A Historical Perspective Is Needed', *Security Dialogue* 35, 2 (2004): 173–189; Rupert Smith, *The Utility of Force: The Art of War in the Modern World* (London: Penguin Books, 2019).

⁸ *Allied Joint Doctrine for Land Operations (AJP-3.2)*, NATO Standardization Office, Edition A (Brussels: NATO, 2016).

⁹ James C. McConville, *Army Multi-Domain Transformation: Ready to Win in Competition and Conflict*, US Army (Washington, DC: Headquarters, Department of the Army, 2021).

¹⁰ Niklas Nilsson, 'Land Operations and Competing Perspectives on Warfare', *Comparative Strategy* 40, 4 (2021): 372–386.

Current and Future Challenges

A new operational environment is developing, posing new challenges for future warfare and combat. The changing character of war, with a compression of time ('the death of distance') and the information domain as the centre of gravity, has become widely recognized. Cyber and space have become domains in their own right, and Artificial Intelligence (AI), Machine Learning (ML), and other types of technologies have come to the forefront of military discussions and thinking.

It is also clear that future combat will take place in urban terrain, including in megacities, posing new challenges for land forces.¹¹ Furthermore, the new operational environment brings challenges in both cross-domain and cross-conflict-spectrum fighting, as the grey zone between peace and war has grown.¹² The former calls for multi-domain operations and a need for interoperability, whilst at the same time handling warfare in an operating environment that is often situated in the grey zone between peace and war.

Whilst breakthroughs in technology are at the centre stage when evaluating the future operational environment and battlefield, it is also important to recognize that we live in a time of a trembling world order. There is an ongoing shift of economic, political, and military power from the West to the East, from the USA and Japan to China, and from the North to the South, which changes the global balance of power and, in the long run, risks undermining the existing world order.¹³ Opinions may differ regarding the end result of this power struggle, but it is a fact that the world will change. The resulting new reality, whether one likes it or not, will be where tomorrow's wars and battles take place.

The military will here have to deal with the new requirements and challenges that come from myriad actors seeking new roles. This applies not only to smaller countries such as Iran, North Korea, and Belarus, and major

¹¹ Anthony King, *Urban Warfare in the Twenty-First Century* (Cambridge and Medford: Polity Press, 2021).

¹² Mikael Weissmann, 'Conceptualizing and Countering Hybrid Threats and Hybrid Warfare: The Role of the Military in the Grey Zone', in *Hybrid Warfare: Security and Asymmetric Conflict in International Relations*, edited by Mikael Weissmann, Niklas Nilsson, Björn Palmertz, and Per Thunholm (London: I.B. Tauris, 2021); Niklas Nilsson, Mikael Weissmann, Björn Palmertz, Per Thunholm, and Henrik Häggström, 'Security Challenges in the Grey Zone: Hybrid Threats and Hybrid Warfare', in *Hybrid Warfare: Security and Asymmetric Conflict in International Relations*, edited by Mikael Weissmann, Niklas Nilsson, Björn Palmertz, and Per Thunholm (London: I.B. Tauris, 2021).

¹³ Mikael Weissmann, 'Capturing Power Shift in East Asia: Toward an Analytical Framework for Understanding "Soft Power"', *Asian Perspective* 44, 3 (2020): 353–382; Astrid H. M. Nordin and Mikael Weissmann, 'Will Trump Make China Great Again? The Belt and Road Initiative and International Order', *International Affairs* 94, 2 (2018): 231–249.

powers including Russia and China, but also countries such as India, Turkey, Brazil, Indonesia, Qatar, and Dubai. Moreover, existing and emerging patterns of alliances and alignments imply that local developments can easily attain global effects.

It is also of great importance to monitor and develop strategies for dealing with the growth of non-state actors. How these develop, and what they do, has a very large direct and indirect impact on the development of the operational environment and the battlefield. This of course concerns the need to deal with direct antagonistic actors such as ISIL/ISIS and Al-Qaeda and various forms of proxy-based intelligence, crime, sabotage, subversion, and terrorism. The proliferation of private military companies and the participation of private actors in warfare and conflicts should also be mentioned here, as their role and the size of this sector have grown and there is no indication that change is underway.¹⁴ Private actors have become an integral part of states' military operations and warfare. At the same time, they risk changing the way military operations and warfare take place and, in the long run, challenging state monopolies and roles, by increasingly enabling companies, individuals, and other non-state actors with monetary assets to acquire their own military capabilities.

