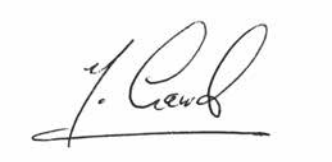
Ministry of Defence

Wargaming Handbook

Development, Concepts and Doctrine Centre

Wargaming Handbook

Wargaming Handbook, dated August 2017,
is promulgated as directed by the Chiefs of Staff



Head Doctrine

Conditions of release

1. This information is Crown copyright. The Ministry of Defence (MOD) exclusively owns the intellectual property rights for this publication. You are not to forward, reprint, copy, distribute, reproduce, store in a retrieval system, or transmit its information outside the MOD without VCDS' permission.

2. This information may be subject to privately owned rights.

Authorisation

The Development, Concepts and Doctrine Centre (DCDC) is responsible for publishing strategic trends, joint concepts and doctrine. If you wish to quote our publications as reference material in other work, you should confirm with our editors whether the particular publication and amendment state remains authoritative. We welcome your comments on factual accuracy or amendment proposals. Please send them to:

The Development, Concepts and Doctrine Centre
Ministry of Defence Shrivenham
SWINDON,
Wiltshire, SN6 8RF

Telephone: 01793 31 4216/4217/4220
Military network: 96161 4216/4217/4220
E-mail: DCDC-DocEds@mod.gov.uk

All images, or otherwise stated are: © Crown copyright/MOD 2017.

Distribution

The distribution of the *Wargaming Handbook* is managed by the Forms and Publications Section, LCSLS Headquarters and Operations Centre, C16 Site, Ploughley Road, Arncott, Bicester, OX25 1LP. All of our other publications, including a regularly updated DCDC Publications Disk, can also be demanded from the LCSLS Operations Centre.

LCSLS Help Desk: 01869 256197
Military Network: 94240 2197

Our publications are available to view and download on the Defence Intranet (RLI) at: http://defenceintranet.diif.r.mil.uk/Organisations/Orgs/JFC/Organisations/Orgs/DCDC

This publication is also available on the Internet at: www.gov.uk/mod/dcdc

Foreword

Wargaming is a powerful tool. I am convinced that it can deliver better understanding and critical thinking, foresight, genuinely informed decision-making and innovation. Sir John Chilcot's report highlighted these very themes. I have also been struck by how important wargaming is becoming among many of our allies and partners. It allows those involved to experiment and learn from their experiences in a 'safe-to-fail' environment.

I wish to reinvigorate wargaming in Defence to restore it as part of our DNA. Historically the UK military was accomplished at wargaming but this culture has largely been lost. Where it exists, it is *ad hoc* and uncoordinated, with demand outstripping existing expertise. We must seek to regenerate this culture and the associated skills among our people – military and civilian alike – at all levels and in all areas of our business. This effort requires everyone's participation and encouragement, but particularly at senior levels.

The *Wargaming Handbook* is the first publication of its type in Defence. It is an important element of this initiative and a key resource for us all. I commend it to you.

Vice Chief of the Defence Staff

‘Understanding informs decision-making....the better our understanding, the better informed our decisions will be.’

Joint Doctrine Publication 04,
Understanding and Decision-making

Preface

Purpose

1. The purpose of the *Wargaming Handbook* is to provide context and guidance for wargaming. It is designed principally to introduce the topic; it is not a detailed manual or practitioner's technical guide.

Context

2. Recent operational challenges have prompted a renewed interest in the part wargaming can play in decision-making and innovation in Defence. Nations around the world are conducting wargaming and investing in their own wargaming capabilities. The *Wargaming Handbook* seeks to explain the importance of wargaming for Defence at all levels.

Scope

3. The *Wargaming Handbook* describes how wargaming can be used to explore issues at the national strategic, strategic, operational and tactical levels and across all domains and environments. It discusses how wargaming can be applied to education and training, planning and executive decision-making.

Audience

4. The *Wargaming Handbook* is intended for all Defence personnel, in particular those who have wargaming as part of their responsibilities, wargame sponsors and those who are tasked to design and execute a wargame. The secondary audience is members of other government departments, related non-governmental organisations and the private sector, with whom Defence personnel are likely to work.

Structure

5. The *Wargaming Handbook* consists of four chapters and two annexes.

- Chapter 1 – Introducing wargaming provides a brief history of wargaming, and explains its utility and key terms and definitions.
- Chapter 2 – Wargaming fundamentals introduces guidelines for effective wargaming and the roles and responsibilities of key personnel.
- Chapter 3 – Wargaming types, variants and contexts discusses the different variations of wargaming and how these can be categorised.
- Chapter 4 – Wargaming process describes the steps required to deliver a wargame from design through execution to lessons learned.
- Annex A contains recent case studies illustrating how wargaming has been applied to Defence problems.
- Annex B provides suggested further reading and links to institutions relevant to wargaming.

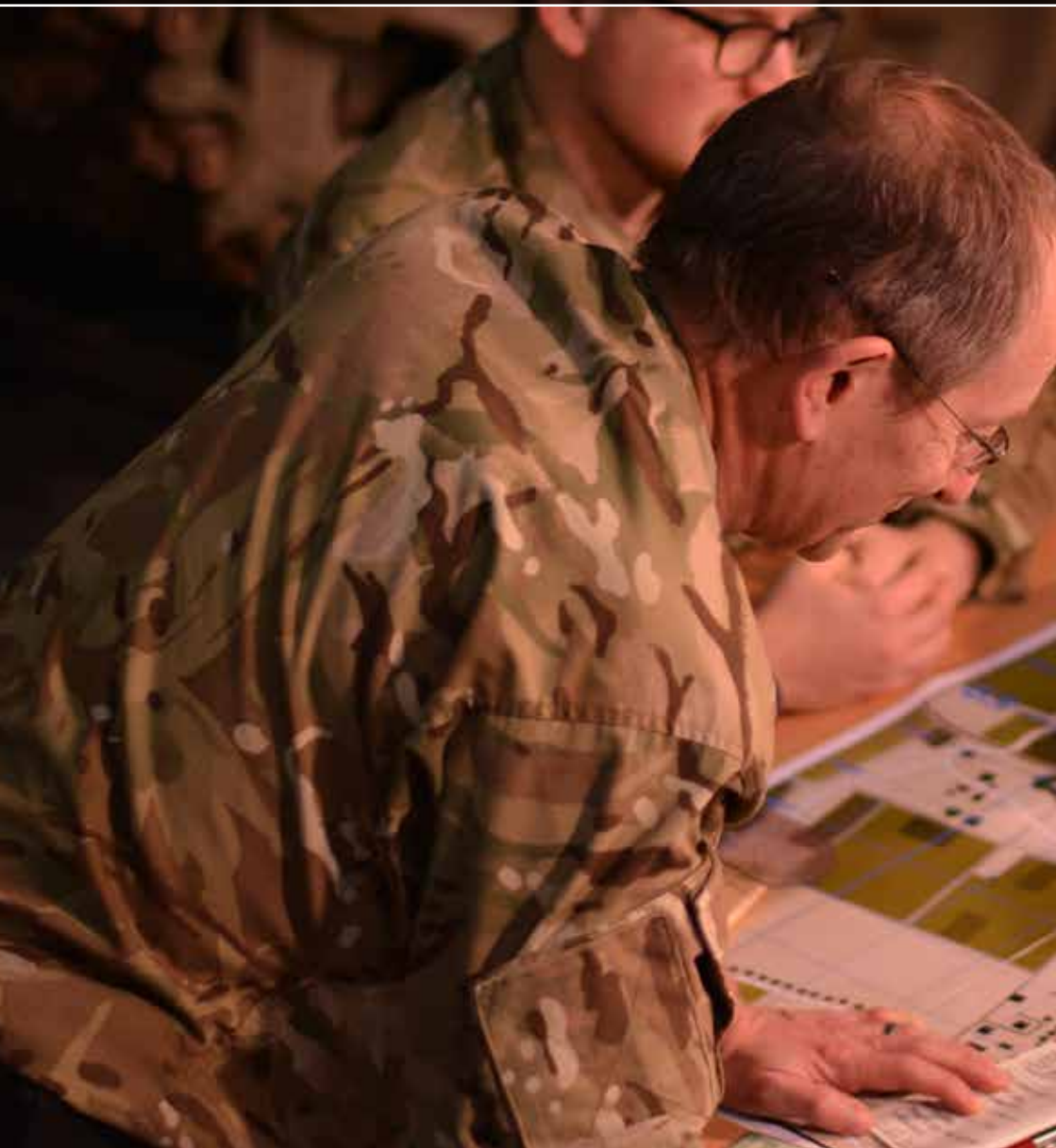
Linkages

6. The *Wargaming Handbook* is a sister publication to the Development, Concepts and Doctrine Centre's *Red Teaming Guide*, Second Edition, 2013. It draws heavily from the recent Defence Science and Technology Laboratory (Dstl) memorandum *Wargaming in Defence; A Thinkpiece for VCDS*.[1] It is also linked to the North Atlantic Treaty Organization's (NATO's) *Bi-Strategic Collective Training and Exercise Directive 075-003* and Joint Doctrine Publication (JDP) 04, *Understanding and Decision-making*, Second Edition, 2016.

1 Dstl/WP100280, *Wargaming in Defence; A Thinkpiece for VCDS* v2.0, dated 20170201.

Contents

Chapter 1



'This is not a game! This is training for war! I must recommend it to the whole Army.'