Technology breakthroughs, both emerging and disruptive, have transformed and will continue to transform the operation environment. These breakthroughs, especially regarding sensor technology, artificial intelligence, and machine learning, have a direct impact on land operations and land warfare. It is already clear that future operations will be more digitized and connected, with the cyber and space domain of foremost strategic importance. At the same time, there is an inherent problem with technology development in relation to warfare; distinguishing revolutionary technology from one-day wonders. A broad perspective is necessary when the future is uncertain. Land forces need to be attentive and adaptable, both utilizing technology to their advantage, understanding how to defend against opponents' technologies, and, not least, identifying which technologies are important, maybe even revolutionary, and which are irrelevant.

It is also clear that the informational environment will be an important centre of gravity in the future operation environment. It is often said that future wars will be decided in the information environment, that 80–90 per cent of future wars will be about strategic communication, and that the struggle for narrative is central and ongoing. Without debating the finer points, it is

¹⁴ Peter W. Singer, *Corporate Warriors: The Rise of the Privatized Military Industry* (Ithaca, NY, London: Cornell University Press, 2008); Sean McFate, *The Modern Mercenary: Private Armies and What They Mean for World Order* (New York: Oxford university Press, 2014); Christopher Kinsey, *Corporate Soldiers and International Security: The Rise of Private Military Companies* (London: Routledge, 2006); Joakim Berndtsson and Christopher Kinsey, eds, *Routledge Research Companion to Security Outsourcing* (London: Routledge, 2016).

clear that the information environment will be important for land forces to understand and manage.

To understand the future challenges for future land operations, one must also consider the direct impact of rapid urbanization, with the global trend of migration to cities, not least megacities, and the opportunities and challenges this entails. This fact, together with other global megatrends, such as climate change and limited natural resources, and subsequent demographical and societal changes, will alter who fights, how, and why, as well as the fundamental fighting conditions. These are all global megatrends that reshape our world, being development processes with major consequences for all actors, including land forces. These megatrends, together with technological breakthroughs and an ongoing power shift, will create circumstances to which actors in future land operations must adapt, respond, and contribute to shaping.

Character of War and Transformation of the Battlefield

One of the most important revolutions on the battlefield is the proliferation of high-quality sensors, which, in combination with the digitalization of the battlefield and AI and ML developments, increase battlefield transparency, as both can and will help manage information flows for a viable command and control system. Sensors, encompassing a wide range of technologies and devices, including radars, acoustic, thermal, optics, seismic, magnetic, active sensors, smart sensors, nano sensors, and wearable sensors, may potentially disperse the ‘fog of war’, making real-time information about the enemy and one’s own forces available to commanders (and sometimes even individual soldiers).

The use of unattended ground sensors has permitted high-tech forces, like the USA and NATO, to enhance intelligence, surveillance, and reconnaissance abilities to a degree making adversaries’ cover and concealment limited at best. This is also why extensive R&D investments are now made to develop new forms of concealments. Cheap and manoeuvrable micro- and nano-drones are also being developed for use in reconnaissance and surveillance, as is wearable sensor technology, to provide location and navigation data and uninterrupted communication between troops and UAVs in areas where GPS signals are weak or absent.¹⁵ The possibility for uninterrupted communication should not be underestimated, as without communication the information from sensors will be non-existent or of limited practical use.

¹⁵ Margarita Konaev, *The Future of Urban Warfare in the Age of Megacities*, Focus stratégique 88 (Paris: Ifri, March 2019).