General von Muffling,
Chief of the Prussian General Staff, 1824

Chapter 1 – Introducing wargaming

1.1. Wargaming[2] is recognised as a valuable tool for commanders, leaders and managers, both within and outside the Ministry of Defence (MOD). This guide is designed to provide information on the use of wargaming, as well as improving its profile throughout the Defence community. It is not intended to be a checklist of detailed actions or tasks. Rather, it is a compendium of ideas and information designed to introduce and guide the reader to enable them to derive the most benefit from the technique.

Section 1 – Wargaming in recent history

1.2. Wargaming in its modern form originated in Prussia in the 1820's. Two officers (von Reiswitz and his son) developed a set of *Instructions for the representation of tactical manoeuvres under the guise of a Kriegsspiel (Wargame)*. In 1824, the *Kriegsspiel* was demonstrated to General von Muffling, the Chief of the Prussian General Staff who, in turn, introduced the concept to the Army. While the Prussians were the first to embrace wargaming, other nations soon copied the technique. Over the next two centuries, the armed forces of most nations employed various forms of wargaming for training and planning purposes, and wargaming was generally accepted across the military by the mid-twentieth century.

British Army pre-World War I wargaming

In 1905, Major General J. M. Grierson ran an extensive five-month long strategic wargame to simulate the outcome of war between Germany and France. The wargame was a much larger scale game than had been attempted before, and required detailed planning which took place in real time. It was umpired by Grierson and his staff.

2 Wargaming (one word) can be used as a noun or a verb.

As the wargame progressed, it allowed Grierson to presciently anticipate the Schlieffen plan and the British commitment to Belgium in 1914. It also highlighted serious deficiencies in mobilising the British Army and transporting it across the Channel. The Admiralty originally envisaged the convoy would require 42 vessels and a shipping time of seven days. The wargame revealed that available transports were so limited that by the tenth day only 22 were in operation. The total convoy took 34 days to complete.

Therefore, the Germans had won before the Anglo-Belgian coalition could organise a sufficient response. It was apparent that existing military preparations were insufficient, as the game showed that France would be defeated before Britain and Belgium could intervene militarily.

Lessons. The wargame's outcome led to a host of actions – in no small part because one of its architects ensured its results were raised on the floor of Parliament. These actions ranged from reworking mobilisation and cross-Channel plans to joint Anglo-Belgian planning and the *Entente Cordiale* with France. The wargame significantly influenced British military strategy in the years to come and is an excellent example – possibly the first – of a wargame affecting the course of British history. The Germans lost the first campaign of World War I in part because the British Expeditionary Force was in the right place at the right time and this was due to the decisions taken resulting from Grierson's wargame.

British Army *kriegsspiel* equipment circa 1890

1.3. Well executed wargames have delivered significant competitive advantage in numerous conflicts – although wargaming does not, and cannot, guarantee success. Furthermore, the use of wargaming tends to be cyclical. It peaked in the inter-war years and during World War II, particularly in Germany, Japan and the United States (US). However, military wargaming reduced after World War II, partly because of the perceived success of operations research in supporting military operations. During the Cold War wargames became formulaic and increasingly focussed on narrow scenarios. Findings were seldom released due to political or classification reasons. Except for the occasional organisation (such as the US Navy), wargaming languished; its value is being recognised once more.[3]

3 For more on the history of wargaming see Perla, P., *The Art of Wargaming*, Naval Institute Press, 1990, pages 15-59.

US Navy inter-war wargaming

US Navy inter-war wargaming underpinned the eventual success against the Japanese in World War II. The Navy's live wargames (Fleet Problem) and constructive wargames (at the US Naval War College (NWC)) were synergistic. NWC wargame rules were used as a basis to improve the umpiring of live wargames, while conversely, live tests of air attack accuracy and Fleet Problem logistics usage improved the NWC's wargame rules. Both the NWC wargames and the Fleet Problems helped both to develop the Navy's evolving doctrine and to socialise changes throughout the force.

In a speech to the NWC in 1950, Admiral Nimitz said: 'The war with Japan had been re-enacted in the game room here by so many people and in so many different ways that nothing that happened during the war was a surprise – absolutely nothing except the Kamikaze tactics towards the end of the war; we had not visualised those'.

Lessons. US carrier-based and amphibious tactics were developed, tested and refined in wargames. During the war, a group of dedicated staff officers examined the wargame findings and took lessons identified to the Pacific theatre of operations. The many insights applied included dock-ships to enable extended operations and arrestor wires on carriers to accommodate larger aircraft. Just as important, frequent exposure to wargaming mentally equipped senior US officers to respond to rapidly changing and often adverse events.

US Navy wargaming

Section 2 – What is wargaming?

1.4. There is no single, commonly accepted, definition of 'wargaming'. NATO defines a war game as: a simulation of a military operation, by whatever means, using specific rules, data, methods and procedures.[4] The importance placed on the decisions of the wargame players, not contained in the NATO definition, means this handbook uses the working definition of wargaming contained in the *Red Teaming Guide*:

> A scenario-based warfare model in which the outcome and sequence of events affect, and are affected by, the decisions made by the players.[5]

1.5. Wargaming is a decision-making technique that provides structured but intellectually liberating safe-to-fail environments to help explore what works (winning/succeeding) and what does not (losing/failing), typically at relatively low cost. A wargame is a process of adversarial challenge and creativity, delivered in a structured format and usually umpired or adjudicated. Wargames are dynamic events driven by player decision-making. As well as hostile actors, they should include all 'oppositional' factors that resist a plan. At the core of wargames are:

- the players;
- the decisions they take;
- the narrative they create;
- their shared experiences; and
- the lessons they take away.

1.6. Wargames immerse participants in an environment with the required level of realism to improve their decision-making skills and/or the real decisions they make. Analytical ('discovery') wargames can be used to explore national-strategic, strategic, operational and tactical issues across the full spectrum of military activity. Training ('learning') wargames are a 'fitness

4 NATOTerm.
5 Development, Concepts and Doctrine Centre (DCDC), *Red Teaming Guide*, 2nd Edition, 2013, Lexicon.

programme for thinking', enabling practise in the conceptual elements of command and control. Wargames are widely used by businesses, the emergency services, academia and humanitarians, as well as defence organisations.

1.7. Wargaming should not be confused with constructive simulation models or synthetic environments, which may or may not support a wargame. Neither is it a synonym for course of action wargaming, which is but one application of the technique. Some of the relative strengths and weaknesses of wargaming, modelling and synthetic environments, and where they overlap are illustrated in Figure 1.1.

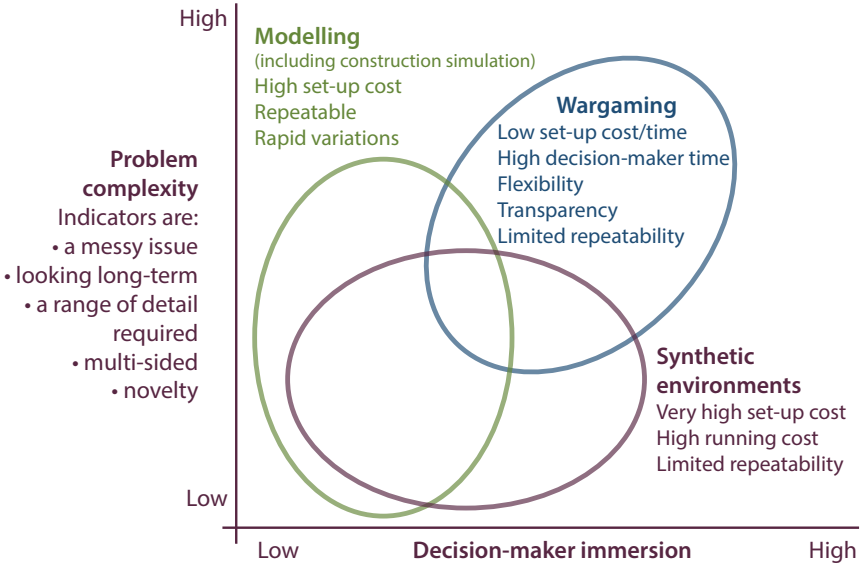


Figure 1.1 – Strengths, weaknesses and overlaps between wargaming, modelling and synthetic environments

1.8. Each of these methods are most effective when used in combination. They should not be seen as competing alternatives. For example, wargames can identify and structure issues, helping to scope and shape more detailed analysis, including the use of modelling and simulation.

The elements of a wargame

1.9. A wargame consists of various elements, all of which will usually be present to some degree. No single element constitutes a wargame. For example, a simulation might provide the 'engine' that determines outcomes, but is not the wargame; in other words, the instrumentality is not the wargame. The elements of a wargame are as follows.

a. **Aim and objectives.** Well-considered aims and objectives are essential to ensure that a problem to be wargamed has been properly framed.

b. **Setting and scenario.** The setting[6] and scenario[7] provide the immersive environment where all game play takes place.

c. **Players (and their decisions).** Player decisions drive all wargames. The primacy of player decisions is discussed at paragraph 2.8.

d. **Simulation.** Simulation can be computer-assisted, computerised or manual. It is the execution over time of the models contained within the wargame. Modelling and simulation is further discussed at paragraph 1.23.

e. **Rules, procedures and adjudication.** Wargames require robust rules and procedures. Adjudication is the process of determining

6 'A geographic and strategic situation designed to provide all the conditions required to support the achievement of high level exercise aims and objectives. The setting, which can be real world, fictionalised or synthetic, is the framework on which the scenario can be developed.' NATO *Bi-Strategic Collective Training and Exercise Directive 075-003*, dated 2 October 2013.

7 'The background story that describes the historical, political, military, economic, cultural, humanitarian and legal events and circumstances that have led to the specific current exercise crisis or conflict. The scenario is designed to support exercise and training objectives and, like the setting, can be real, fictionalised or synthetic as is appropriate.' *Ibid*.

the outcomes of player interactions. It is a key concept and is further discussed at paragraphs 3.10 to 3.13.

f. Data and sources. Data is required to build the setting and scenario. Furthermore, all simulations rely on data and data sources to populate their models.

g. Supporting personnel and subject matter experts. Experts are usually required to assist with the design and delivery of a wargame.

h. Analysis. Analysis – reliant on data gathered in-game – is normally required to help us understand what has happened during a wargame and consolidate the benefits of wargaming. This is discussed at paragraph 2.17.

1.10. This list of elements provides a first insight into the diversity of activities that can be classified as wargames. A small group playing a historical hobby game and a distributed multinational exercise can both be wargames. The complexity of the elements will vary, but all will usually be present in a wargame.

Section 3 – Applications

1.11. Historically, wargaming has proved its utility to UK Defence and remains relevant to today's problems. In particular, it can be applied to the following areas.

a. Education and training wargames focus on training personnel, using safe-to-fail environments to allow participants to practise, experiment and innovate. Wargames are well suited to this because they create experiential learning opportunities, helping to develop a shared narrative about situations and tasks that personnel might face in the real world.

b. Planning wargames are analytical wargames used to develop and test plans for dealing with particular events or circumstances. Applications span policy, strategic, operational and tactical situations. Their aim is to expose plans to rigorous examination to identify risks, issues and previously unconsidered factors.

c. Executive decision-making wargames are analytical wargames that inform real-world decisions. The dynamic and unpredictable nature of wargames enables the players to consider future events, and supports related decision-making. The intent is to generate insights and data that will increase understanding of, for example, how:

- situations might develop;
- force structures and concepts might adapt to new challenges; and
- science and technology might deliver a competitive advantage.

1.12. The distinction between education and training wargames and analytical wargames is not rigid. A wargame designed for one purpose is also likely to have benefits in the other. However, in 1966, Francis McHugh wrote, with regard to wargames designed for training or analytical purposes: 'In practice, it has been found that it is better to point the game towards but one of those objectives, that is, to select as the primary objective one of the following: (a) provide military commanders with decision-making experience, or (b) provide military commanders with decision-making information.'[8] This is illustrated in Figure 1.2. Note the final sentence in the figure – a wargame must be applicable to real-world situations to make it relevant.

8 McHugh, F., *Fundamentals of War Gaming*, US Naval War College, 3rd Edition, 1966, page 9.

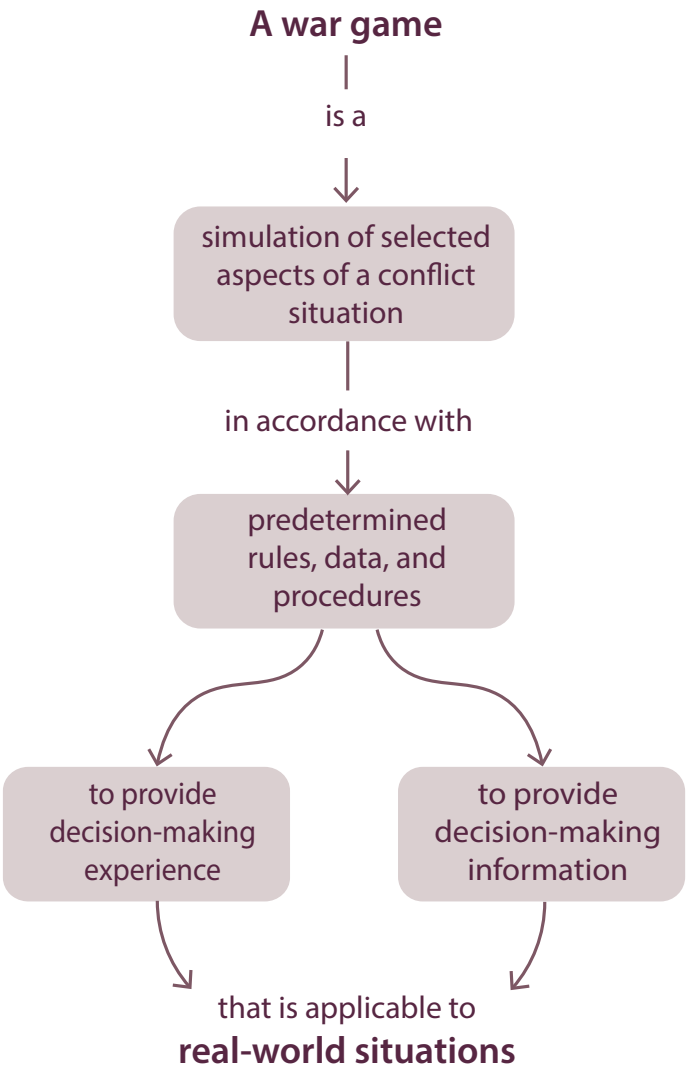


Figure 1.2 – The general purposes of wargames[9]

9 *Ibid.*

Section 4 – Why wargame?

'If my career were ahead instead of behind me, I should endeavor to the extent of my ability, and at the earliest opportunity, to acquire as thorough a knowledge of the principles of the art of war as possible, and should neglect no opportunity to train myself in their application by playing competitive wargames.'

US Admiral William Sims, 1919[10]

1.13. Wargames offer a safe, vicarious reflection of some of the situational and decision-making dynamics associated with armed conflict. Wargames enable active learning: players are confronted with continuous and often unexpected questions and challenges as they explore, experiment and compete within the artificial model the game provides.[11]

1.14. Wargaming offers unique perspectives and insights that complement other forms of analysis or training. It enables us to examine, replicate and develop an understanding of decision-making in complex contexts when faced with a determined and dynamic opponent. Indeed, it is often the only way to explore 'wicked' problems. Wargaming enables users to integrate different methods, tools and techniques (quantitative and qualitative) with a human element, thereby creating a capability that is greater than the sum of its parts.

Benefits

1.15. There are a number of benefits of wargaming. Some of these are:

- an opportunity to explore options and take risks without risking lives or disrupting business continuity;

10 Taken from https://news.usni.org/2015/03/18/opinion-the-navy-needs-a-wider-look-at-wargaming

11 See Professor Philip Sabin, 'Wargaming in Higher Education', *Arts and Humanities in Higher Education*, October 2015.

- a cost-effective way to practise command, and exercise staff procedures and management skills;
- exposure to friction and uncertainty, including adaptive, thinking adversaries, competitors, allies and stakeholders;
- a mechanism for exploring innovation in the art of war and business; and
- a method for discovering new factors and questions not previously identified.

Limitations

1.16. Wargames are not a panacea and should only be applied when appropriate. The following paragraphs outline the limitations of wargaming.

1.17. **Wargames are not reproducible.** Wargames are driven by player decisions. Players will make different choices even when presented with the same situation. Add to this the element of chance inherent in wargaming and no game will ever be the same, even when the starting situation is replicated. Of course, it is this very unpredictability, coupled with the creativity of participants, which enables wargames to generate new ideas. Such variations must be balanced by the underlying continuities and the opportunity to explore the degree of determinism inherent in each situation.

1.18. **Wargames are qualitative.** If the output required from an event is numerical, a wargame is unlikely to be an appropriate tool. While most wargames include mathematical systems that produce numerical results, precise outcomes will vary. Wargames can complement, but are not a substitute for, more rigorous or detailed forms of analysis. Wargames are best used to inform decisions by raising questions and insights, not to provide a definitive answer.

1.19. **Wargames are not predictive.** Wargames illustrate **possible** outcomes, so there is a risk of false lessons being identified from a single run of a wargame. Wargames can illustrate that something is **plausible**, but will not be able to definitively predict that it is **probable**. Using multiple games,

perhaps with different scenarios, starting conditions or players, allows more robust conclusions to be drawn.

1.20. Wargames are only as good as the participants. An uninformed, unqualified or overconfident wargame team is unlikely to add value, and may be detrimental to the project. Furthermore, the product of a successful wargame will be of benefit only if it is accepted or considered by the sponsor. Finally, greater diversity among participants is likely to generate richer collective insight. In some cases, having military officers as the only participants, or having military officers with common experiences and perspectives, may limit the quality of the game.

Section 5 – Associated techniques

1.21. Several associated techniques can support, or be supported by, wargaming. These all overlap to some extent and, with wargaming, add to the 'toolkit' of decision-making techniques.

1.22. Operational analysis or operational research is used to apply research and analysis methods to the systematic investigation of operational problems to assist executive decision-makers. In Defence, it largely involves applying operational analysis/operations research to complex socio-technical problems within the MOD and in operations. Most wargame outcomes are based on operational analysis at some level. Operational analysis can directly support wargaming (as explained in paragraph 3.12), while wargaming is often used to integrate operational analysis into planning.

1.23. Modelling and simulation. A model is a representation of a system, entity, phenomenon, or process.[12] A simulation is the execution over time of models representing the attributes of one or more entities or processes.[13] Note the importance of the passage of time: a wargame must incorporate elapsed game time to force players to face the consequences of their

12 *MOD Acquisition System Guidance,* Version 20.14, 1 June 2017, Modelling and Simulation Glossary.
13 *Ibid*.

decisions. Simulations can be: live; virtual or constructive.[14] Constructive simulations, which are those that most commonly support wargames, can be computer-assisted, computerised or entirely manual.