Tomorrow's wars will often be fragmented and dispersed, taking place on a multi-territorial battlefield across borders, and often far-flung. Nor is there a clear distinction between the battlefield and elsewhere. This is true in terms of geography, since there are seldom clear borders for battlefields, and in relation to what domain the battle takes place in. This relates not only to the traditional domains of air, sea, and land, but also to the cyber and possibly the space domains. Besides domains, the information dimension is crucial, since here the narrative battle of war, combat, battle, and victory plays out. The battlefield often also includes many types of fighters, ranging from armed groups to regular forces, as well as an assortment of allies, supporters, friendly forces, non-supporters, neutrals, inactive hostiles, and unknowns, in addition to the clear enemy, further complicating future operations.¹⁶

There is also heterogeneity of actors on the new battlefield, including not only regular and irregular, but also a range of private and hybrid actors with unknown masters, as well many civilians who may, or may not, be friends or foes, or whose loyalty shifts over time.

Tomorrow's battlefield will also be complex in the sense that one must prepare to fight high- as well as low-tech opponents, and prepare to meet not only non-peer opponents, but also peers or near-peers. Similarly, as noted, one must also prepare for cross-domain hybridization, where fighting occurs in all five domains as well as in the information environment simultaneously, not because one wishes, but because one must.

Challenges related to hybrid threats and hybrid warfare must also be managed. It has become clear that the battlefield of the future exists in the grey zone between war and peace. In this grey zone, non-kinetic effects are found to replace, or combine with, kinetic effects. A synergistic assortment of military and non-military activities exists, ranging from different forms of strategic communication, through measures like intrusions, special operations, sanctions, and subversions, and to the use of masked soldiers, like the so-called green men in Crimea, cyberattacks, sabotage, and terror or proxy warfare, before passing the threshold of war.¹⁷

It is also clear that future combat will take place in dense urban areas, including in megacities. To prepare for urban warfare has become an accepted necessity, driven by several mutually supporting trends. Urbanization and

¹⁶ *Allied Joint Doctrine for Land Operations*, 1–5.

¹⁷ Weissmann, 'Conceptualizing and countering hybrid threats and hybrid warfare'. See also 'The U.S. Army in Multi-Domain Operations 2028', US Army, accessed 13 September 2021, <https://api.army.mil/e2/c/downloads/2021/02/26/b45372c1/20181206-tp525-3-1-the-us-army-in-mdo-2028-final.pdf>; 'Joint Concept Note 1/20, Multi-Domain Integration', Ministry of Defence, accessed 13 September 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950789/20201112-JCN_1_20_MDI.PDF.

technology are driving forces, the former making cities the clear centre of gravity and the latter creating an irregular turn and urbanization of insurgency as urban areas create the defensive advantage needed for irregular forces to survive. To this can be added the changing character of war, outlined above. In short, asymmetrical warfare, in which the weaker force seeks defensive advantage in urban areas, will become a necessity, in particular in the global South, as megacities and feral cities alike grow larger, sometimes even with cross-border megaregions creating further complexity.¹⁸ Urban operations will also need to meet the challenges from cross-domain and cross-conflict-spectrum fighting, as the grey zone between peace and war has grown. Cities, as the interconnected hubs of population and power, are the nexus of this grey zone. This includes dealing with threats and attacks below the threshold of war.

One further parameter increasingly apparent on today's battlefields is the exponential increase in information flows. Thus, access to potentially important information has increased drastically, whilst prioritization, processing, and analysis of almost unlimited amounts of information has become increasingly resource intensive. Operational assessment requires tools for managing the dynamics between information flows, continuous assessment, information dissemination, and forward-looking operational advice in an environment with basically unlimited information. Here, information flows from a range of information sources must be managed.

Structure of the Volume

This volume aims to synthesize the best of theory, practice, and professional experience. To this end, each chapter will be written by a leading international scholar or practitioner. In relating to the realities of the modern battlefield, the volume will address several critical questions about land tactics and operations, combining a conceptual basis with empirical examples of tactical thinking and practice. It emphasizes the importance of understanding the perspectives of various national armies.

By drawing on the knowledge and insights of leading war scholars, many with military experience, the volume aims to provide a current understanding of the central issues of land warfare. The project will be led by members of the

¹⁸ Jeremiah Rozman, *Urbanization and Megacities: Implications for the U.S. Army*, ILW SPOTLIGHT 19–3 (Arlington: The Institute of Land Warfare, the Association of the United States Army, 2019); Kon-ae, 'The Future of Urban Warfare in the Age of Megacities'; Joel Lawton and Lori Shields, *Mad Scientist: Megacities and Dense Urban Areas in 2025 and Beyond* (Fort Eustis: United States Army, Training and Doctrine Command (TRADOC) G-2, 2016).