1.24. Red teaming is the independent application of a range of structured, creative and critical thinking techniques to assist the end user make a better-informed decision or produce a more robust product.[15] Wargaming is a recognised red teaming tool,[16] while red teams often support wargames. However, neither is a 'parent' technique to the other; 'sister' is a better term.

14 Live: real people using real systems. Virtual: real people using simulated systems. Constructive: simulated people using simulated systems. Constructive simulations can further be divided into: entity-level (modelling individual platforms); and aggregated (modelling groups of platforms).

15 DCDC, *Red Teaming Guide*, 2nd Edition, 2013, page 1-3.

16 *Ibid*., pages 3-9, 3-11 and A-29.

Notes:

Chapter 2

‘Wargaming is a powerful tool which is currently not well understood and therefore somewhat neglected.’

Exercise AGILE WARRIOR 11, insight #10

Chapter 2 – Wargaming fundamentals

2.1. Successful wargaming relies on its ability to challenge. It is a rigorous intellectual activity as opposed to a consensual confirmatory exercise or discussion. Because of this, wargaming is not easy to do well without appropriate preparation and commitment.

2.2. Games are an integral part of all human cultures and are at the heart of all learning. A good game provides a unique experiential learning opportunity experience. Peter Perla and Ed McGrady wrote: 'Games are story-living experiences. By engaging their players in ways more similar to acting in the real world than reading a novel or watching a film, games affect their players in ways more deeply remembered and more transformative of their personae than other techniques for entertainment and learning.'[17]

Royal Navy World War II U-boat tactical analysis

The Royal Navy's Western Approaches Tactical Unit (WATU) operated between 1942 and 1945. WATU used wargaming to develop innovative tactics for dealing with U-boat attacks on convoys. WATU developed a basic set of wargame rules with processes to represent real-time decision cycles, tactical doctrine and communications realities. Players representing escort commanders could only see the gameplay through a restrictive screen to represent the limited information that they would have in a real battle and U-boat tracks were hidden from the players.

The initial series of games undertook to evaluate how a U-boat might best approach a convoy during a night attack. These revealed the theory – that proved to be correct – that U-boats were not attacking from outside the perimeter of convoys, but were instead moving stealthily amongst the supply ships using their intended victims as cover.

17 Perla, P., and McGrady, E., 'Why Wargaming Works', *US Naval War College Review*, Summer 2011, page 125.

The WATU team also ran courses for officers about to serve on escort duty. The wargames were so useful that they were endorsed at the highest level; the Commander in Chief Western Approaches, Admiral Max Horton, took the course himself to show his support.

Lessons. The WATU wargames were used to analyse enemy tactics and identify potential new threats. The wargames provided an analytical capacity beyond the scope of individual ship's captains, allowing WATU to anticipate enemy actions and devise tactics to counter them. They also successfully predicted a number of future developments including wolfpacks, the potential of air/sea collaboration and the introduction of acoustic torpedoes. The WATU wargames also demonstrate the importance of senior officer engagement.

© IWM (A9891)

© IWM (A21819)

Wrens of the Western Approaches Tactical Unit wargaming a wolfpack attack on a convoy and course officers examining the situation via peepholes

2.3. The considerable power of games demands caution. Games that under- or over-state the consequences of an event or factor can lead to erroneous insights and false lessons. It is the responsibility of the wargame designer, working alongside their sponsor, to mitigate this risk.

Section 1 – Guidelines for good wargaming

'[The power of wargames]... lies in the existence of the enemy, a live, vigorous enemy in the next room waiting feverishly to take advantage of any of our mistakes, ever ready to puncture any visionary scheme, to haul us down to earth.'

William McCarty Little,
US Navy, 1912[18]

2.4. Successful wargames are a combination of science and art, as are successful operations. Wargames must not be designed to reinforce preconceived answers to a problem. The characteristics listed below are strongly recommended for consideration during the wargame process and should feature in a wargame unless there is a good – and noted – reason for them not to.

2.5. Adversarial. 'Adversarial' is a key – perhaps the key – characteristic of wargaming. Wargaming is a competitive intellectual activity, and the primary challenge is usually provided by a combination of:

- opposing players representing active, thinking and adaptive adversaries and competitors;
- wargame controllers using the level of threat as a variable; and
- a red team that challenges assumptions and, in conjunction with the wargame controllers, can introduce friction.

Opponent players are usually grouped into a red 'cell' but competing actors might also form black (organised crime) and/or orange (armed non-state actors) cells. Each of these might represent several factions. Operations rarely unfold as we wish, even in the absence of adversaries or competitors,

18 Taken from 'The Strategic Naval War Game On Chart Maneuver', *US Naval Institute Proceedings Magazine – 1912*, Volume 38/4/144, paragraph 20.

so 'oppositional' frictions, in the Clausewitzian meaning,[19] should also feature. These can be introduced by a red team or wargame controllers. Semi-cooperative situations such as inter-agency processes or coalition activities can also be wargamed.[20] How to staff the appropriate cells, and determining their capabilities and plans is an important consideration during both the design and execution of a wargame.

2.6. **Chance.** Clausewitz said: 'War is the province of chance... It increases the uncertainty of every circumstance and deranges the course of events'.[21] Chance is an ever-present characteristic of warfare, and so must feature in wargames. It is an expression of risk, which is a fundamental concept that all military personnel should be experienced in calculating and managing; wargaming allows this in a **safe-to-fail** environment. Chance plays a key role in handling the extensive middle ground between inevitable failure and confident success. The element of chance is most easily generated in a wargame by using random number generators. These can be used to determine the outcomes of interactions within a wargame, including – but not limited to – combat. Commonly used random number generators include dice, computational methods and look-up tables, all of which are acceptable instruments. Chance can also be introduced by using 'event' cards.

2.7. **Uncertainty.** Uncertainty and the fog of war are fundamental characteristics of warfare, and should be considered in a wargame. Experiencing uncertainty fosters a robust mental capacity among players, better allowing them to deal with adverse outcomes. It often leads to new, and unexpected, situations and insights. Active, thinking opponents and the element of chance are the primary means of introducing uncertainty into a wargame, but other methods include:

- hidden movement, until forces or intentions are revealed by intelligence;

19 Friction has been defined as: the propensity of unexpected delays to occur during armed conflicts. Simpson, W., *A Compendium of Wargaming Terms*, Military Operations Research Society (MORS).

20 Further information can be found in Gaming the semi-cooperative, available at https://paxsims.wordpress.com/2016/02/02/gaming-the-semi-cooperative/

21 von Clausewitz, C., *On War.*

- unclear or unspecified aims and intentions, including those of allies, actors and factions other than the adversary;

- random events appropriate to the scenario such as bad weather, political interference, media scrutiny or mechanical breakdown affecting operations; and

- altering the sequence of play, which can allow one side to 'steal a march' or get inside the decision-making cycle of the other.

2.8. Primacy of player decisions. The players are the protagonists. Their combined behaviour should determine the course of a wargame. Maximising 'story-living', with all its benefits, takes place when the narrative is driven by player decisions and when players face the consequences. During execution, this requires wargame controllers to allow a dynamic, open-ended narrative to evolve. Hence, care should be taken to avoid:

- presumptive answers influencing analytical wargame design and execution so that outcomes inevitably reinforce these preconceptions; and

- excessively predetermined events in a training wargame that constrain player decisions and constrict a dynamically evolving narrative.

2.9. Control. Control is the minute-by-minute activity that ensures the wargame proceeds as required to address the problem. It most often takes the form of a wargame control team, which can range from one person to hundreds sharing distributed systems in many geographical locations. The North Atlantic Treaty Organization (NATO) *Bi-Strategic Collective Training and Exercise Directive 075-003* has a comprehensive list of the control appointments, responsibilities and sub-organisations required for large wargames. Smaller wargames require less control. Whatever the size of the wargame control organisation, it retains several key functions.

a. Meeting objectives. The control team must ensure that the wargame meets its objectives. This is an enduring function during wargame design, development and execution.

b. **Maintaining player immersion.** The setting and scenario require careful management if they are to properly support the wargame. During execution, the integrity of the scenario must be maintained to ensure player immersion. Because wargames are 'story-living' events, the scenario will evolve dynamically. This evolution should accommodate player decisions, but the created world must remain coherent and consistent while delivering the required objectives. This is a difficult balance to achieve, and requires skill and effort.

c. **Adjudicating.** Adjudication is the process of determining outcomes, usually by an objective human in the loop (although adjudication in some wargames occurs entirely within the simulation, with no human intervention). Good adjudication is the key to successful wargames, whether by a single 'umpire' or a large organisation. More detail is provided in Chapter 3. To reinforce the primacy of player decisions, adjudication should be applied with as light a touch as possible. The potential for adjudicators, and wargame controllers in general, to become a 'dominant player' must be mitigated, especially where player decisions and beliefs are a wargame's primary output.

d. **Facilitating.** Players should be free to concentrate on decision-making. While they may understand the game rules, facilitation is often required to avoid players having to know the wargame system. Because Defence wargames can be complex, facilitation is often required to assist non-expert support staff, as well as players.