Land Warfare Research Group (LWRG) at the Swedish Defence University, and brings together contributions by distinguished scholars and practitioners in Europe, the USA, and beyond.

Part I of the volume comprises nineteen chapters divided into two parts. After this Introduction, the first part contains an introduction and ten conceptual chapters, followed by Part II with seven country-based case-studies and a concluding chapter tracing the patterns, practices, and implications going forward.

The first two conceptual chapters address, respectively, the future of manoeuvre warfare and mission command in the emerging operational environment. Chapters 4 and 5 focus on combat logistics in the twenty-first century and the present state of command and challenges in contemporary armies. Chapter 6 explores several tactical tenets and the utility of military theory. Thereafter follow three chapters exploring several dimensions likely to be central on future battlefields: urban warfare, emerging technologies, and interoperability. Chapter 11 addresses the moral component of land warfare from a perspective that transcends the issue of unit cohesion, exploring the link between soldiers' motivation to fight and the society of which they are part. Finally, the focus moves to the military health service's role in the twenty-first century.

The second part of the volume consists of eight country-based case studies of land tactics and operations. They address the divergent cultures of land forces in the USA; the constitution and tactics of China's People's Liberation army; lessons learned by Russia from land operations in Syria; the successes, failures, and adaptive capability of Israel's Defence Forces; and the United Kingdom's balancing act between strategic ambition and financial and material constraints in the development of the British Army. The penultimate chapter focuses on the French army, expeditionary warfare, and the return of strategic competition, whilst the final chapter looks at post-Cold War trends in the land warfare capability of Poland and the Visegrád States.

Finally conclusions are drawn, outlining *the integrated versatility model* as a way to capture the needs to secure the versatile edge of land warfare capabilities ready for tomorrow's battlefields.

Chapter-by-chapter Synopsis

Commencing Part I, Chapter 2, 'The Future of Manoeuvre Warfare', is written by Dr Christopher Tuck, Reader in Strategic Studies, the Department of Defence Studies, King's College, London. Dr Tuck assesses the future relevance of manoeuvre warfare, a key philosophical and doctrinal concept

in the debate on the effective conduct of land operations. Tuck argues that the relevance of manoeuvre warfare is likely assured, although its relevance cannot be assumed to be coterminous with effectiveness. Despite its prominence, manoeuvre warfare is a contested idea. This chapter explores contending views on its future: manoeuvre warfare might be of continued relevance, because it is context-agnostic; it might be of greatly increased relevance, because of developments in the character of conflict and the emergence of concepts such as Multi-Domain Operations; or manoeuvre warfare might be largely irrelevant to the reality of future operations, its survival saying more about military norms, values, and perceptions.

Chapter 3, 'Commanding Contemporary and Future Land Operations: What Role for Mission Command?', is written by Dr Niklas Nilsson, Associate Professor in War Studies and Co-Convenor of the LWRG at the Swedish Defence University. Nilsson engages the adaptation of Western land forces in the face of an evolving operational environment that places varying and frequently contradictory demands on command systems. The chapter examines the concept of mission command, a decentralized command philosophy with adjacent methods and practices that is formally embraced by land forces across the West, in light of ongoing trends in the evolution of warfare and military operations. The chapter starts with a discussion of mission command respectively in terms of a culture or command philosophy, and as a set of methods and practices of command. Nilsson then considers the role and future utility of mission command in light of developments in three broad areas that are of central importance to the evolution of military command. These are, first, general trends in the current and future operational environment with implications for the command of land operations, with a focus on the US Army's concept of Multi-Domain Operations. The second area concerns the ever-increasing demands for information management, and the daunting challenge it poses for any military command system. Third, developments in information technology over the last decades and the more recent but very rapid shift toward artificial intelligence and automation have opened new horizons, as well as vulnerabilities, to military command.