2.10. **Safe to fail.** Wargames can provide a safe to fail environment, where mission command is practised and 'thought experiments' undertaken with no fear of failure. Commander Field Army said in January 2017: 'Delegate and foster mission command in barracks as much as in training. Be bold and reward boldness. Release the genie from the junior commander bottle. I don't want failsafe (except in security, money, Service complaints and law). I want safe to fail – providing the reason is positive.'[22] Wargames that involve undue assessment, consciously or subconsciously, stifle innovation, risk-taking and the opportunity to learn. The Israeli Defence Force perspective

22 Commander Field Army presentation to General Staff Conference, 12 January 2017.

is that, to learn, the trainee has to fail, be surprised and be mentally challenged.[23]

2.11. Engagement. Challenge and professional satisfaction should be inherent in all games, but wargames should also, where appropriate, be fun. This in no way undermines the serious nature of wargames – Defence wargames might not be undertaken for fun, but they can still be fun. 'Fun' is an acceptable term; it is a primary factor in ensuring that players engage. Engagement, through active learning, leads to better internalisation of training lessons and greater analytical insight. This effect extends to wargame designers, support staff and observers.

2.12. Processes. The processes required to design, deliver and evaluate a wargame are described in Chapter 4. Process is of paramount importance for successful wargames, even when the use of large numbers of computers presents technical challenges.

2.13. The wider context. Wargames provide greatest utility when used iteratively within a wider decision-making process. For example, Defence experimentation recognises the necessity to combine different techniques in a series of inter-connected events. The Integrated Analysis and Experimentation Campaign Plan (IAECP) is accepted best practise.[24] A multi-technique, integrated approach enables a 'cycle of research', which is: 'an iterative application of the principal tools the military uses to explore, understand, and prepare for future conflict.'[25] Wargames are one potential component. The principle applies to all wargaming, whether analytical or training.

23 Brigadier Dr Meir Finkel, Israeli Defence Force, speaking at the I/ITSEC Conference, 3 December 2015.

24 See, for example, American, British, Canadian, Australian and New Zealand (ABCA) Armies Program, *Guide for Understanding and Implementing Defense Experimentation*, The Technical Cooperation Program, February 2006, and the *UK Land Handbook – Force Development Analysis and Experimentation*, July 2014.

25 For more information, see Commander Philip Pournelle, 'Preparing for War, Keeping the Peace', (based on Peter Perla's *Art of War Gaming*), *Proceedings Magazine*, September 2014, Volume 140/9/1,339, available at http://www.usni.org/magazines/proceedings/2014-09/preparing-war-keeping-peace

2.14. **Cheap, frequent and small scale.** Recent United States (US) experience shows that the majority of wargames should be cheap, frequent and played in small groups.[26] While some wargames are necessarily large, a 'cheap and frequent' approach maximises learning opportunities and allows innovations to develop in subsequent games. Single wargames conducted as a 'box ticking' exercise generally fail to build on the educational process or analytical findings.

German Army inter-war doctrinal development

Wargames were used in the inter-war years by the German Army as:

- teaching tools for the study of previous operations;
- training environments for the techniques and procedures of writing and issuing orders; and, most importantly,
- testing grounds for new doctrinal principles.

Limited to a skeletal military, Germany used wargames to develop a doctrine for forces they did not possess. They gained some understanding of the capabilities of weapons by studying World War I, conducting exchanges with foreign militaries and witnessing foreign manoeuvres. They then conducted map-based wargames that incorporated units with the equipment they had observed. The most promising concepts they derived were assessed in field exercises where substitutes were used for forbidden equipment – all undertaken with forces that did not physically exist.

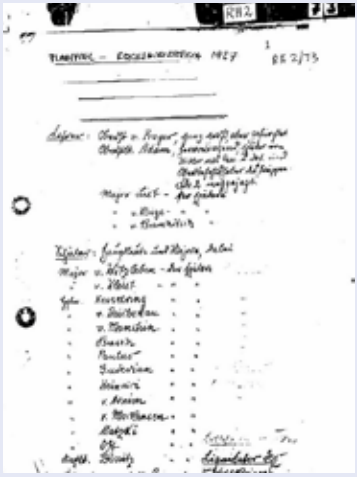
The Germans called one concept they developed 'mobile operations'. The rest of the world would call it *Blitzkrieg*.

In 1927, the participants in one wargame included the following junior officers: von Prager, Adam, List, von Kluge, von Brauchitsch, von Witzleben, von Kleist, Kesselring, von Reichenau, von Manstein, Busch, Paulus, Guderian, Heinrici, von Arnim, von Mackensen, Matzky, Ott and Donitz. All went on to be Field Marshals, less for Guderian who reached General.

26 McGrady, E., *Introduction to Wargaming Class*, MORS Wargaming Special Meeting, Alexandria, Virginia, US, 17 October 2016.

Lessons. The *Blitzkrieg* doctrine was developed within an artificial environment and its subsequent success on the battlefield demonstrates the utility of wargames as 'sandbox' environments. Players can develop, test and refine concepts against active opposition prior to employing them against the enemy. This provides a process through which weaker ideas can be eliminated in favour of those with greater potential.

Introducing wargaming early in a military career increases the chances that it is inculcated into an organisation's culture.



Class of 1927

General Heinz Guderian with tank crews near Smolensk, 1941

2.15. Appropriate supporting simulation. All wargames require simulation. There are many instances where this can be manual, rather than computerised; even role-playing is a form of simulation. Computer and manual simulations each have strengths and weaknesses and are generally complementary. All types of simulation should be considered and an appropriate solution determined. Whatever supporting simulation is selected, there is generally a requirement to incorporate a human-in-the-loop, usually as part of the adjudication process.

2.16. Transparency. Simulation outcomes, and the reasons for these, should be clear and open to scrutiny. This allow participants to understand the dynamics of a situation. When adjudication is based on transparent calculations there is a clear understanding of how the outcomes have been derived. This transparency is equally important in training and analytical games.

2.17. Analysis. Analysis can range from an informal discussion after a hobby wargame to a large after action review. The wargame design and development process should determine the analysis plan, which will include the size and frequency of after action reviews, along with the staff and processes required to enable analysis. In-game and immediate post-game analysis are part of execution. Post-game analysis can only take place if sufficient data has been captured in-game. Constant reference should be made to aspects related to analysis.

a. Data collection and management plan. The data collection and management plan (DCMP) is fundamental to analytical wargames. Pre-game, it will dictate aspects of the scenario and the activities to be wargamed. In-game, it must be checked to ensure sufficient and relevant data is being collected.

b. The after action review process. Some after action reviews occur daily or more frequently; some wargames only feature them at the end. In all cases, the systems and sub-processes required to enable after action reviews and feedback must be borne in mind throughout design and execution.

c. Lessons identified. A lessons identified log should be readily available to all wargame participants throughout execution. This is used to collect and collate lessons identified and issues arising as the wargame progresses; it is too late to ask for these at the end, when they are long forgotten.

Section 2 – Roles and responsibilities

2.18. The credibility of a wargame depends on the skills and experience of the wargame design and delivery team, with senior sponsorship and support. The key personnel involved, and their roles and responsibilities, are outlined below. The NATO *Bi-Strategic Collective Training and Exercise Directive 075-003* details the roles required in large-scale events. The following list is shorter, acknowledging that wargames can be small. Indeed, some of the roles below might be combined.

2.19. Game sponsor. The sponsor is the senior officer or official under whose authority the game is being conducted.[27] Defence wargames are usually initiated by a sponsor. As well as starting the process, their understanding, continuing commitment and open-mindedness will contribute to successful wargames. The sponsor needs to:

- inculcate a common and widespread culture of wargaming at all levels, characterised by senior sponsorship and active participation;
- define the problem to be wargamed and approve aims and objectives; and
- remain open-minded to wargame insights; cognitive bias and Service or individual interests must be avoided.[28]

27 Simpson, W., *A Compendium of Wargaming Terms*, Military Operations Research Society (MORS).
28 For further reading see Dr Stephen Downes-Martin, 'Adjudication: The Diabolus in Machina of War Gaming', *Naval War College Review*, Summer 2013, Volume 66, Number 3.

Wargaming outside defence – FMC Corporation and effective leadership

In a climate of declining defence spending at the end of the Cold War, FMC Corporation – manufacturers of the M113 Armoured Personnel Carrier and the Bradley Fighting Vehicle – commissioned a wargame to assess the advantages of a potential merger with General Dynamics' Land Systems division.

During the course of the game the FMC team could not strike a deal with General Dynamics, but they came to a realisation that merging with a different company – the BMY division of Harsco Corporation – would provide a greater benefit.

FMC's head – a West Point graduate with a Harvard MBA described as having a 'powerful personality' with an operating style which 'did not exactly encourage pushback among his senior employees', disagreed with this assessment. He repeatedly demanded that the team rethink the problem in light of the fact that the process of merging with General Dynamics had been under extensive discussion for over two years. The game was therefore repeated multiple times with different base assumptions, but the outcome remained the same. Eventually, FMC's Head ceased resisting and began to accept the results. As the game was winding down he asked his team 'Why didn't anyone tell me this was such a dumb idea?' and, to a deathly hush, one employee replied: 'Because it was your idea, boss'.

Lessons. This business wargame demonstrates a number of points in relation to leadership which are just as applicable on the battlefield as the boardroom. Leaders and sponsors must be open-minded and not let presumptive answers colour their judgement, even if that means jettisoning plans they have been personally invested in. Wargames also allow lower-level personnel to challenge their superiors in a risk-free environment. This example highlights how a flawed idea had progressed to an advanced stage because the forceful personality of a superior had stifled valid criticism.

2.20. Game director. The game director represents the sponsor, and is responsible for delivering a wargame that satisfies the problem. Once a wargame's aims and objectives have been approved by the sponsor, the game director is responsible for achieving them. The game director is responsible for the following.

- Ensuring that the wargame team consists of suitably qualified and experienced personnel.
- Being actively involved in the design and development of the wargame.
- Ensuring that planning is done at the appropriate time. It is too often assumed that a wargame can be 'pulled off the shelf' at the last minute. Sufficient time to design and develop all elements of the wargame must be allowed.
- Empowering the wargame team. The game director should be open to external ideas but protect the team from unwarranted criticism, and ensure that design and development outcomes are acted upon by other decision-makers.
- Ensuring the wargame is correctly staffed.
- Providing direction and guidance as required during wargame execution to ensure objectives are met.
- Ensuring that lessons are identified throughout the wargame process, analysed and promulgated.
- Validating the wargame, and promulgate findings.

'It is important to make one thing clear at the very start; designing and delivering a wargame is an art, not a science. Experienced military officers, practised operations research analysts, and accomplished computer programmers are not necessarily capable of designing useful wargames. Although some or all of the knowledge and skills for such people are important tools for a wargame designer to possess, the nature of game design requires a unique blending of talents.'

Peter Perla,
The Art of Wargaming

2.21. The wargame team. An empowered wargame design and delivery team must be established at the outset of a wargame project. The size of the team will vary considerably with the scale of the wargame. The wargame team should comprise the following.

a. Sponsor representative. One or more representatives of the sponsor should form part of the design team. They are the custodian of the aim, objectives and scope of the wargame, and should be available throughout for direction, guidance and clarification.

b. Designer. An experienced wargame designer should orchestrate the programme of wargame design and development.

c. Analysts. Analysts are usually required to design and/or validate:

- simulation models, to ensure these are sufficiently realistic; and
- data collection and management plans.

d. Simulation experts. Experts are required to ensure that the simulation(s) selected are appropriate and will enable delivery of the wargame objectives.

2.22. Game controller. The game controller (GameCon) is the critical role during wargame execution. They steer the wargame minute by minute to achieve the objectives, following direction and guidance from the game director as required. The role includes, but goes beyond, 'umpire'; the GameCon should be the final arbiter of all routine decisions. These decisions might relate to adjudication, scenario evolution, or any aspect of the wargame. The GameCon can be likened to the conductor of an orchestra, controlling all sections of the ensemble to produce a harmonious and coherent whole. As well as being the key wargame controller, the GameCon is responsible for the following (but does not necessarily personally undertake).

a. Adjudication. Whether a person, in the form of an adjudicator, or a multi-person, multi-tool function, the adjudication process is key to the success of the wargame.

b. Facilitation. The complexity of the wargame might necessitate a facilitator, or facilitation organisation. The facilitator/organisation could assist both players and wargame support staff.

2.23. Players. Wargame players can number from one to thousands. They are usually organised into cells, the size and shape of which can vary considerably. The colour 'coding' of these varies between nations and organisations, sometimes causing confusion. The red cell should not be confused with the red team.[29] Each has a specific role, although they may work together. For this reason, the word 'team' is best avoided in wargames except when applied to the red team. The colours suggested below accord with the *Red Teaming Guide*:[30]

- blue – friendly or allied forces;
- red – the opposing force(s);
- orange – armed non-state actors;

29 The Development, Concepts and Doctrine Centre's (DCDC's), *Red Teaming Guide*, 2nd Edition, describes a red team as 'a team that is formed with the objective of subjecting an organisation's plans, programmes, ideas and assumptions to rigorous analysis and challenge.'

30 *Ibid*., page 3-6 and Lexicon.

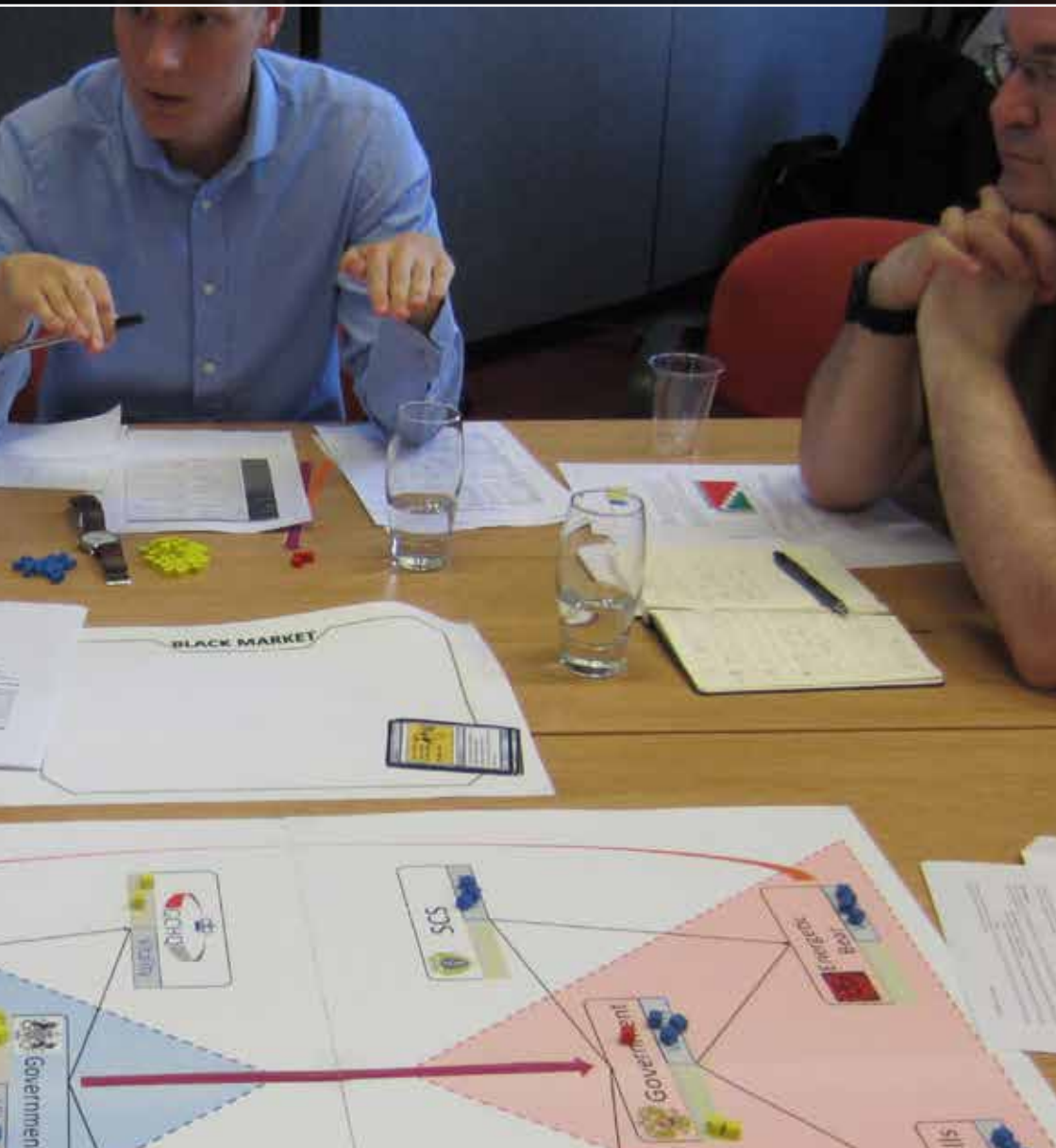
- black – organised and transnational organised criminals;
- green – indigenous security forces;
- brown – neutral actors or civilian population; and
- white – national and supranational political organisations and diplomats, humanitarians, international organisations and non-governmental organisations.

Notes:

Chapter 3

'In the whole range of human activities, war most closely resembles a game of cards.'

Carl von Clausewitz
On War



Chapter 3 – Wargaming types, variants and contexts

3.1. Wargames are many and varied. There are many approaches and techniques which produce numerous wargame **variants**. Wargames therefore take many forms and they can be almost unrecognisable from each other. Because there are so many variations, it is not sensible to precisely classify wargames. Rather, this chapter discusses certain recognised types, the many wargame variants and the scope of wargame contexts.

3.2. The **purpose** of a wargame is usually derived from the activity the wargame is supporting; wargaming is an enabling activity. A purpose often does not need to be stated, but will provide clarity for the players and the wargame team.

Section 1 – Wargame types

3.3. Some wargame terms are commonly used. The word 'game' is used to describe matrix and seminar (war)games because the context of these, more open-ended, events tends toward the full range of political, military, economic, social, infrastructure and information (PMESII)[31] factors; 'war' itself frequently does not feature.

3.4. **Seminar game.** Seminar games enable an open-ended, argument-based discussion between experts, to elicit opinions and judgements. Players are immersed in a context, asked to make decisions and then face the consequences of these. Adjudication can be semi-rigid but tends towards free (see paragraph 3.10). Seminar games are usually conducted in small groups; hence the name. They should not be confused with a conventional seminar or the colloquially-named 'bunch of guys sat around a table (BOGSAT)'. Both of these can serve a valuable function; they often provide the primary dialogue to which seminar (and matrix) games

31 These are also used with physical environment and time, and/or cultural appended.

can be a useful adjunct. However, 'Seminar games must be differentiated from scenario-based structured discussions that have no causal interactivity, adversarial play, or temporal consequences to actions…'.[32]

3.5. Course of action wargame. Course of action wargames are used during the planning process by headquarters at all levels. They are noteworthy because they are probably the most commonly used form of wargaming in Defence. A course of action wargame is a systematic method for analysing a plan to visualise the potential ebb and flow of an operation or campaign. They are used to compare and test forming courses of action and allow 'what if' questions to be asked. The technique can be applied to any context. Extant doctrine and other guidance[33] provides advice for this well-practised technique.