Chapter 4, 'Combat Logistics in the Twenty-first Century: Enabling the Mobility, Endurance, and Sustainment of NATO Land Forces in a Future Major Conflict', shifts the focus to combat logistics. Here, Dr Christopher Kinsey, Reader in Business & International Security, Kings College, London, UK, and Colonel Ronald Ti, visiting lecturer Baltic Defence College and PhD candidate, Defence Studies Department, King's College London, UK, reinforce the ongoing importance of combat logistics in NATO, discuss new and old challenges as the Alliance prepares for large-scale combat operations, and

comment on the potential effects on combat logistics of emerging, disruptive technologies. The chapter first sets the scene by outlining the character and scope of combat logistics and placing it within the context of conflict between NATO and a peer–near-peer adversary. Critical theatre-wide challenges facing NATO, particularly in sustainment and mobility, are then highlighted, before the chapter focuses on the so-called ‘last tactical mile’, which is a metaphor for the operational area in closest proximity to the encountered threat. Finally, the chapter concludes with a summary and brief notes regarding how deficiencies may be addressed through technology.

In Chapter 5, ‘The Command of Land Forces’, Jim Storr, former British Army officer, is now an independent defence consultant, observes that commanders agreed unanimously that land force headquarters are too big and take too long to produce overly long orders. But how, and why? The chapter considers the purpose of land force command systems, the products they generate, the processes they use, their structures, the systems they use, and the people within them. It is argued that command systems are not primarily technical but that they are socio-technical entities. They, and the land forces they direct, would be more effective if they were much smaller and operated much faster. This would require abandoning much explicit process and changing how information systems are used. It would also require higher levels of individual training for fewer, more carefully selected staff officers, and removing most senior staff officers in headquarters. Critically, it would require command post exercises to be genuinely free-play, two-sided, and to take place in real time. Looking more closely at who is promoted to senior ranks would expose some unpleasant realities.

Chapter 6, ‘Tactical Tenets: Checklists or Toolboxes’ is written by B. A. Friedman based at the Marine Corps Warfighting Laboratory, USA, and Henrik Paulsson at the Swedish Defence University. The chapter focuses on defining tactics as a practice, tactical theory as a field of study, and its relationship to strategy. A brief history of tactical theory, focused on classical tactics prior to modern times, is presented to set the stage for the most common tactical theory thereafter, the principles of war. The chapter then proposes a recapitulation of the principles of war as tactical tenets as an analytical tool. Although almost every military organization has adopted the principles of war, no version is identical and few conceptions of the principles of war use them as an analytical tool, instead just listing them. The tactical tenets can be seen as a common toolset to foster analysis and comparison of military organizations. Finally, tactical tenets is applied on two case studies as a proof of concept as an analytical tool: the United States Marine Corps and the Swedish Army.

Chapter 7, 'Urban Warfare: Challenges of Military Operations on Tomorrow's Battlefield' takes on the challenges of military operations in urban terrain (MOUT). The chapter is written by Dr Mikael Weissmann, Academic Head & Deputy Head, Land Operations Division, Swedish Defence University and Co-Convener of the LWRG. This chapter addresses the daunting challenge of urban warfare on tomorrow's battlefield. In the first section, it provides a brief background of the urban warfare phenomenon. It approaches urban warfare by asking why the field has now emerged after a long period of relative neglect. Thereafter, the chapter outlines the different challenges to and expectations for urban operations on the battlefields of today and tomorrow. A number of key challenges are addressed: the impact of rapid urbanization, multi-domain operations, grey zone problems, the impact of technology on urban operations, and the urbanization of insurgency. Observing that urban areas will be an increasingly important arena for future land warfare, the chapter argues that urban operations and warfare should acquire a greater significance in our understanding of the operational environment. With large cities being the centre of gravity for political and economic interaction and although urban warfare is a nightmare that one reasonably hopes to avoid, it is not always possible to choose the battlefield and it is therefore better to prepare thoroughly for this eventuality. Finally, to help with the preparation, the chapter presents eleven lessons about urban warfare.