3.6. Matrix game. Matrix games demand that players provide several specific arguments for the success of a proposed action. These are limited only by player imagination and feasibility. Other players can then make counter-arguments. If opposed, a short discussion leads directly to an adjudication outcome. Debates are time-limited to allow multiple actions and counter-actions in the game, so that the participants are forced to live with the consequences of their decisions over time. As the scenario permits, players are free to negotiate with each other, with completely open-ended outcomes. These characteristics stimulate free-thinking creativity and novel outcomes from the narrative generated in the game. Matrix games rely on an experienced facilitator/umpire who leads players through the process, suggesting moderations that the group can then discuss.

3.7. *Kriegsspiel*. 'Wargame' is the literal translation of the original German *'Kriegsspiel'*; they are one and the same thing and can be used interchangeably. The term 'classic' *kriegsspiel* is often used to denote a three-table,[34] closed[35] wargame using rigid or semi-rigid adjudication.

32 Professor Rex Brynen, McGill University, blog post on PAXsims, available at https://paxsims.wordpress.com/

33 For example: Allied Joint Publication (AJP)-5, *Allied Joint Doctrine for Operational-level Planning* (with UK national elements); Joint Services Command and Staff College, *Wargaming Aide Memoire*; Fuhrungsakademie Der Bundeswehr, *Guide to Preparation and Execution (Wargaming)*; and the British Army, *Staff Officer's Handbook*.

34 One table each for the two sides and umpire team.

35 Provision of intelligence is limited to what the umpire assesses would be known.

A perfectly valid variant (and the original Prussian version), this is just one example of a wargame.

3.8. Historical and hobby wargame. Historical wargames are most often hobby wargames used to study actual conflicts. Taking many forms, hobby wargames typically feature two people playing a board or miniatures game, or one or more people playing a computer game, solitaire or collaboratively. Wargame control, including adjudication, tends to be contained within the game system, or rules, so there is often no human-in-the-loop. Many thousands of historical hobby wargames have been published since the 1950s, on almost every recorded war. These continue to appear at a rapid rate. A historical precedent makes it easier to tweak new game designs to make them more accurate.

United States Joint Staff First Gulf War planning analysis

In Washington at 10am on 2nd August 1990, the day of the Iraqi attack which would begin the First Gulf War, Mark Herman, the designer of the board wargame *Gulf Strike*, was approached by the United States (US) Joint Staff and asked to produce a wargame of the developing situation. By modifying his commercial game, he was able to begin play of a now-classified wargame by 3pm the same day.

On several occasions prior to the ground war, Army and Joint Staff planners used the game with real information on forces, and the entire war took only two game turns and ended with almost no losses on the American side. These outcomes put Herman in direct intellectual conflict with the entire Army analytical community. However, he believed that *Gulf Strike* provided 'a much better angle on the truth than the multi-million dollar computer simulations.' James Dunnigan states that: 'The results of this manual game were the basis of much of the decision-making in Washington during August'.

Lessons. The outcomes of these wargames affirm the continuing utility, flexibility and viability of the manual hobby wargame in an age dominated by computerised simulations. Furthermore, the 1991 use of *Gulf Strike* also demonstrates the utility of commercial products in the professional military sphere.

Hobby wargamers playing *Gulf Strike*

3.9. Business wargame. Wargaming is increasingly used in competitive commercial situations: 'Wargames in business are hot. Recent reports in the business press suggest the large consulting firms are running three times the wargames they used to just a few years ago…to replace 'navel gazing' with a more insightful, external perspective of your markets and your products'.[36] Business wargames share the same variants and processes outlined below, but applied to a business context.

36 Gilad, B., *Business War Games*, page 13.

Section 2 – Adjudication

3.10. **While adjudication is just one of the variants that produce different wargames, it is common to all wargames and is of primary importance.** Ranking adjudication as the principal variant does not imply that the others are unimportant. Quite the opposite; the other variants generally take the majority of wargame design and development effort. However, adjudication requires the most careful consideration and so is placed foremost.[37]

3.11. Adjudication is the act of determining the outcome of player decisions.[38] It enables consequences to be highlighted and discussed, and options to be explored. The methods of adjudication are as follows.[39]

a. **Free adjudication.** The results of interactions[40] are determined by the adjudicators in accordance with their professional judgment and experience.

b. **Rigid adjudication.** The results of interactions are determined according to predetermined rules, data and procedures.

c. **Semi-rigid adjudication.** Interactions are adjudicated by the rigid method, but the outcomes can be modified or overruled by the adjudicator.

d. **Minimal/consensual.** Adjudication is by the collective opinion of players and the adjudicators.

37 See Dr Stephen Downes-Martin, 'Adjudication: The Diabolus in Machina of War Gaming', *Naval War College Review*, Summer 2013, Volume 66, Number 3.
38 Dstl/WP100280, *Wargaming in Defence; A Thinkpiece for VCDS* v2.0, dated 20170201.
39 *Ibid*., page 8.
40 Interactions can be kinetic (for example, combat) or non-kinetic (for example, a meeting or aid delivery).

3.12. Several tools and techniques can be used to support adjudication.

a. **Operational analysis.** Operational analysis informs the adjudicator(s), typically by presenting a spread of outcomes such as the best, worst and most likely cases. Using this to inform the decision influences adjudication in the direction of a rigid outcome.

b. **Computers.** Computer assistance in the form of a 'plug-in' model or spreadsheet 'combat calculator' likewise informs the adjudicator's pending decision. Like operational analysis, the influence is towards a rigid outcome. Computerised simulations exert an even stronger influence in the direction of rigid adjudication. Commonly used, computerised simulations can provide the entirety of the adjudication function.

c. **Moderation.** To moderate is defined as: cause to be less extreme; to move towards the medium or average quantity.[41] Moderation is used to steer a wargame to achieve specific training objectives, or to lessen extremes in an analytical event. Moderation is generally used during semi-rigid adjudication, and can influence the decision in either direction (towards an average expected outcome). However, moderation has perils, since shifting towards average outcomes can all too easily sideline important conclusions about the vulnerability of plans to chance and bad luck.

d. **Role play.** Defence wargames sometimes include an element of role play, but are rarely role-play-only. Role play can exert a strong influence towards free, or even consensual/minimal, adjudication. Constraining role-play actor interactions can reduce the influence, but that risks lessening the benefits of role play (free thinking creativity). The ultimate expression of role play is completely open-ended games featuring consensual adjudication. There is some evidence,[42] when considering human conflict situations, that role play is a better predictor of outcomes than either a single 'expert', or game theory, or simulated interaction and unaided judgement for forecasting decisions in conflicts.

41 *Concise Oxford English Dictionary*, 12th Edition, 2011.

42 Green. K. C., *International Journal of Forecasting 21*, 2005, pages 463–472.

Section 3 – Wargame variants

3.13. As well as differing methods of adjudication, there are many different tools and techniques that can be applied to a wargame. The interaction of these many axes can produce a wide number of wargame variants.

- Number of sides: one through to many-sided.
- Number of players: solitaire through to very large multiplayer.
- Number of (force) elements: a few per side to many.
- Representation of elements: entity/platform-level through to highly aggregated.
- Representation of 'soft' factors:[43] none (i.e., entirely kinetic) to social science simulation of actors' and populations' perspectives at all levels.
- Size of play space: small (sub-tactical) up to global (geostrategic).
- Amount of intelligence provided: closed through to open disclosure.
- Situational awareness – number and type of table/display: single table or screen through to many, including distributed, computer displays.
- Degree of computerisation: manual, computer-assisted through to computerised.
- 'Turn' length: real-time through to turn-based cycles of months or even years.[44]

43 Often called non-kinetic effects or human behaviour representation (HBR). These include the perceptions of civilian populations.
44 This is a continuum; 'real-time' computer simulations still execute in cycles of a few seconds to a few minutes.

- **Narrative driver:** open-ended through to pre-determined, pre-scripted events.

- **Size and composition of control:** none through to large, distributed, control organisations.

Section 4 – Wargame contexts

3.14. There are many contexts to which a wargame can be applied. These reflect the span of human competition and imagination and are not limited to the levels of warfare, domain or environment. Examples of different contexts that should be considered include:

- complex ('wicked') through to well-bounded problems;

- original creative thought through to rigorous analysis; and

- the level of understanding required of the wargame – considering a spectrum from 'understand' through 'insight' to 'evaluate' is a useful way of considering the context, and required complexity, of a wargame.

3.15. Clear, easily defined problems, such as kinetic activity, can be more suited to a rigid, computerised approach. 'Soft' problems lend themselves to free, or minimal, adjudication that relies more on a human element.

Notes:

Chapter 4

'We wargame because we must. There are certain warfare problems that only gaming will illuminate. Wargaming is a distinct and historically significant tool that warriors have used over the centuries to help them understand war in general and the nature of specific upcoming operations.'

Professor Robert Rubel,
The Epistemology of Wargaming

Chapter 4 – Wargaming process

4.1. In common with all systems and projects, a wargame is best considered in terms of a holistic life cycle, as shown in Figure 4.1. The following sections offer an overview, not a detailed step-by-step guide. The intent is to give the Defence sponsor and game director sufficient insight to ensure that a prospective wargame team has the necessary expertise to design and deliver a wargame. While wargame design and execution should be primarily driven by the (educational or analytical) objectives, in practice resources and constraints (time, space, budget, participants, and so on) must also be considered.