In Chapter 8, 'Emerging Technologies: From Concept to Capability', Jack Watling, Senior Research Fellow for Land Warfare at the Department of Military Sciences of the Royal United Services Institute in London, examines several emerging technologies, widely anticipated to transform land warfare, unpacks the practicalities of their employment, and considers how this is likely to shape their eventual use. Critically it outlines why the frictions involved in employing them make some of the visions of military futurists unrealistic. The four technologies to be considered in sequence are autonomous systems, layered precision fires, high fidelity sensors, and artificial intelligence. The chapter concludes by considering these capabilities in combination, and their collective impact on established principles in land warfare.

Chapter 9, 'Interoperability Challenges in an Era of Systemic Competition' is written by Air Commodore (Rtd) Andrew Curtis, OBE, is Associate Fellow at RUSI, UK, and an independent defence researcher. Curtis explores the future challenges for interoperability in an era of systemic competition, beginning with an assessment of what interoperability is, its characteristics, and its benefits. This analysis is centred on NATO's approach to interoperability and how that has influenced the actions and activities of its

member states. Curtis then examines the issues surrounding the pursuit of interoperability in an emerging era of systemic competition. Recognizing the impact that the latest evolution of the American way of war—Multi-Domain Operations (MDO)—will have on the development of Western military capability in the coming decade, Curtis considers what the future may hold for the various characteristics of interoperability. Finally, the chapter outlines the UK's approach to interoperability, driven as it has been by the demands of the Cold War, expeditionary operations, and now the outcome of its recent Integrated Review.

In Chapter 10, 'The Moral Component of Fighting: Bringing Society Back In', Dr Tua Sandman, Assistant Professor of War Studies, Swedish Defence University, approaches theories of victory in battle and combat tactics focusing on the oft-included moral dimension. It is argued that the question of how to win a war or battle cannot merely centre on the physical means to fight, or conceptual problems of how to fight. To understand and shape the outcome of land operations, one must also consider the moral component of fighting, essentially the will to fight. Morale, combat motivation, and cohesion are thus typically regarded as integral and critical aspects of how to achieve advantage. The chapter aims to unpack the literature on combat motivation and moral cohesion, seeking to advance our conceptual understanding of willingness to fight.

In Chapter 11, 'Military Health Services Supporting the Land Component in the Twenty-first Century', former Surgeon-General of the British Armed Forces, Lt Gen (Rtd) Professor Martin C. M. Bricknell is Professor of Conflict, Health and Military Medicine at King's College, London, examines the dual tasks of a military health service (MHS): to enable military personnel to be a 'medically ready force', and to provide a 'ready medical force' that supports armed forces during combat and other operations. Armies have the largest number of personnel exposed to risk, suffer the highest number of casualties, and have the largest medical services. Military medicine was transformed during the combat operations in Iraq and Afghanistan, resulting in the highest probability of survival for military casualties in history. MHSs have also been involved in humanitarian missions, the response to the Ebola outbreak in 2014, United Nations peacekeeping missions, and as part of national responses to the COVID pandemic. The future land battlefield may cause high casualty rates and unfamiliar threats to field medical services. The concepts of prolonged field care and prolonged hospital care describe the new approaches that will be necessary if medical planning guidelines cannot be met. Advances in medical information technology, additive printing and autonomous vehicles may also enhance medical care on the future battlefield.

The second part, Case Studies, starts with Chapter 12, 'The Operational Cultures of American Ground Forces' by Dr Bruce I. Gudmundsson, advisor to the Marine Corps Tactics and Operations Group, Twentynine Palms, California. The chapter explores the common origin and subsequent interplay of the two very different ways of thinking, teaching, and fighting at work in the US Army and Marine Corps of the twentieth century. In particular, it looks at the introduction, from Germany, of the 'applicatory method' and the subsequent evolution of its various components, some of which became rigid formats and others which inspired an approach to the art of war that was rich in creativity, innovation, and self-directed action. The chapter also describes the two very different views of 'doctrine' at work in American ground forces, as well as the effect of the 'futuristic fad' phenomenon on American military culture, as well as the experience of four very different wars during the second half of the twentieth century. The chapter will be of interest to students of US Armed Force and American military history, as well as those studying the role of military manuals, the manoeuvre warfare movement, and the relationship between teaching methods and operational styles.

Chapter 13, 'People's Liberation Army Operations and Tactics in the Land Domain: Informationized to Intelligentized Warfare' is written by Brad Marvel, Senior Research Analyst at the US Army Training and Doctrine Command (TRADOC), USA. The chapter argues that China's People's Liberation Army (PLA) is perhaps the most carefully observed and studied military in the world, with forty years of near-constant reform that radically altered the composition and capabilities of the PLA, transforming it from a poorly equipped and trained revolutionary mob to a modernized and professionalized military. The modern PLA presents a true multi-domain capability set, an emerging joint backbone, and a unique operational structure built upon decades of relentless study and experimentation. Indeed, the PLA's modernization efforts are not yet complete: new operational concepts and new systems are under development and are being integrated on a seemingly daily basis. The chapter outlines the historical background and the impetus for change that shaped Chinese military thinking, along with the strategic and political dynamics that influenced the PLA's era of modernization. It then moves into a detailed discussion of the PLA's current and future operational concepts, describing the modern Chinese way of war.

In Chapter 14, 'A Strategy of Limited Actions: Russia's Ground-based Forces in Syria' Dr Markus Göransson, Senior Lecturer, Swedish Defence University, considers the role of Russia's ground-based contingent within the overall Russian military operation in Syria. It identifies six key strategic functions of the contingent, which was small in size but highly diverse in its

composition. The functions reach beyond those of base security and support to the aerial forces that spearheaded Russia's operation, and also include the ability to carry out high-value tasks, providing capacity-building to allied forces, facilitating ally coordination and supporting escalation management. Importantly, Russia's ability to operate forces with different degrees of deniability/officiality gives it greater flexibility in managing allies, adversaries, and third-party actors alike.

Chapter 15, 'The Role of Israel's Ground Forces in Israel's Wars' is written by Eado Hecht, Senior Research Associate at the Begin Sadat Center, Bar Ilan University together with Eitan Shamir, Director of the Begin Sadat Center and an Associate Professor at Bar Ilan University. The authors follow the transformation of the Israeli Defence Force (IDF) from an underground militia into an infantry-based state army during the 1948 war, and its subsequent evolution into an army based on armoured units able to conduct combined arms, high-tempo mobile operations in the 1956 and 1967 wars. Following lessons learned in the 1973 war, the IDF increased combined arms training. During the 1990s, new technologies enabled more precise targeting from afar, leading to a new concept that emphasized precision attacks, mostly by the air force. Gradually, the new concept evolved into a belief that campaigns can be won with standoff fire systems alone. However, significant results proved elusive with this means. The enemy improved its ability to disappear in underground shelters, often dug under civilian habitations. The ground forces' setbacks in the 2006 Second Lebanon War set in motion a debate within the IDF that continues to this day. On one side, advocates of improving standoff fire technologies as a substitute for manoeuvre argue that manoeuvre should be limited and sensor-saturated, in order to rapidly discover enemy locations and pass them on to fire-forces. Their opponents argue that, although new technologies improve fire capabilities, they do not enable fire to fully replace aggressive large-force manoeuvres to find and defeat the enemy whilst conquering territory. The IDF's latest multiyear force build-up plan, *Tenufa* (Momentum), seems to be an attempt to find a middle ground between these two approaches.

Chapter 16, 'Tactics and Trade-Offs: The Evolution of Manoeuvre in the British Army' is written by Professor David J. Galbreath, Professor of International Security, University of Bath, UK, and Alex Neads, Assistant Professor of International Security, Durham University, UK. The chapter argues that the future trajectory of land warfare in the United Kingdom stands at a crossroads. For decades, the British Army has been a reliable and enthusiastic proponent of US-led digital transformation, adapting expensive US concepts to British budgets and organizational preferences. Indeed, the desire

to maintain operational currency with the US military lies at the heart of British defence doctrine, even as the UK has increasingly struggled to afford the full spectrum of capabilities such a policy implies. Now, with the character of warfare evolving once again, this old paradox presents new challenges for the British Army as it attempts to rejuvenate its warfighting capabilities in a fashion fit for the future. On the one hand, the UK Ministry of Defence's new *Integrated Operating Concept* mirrors the essential contours of the US's *Multi-Domain Operations*, presaging a further step-change in manoeuvrist doctrine. On the other, the British Army's ageing fleet of conventional platforms—from main battle tanks and infantry fighting vehicles to artillery systems and communication suites—are verging on obsolete, raising profound questions about where the technological crux of future tactical capability should lie. This chapter reveals the complex trade-offs and path dependencies inherent in the construction of British military manoeuvre. Charting the evolution of UK doctrine through professional debates over concepts and capabilities, it illuminates the uncomfortable interaction between martial thinking and material reality, strategic ambition and financial constraint, at the heart of the British Army's emergent approach to land warfare.

In Chapter 17, 'Caught between a Rock and a Hard Place: The French Army, Expeditionary Warfare, and the Return of Strategic Competition', Professor Olivier Schmitt, Center for War Studies, University of Southern Denmark, and Elie Tenenbaum, Director of the Security Studies Center at the French Institute of International Relations (Ifri), explore the transformations of the French army, and its impact on army tactics, broadly understood. The first section discusses the importance of foreign interventions for the army, and details some lessons learned of three decades of expeditionary warfare. The second section details the institutional, doctrinal, and capability changes in the French army. Assessing future challenges for the French Army, Schmitt and Tenenbaum conclude that the advent of a new era of strategic competition and the foreseeable reflux of Western interventionism is a key challenge for the identity of the French army. It has been designed, since the end of the Cold War, as a combat-ready expeditionary force best fitted to low or medium intensity stability and contingency operations. The new strategic environment is being taken into account and already translates in evolving tactics, doctrine, and capability development. This transformation, however, will take time as it challenges both the operational experience and the cultural heritage of a French army that finds itself, more than ever, at a crossroads for defining its future role in the strategic landscape.

Chapter 18, 'Trends in the Land Warfare Capability of Poland and the Visegrád States, 1991–2021', is written by Scott Boston, senior defense analyst at the RAND Corporation. Boston provides an overview of the transition of Poland, the Czech Republic, Hungary, and Slovakia from Warsaw Pact member states to NATO membership and their contributions to NATO and other multi-national missions in the years since 1999. The chapter then compares some important selected aspects of Warsaw Pact and NATO forces, focusing on the nature of the changes needed to fully adopt the system of land warfare typical of modern Western states, in the context of the rapid change in the security environment in Europe. Finally, Boston considers some of the implications of the continuing evolution of combined arms tactics and operations, with a focus on the mission to deter or defeat an adversary possessing a modern combined arms land force. Boston concludes that from the end of the Cold War to the beginning of the 2020s, the military forces of the Visegrád States have followed a winding and occasionally abrupt path from mass conscript forces subject to the control of a foreign power to smaller but more modern and flexible land forces capable of contributing to international missions and collective defence. As this work continues, it will be instructive to see how these armies make their own way toward developing the forces and capabilities they need to meet their nations' aims in the future.

Finally, the concluding chapter outlines the findings of the chapters and the volume. The authors outline a framework for a versatile approach to land warfare. First, they establish a structure of the myriad elements and factors influencing land forces, presenting a continuum of land operations modelling the use of conventional capacity and kinetic effects at different levels of conflict intensity and the role of land forces visualizing the heterogeneity of possible conflict environments where land forces may be deployed.

Thereafter, the chapter presents two schematic models; the first locates land forces in the broader operating environment by outlining how the strategic environment, conflict intensity, interoperability, and multi-domain operations are constitutive enablers and/or constraints to activities in the land domain. The second outlines how the capabilities of forces in the land domain need to be understood as a function of the interaction between own capabilities, the adversary, the human- and physical terrain, and the information environment. The multidimensional demands placed on land forces in contemporary and future operational environments necessitate a conscious multi-pronged approach to the development of land warfare capabilities, aimed at gaining a versatile edge on tomorrow's battlefields. In turn, this concerns both the build-up and construction of capabilities, and the means by

which they are deployed and utilized in future conflict. The chapter argues that the achievement of *versatility* should be a crucial aim of contemporary land forces. As outlined in *the integrated versatility model*, versatility builds on two interrelated and mutually reinforcing qualities in a military organization, *adaptability* and *flexibility*. Together, they compose the underlying preconditions for truly versatile land forces.