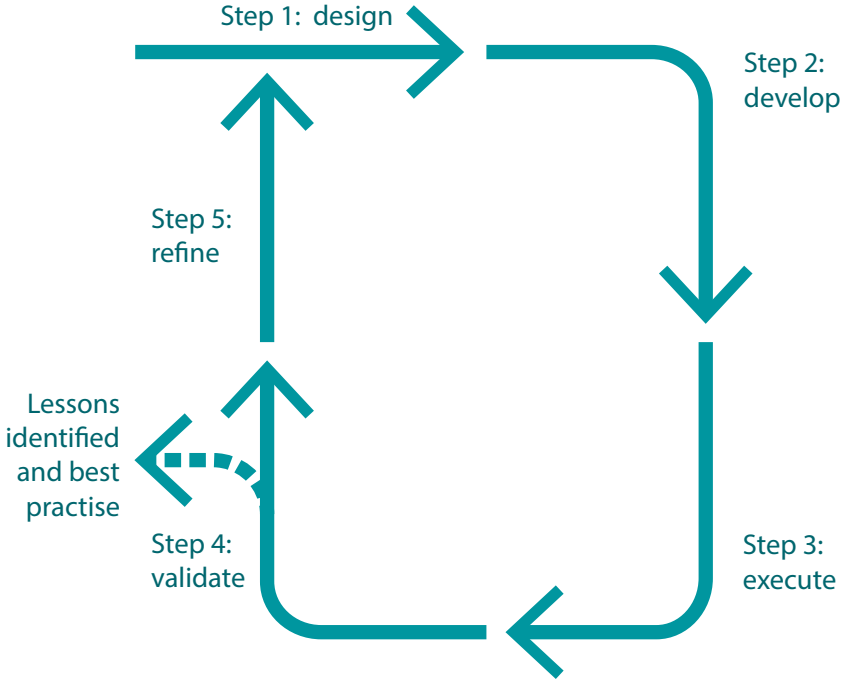


Figure 4.1 – The wargame process

4.2. Wargames are iterative, and follow a circular life cycle: the refine step leads directly back into (re-)design, even if changes are minor. Even one-off wargames should follow all steps. Lessons identified should be captured and promulgated to inform other wargames as applied lessons learned. All wargame proceedings, findings, suggested refinements and best practise should be collected centrally for future use, as the United States (US) Navy did so effectively during the inter-war years – and are starting to do so again.

Section 1 – Step 1: Design

4.3. As McHugh[45] advised, wargames should 'point to' either a training or analytical purpose, but a dual benefit will ensue. Typical design steps are shown in Figure 4.2 for training and analysis wargames. While similar, the key difference lies in:

- the effects to be enacted on the players (training); and
- subjects of analysis and metrics (analysis).

45 McHugh, F., *Fundamentals of War Gaming*, US Naval War College, 3rd Edition, 1966.

Training wargame steps	Analysis wargame steps
1. Specify the aim and training objectives.	1. Specify the aim (usually the study question) and objectives.
2. Identify how the outputs will be used and integrated.	2. Identify how the outputs will be used and integrated.
3. Identify the people to be trained, their roles and the decisions they will be expected to make.	3. Identify the subjects of analysis, the critical elements within these and any key variables.
4. Determine the desired effects on the players, and the exercise activities required to create these.	4. Determine how the subjects of analysis will be examined.
5. Determine the setting, scenario and types, level and sources of information the players will need to make their decisions and to enable the training objectives to be achieved.	5. Identify any metrics and data to be gathered to enable the examination, and how this data capture will be done.
6. Identify the structures and processes required to achieve Steps 3 and 4.	6. Determine the scenario, and any specific vignettes, required to enable the examination.
7. Identify or design the tools, technology and subject matter experts needed to populate and enable these structures and processes.	7. Identify the people required to ensure the validity of the examination findings.
8. Create an audit trail by documenting all decisions taken and the reasons for them.	8. List any assumptions made to date.
	9. Identify, or design, the processes required to achieve the examination, including adjudication of outcomes.
	10. Devise the tools, techniques and subject matter experts required to make these processes work.
	11. Create an audit trail by documenting all decisions taken and the reasons for them.

Figure 4.2 – Example wargame design steps

4.4. The design step often includes an initial wargame design meeting. North Atlantic Treaty Organization (NATO) direction[46] refers to this as an Exercise Specification (EXSPEC) Conference. This should be held as early as possible in the overall planning of the activity that the wargame will support. Wargame design 'by committee' can be counter-productive, so attendance should be restricted to the minimum number required. A NATO EXSPEC Conference demands a significant number of attendees.[47] The list below tends towards the smaller end of the wargaming spectrum and is typical for Defence wargames. In very small wargames, one person may perform the last three roles.

- Sponsor, or an authorised representative.
- Game director (who could be the sponsor's representative).
- Wargame designer.
- Lead simulation expert. The expertise required is a broad knowledge of simulations, rather than expertise in a particular simulation. The latter would presume the use of a pre-determined simulation, whereas what is required is to select appropriate simulation(s).
- Lead operational analyst.

4.5. The agenda typically follows the design steps at Figure 4.2. While the wargame designer should facilitate, the sponsor is responsible for providing clear aims, objectives and scope for the wargame. These frame the problem and are an essential start point for all wargame design. The outcome of the design step should be an agreed and documented set of actions and their rationale. This becomes the schedule for all development activity and provides a constant reference point for all queries arising. Wargame design is an iterative process and outcomes should be revisited as necessary.

46 NATO *Bi-Strategic Collective Training and Exercise Directive 075-003*, dated 2 October 2013.

47 The full North Atlantic Treaty Organization (NATO) process directs the following appointments: Officer Scheduling the Exercise; Officer of Primary Responsibility; Officer Directing the Exercise; Officer Conducting the Exercise; Exercise Planning Group; and Core Planning Team.

4.6. Scoping previous wargames. The wargame team should devote resources to identifying and speaking to organisations that have conducted wargames like the one they are considering. This relates directly to the 'validate' and 'refine' steps from previous games, which should identify wargaming lessons identified for future wargame teams to use. This engagement can occur before the design step starts in earnest.

Section 2 – Step 2: Develop

4.7. The wargame team, with appropriate assistance, individually or collectively complete the actions arising from the design step. Examples of development taskings include the following.

a. Setting and scenario. The effort required to develop a scenario (including mapping, whether physical or digital) can be considerable. The six modules detailed in the NATO directive[48] provide a good guideline, including for smaller wargames. While the use of main events lists and master incidents lists[49] is common, take care to avoid pre-scripting the wargame narrative.

b. Adjudication methods. These will ideally be drawn from existing and proven methods, but new tools or techniques might be needed.

c. Wargame processes. The success and failure of most wargames depends on using correct and robust processes, irrespective of the technologies used.

d. Analysis plan, plus any supporting processes. An analysis plan should exist for both training and analytical wargames.

e. Data capture plan. This is derived from, and supports, the analysis plan.

48 NATO *Bi-Strategic Collective Training and Exercise Directive 075-003*, dated 2 October 2013, Appendix 1 to Annex M.

49 Each main event will consist of one or more incidents that are presented to the training audiences by means of injections; see Glossary for further detail.

f. Simulation. The simulation(s) might be original, or a modification of an existing one. Considerable effort may be required to configure, populate and physically set up the simulation(s).

g. Players and supporting personnel. Unmanned player cells or absent subject matter expert functions can invalidate the entire wargame.

h. Venue and layout. The physical space within which the wargame will take place can vary from a single table to distributed multinational locations. While this should be dictated by the wargame design and development process, it is often the case that venues will be predetermined and can act as a constraint on wargame design.

4.8. Several development meetings, workshops and conferences are typically required. These can be large, such as the series of initial, main and final planning conferences used by NATO, but need not be for smaller wargames. The outcomes of the design step should form the agenda for development meetings, or at least be reviewed as an important agenda item.

4.9. An essential element of development is one or more test exercise(s). 'Play testing' is critical to deliver all wargames successfully. A series of events, interleaved with ongoing development work, is commonplace, and could include the following.

a. Internal play test. The internal play test is usually limited to the wargame team. The purpose is to test the progress of key development items such as adjudication methods, processes, the scenario, data capture and analysis plans.

b. Integrated systems test. The purpose of the integrated systems test is to assess whether the wargame systems integrate to the required degree of rapidity and simplicity. It is a good opportunity to involve the sponsor and game director to confirm that the wargame is on target to achieve the objectives.

c. Test exercise. The purpose of the test exercise (TESTEX) is to robustly test all aspects of the wargame to ensure they are fit for

purpose. While all wargame elements (including briefings, technology and processes) should be evaluated, the TESTEX should not be mistaken for a rehearsal. A representative of the sponsor and the game director should be present.

4.10. **Rehearsal.** Differentiated from the TESTEX, a rehearsal is required just before the actual wargame, with sufficient supporting staff and player representatives. No new issues should arise; the rehearsal is primarily to confirm that the technology and processes supporting the wargame will work.

4.11. **Outcome.** The desired outcome from the development step, and the series of play tests in particular, should be that the sponsor, game director and all members of the wargame team are confident that the wargame can be set up, executed with a full player contingent, deliver the required outputs and meet the overall aim.

Section 3 – Step 3: Execute

4.12. Execution is what differentiates a wargame from a planning exercise. It is where plans are enacted and players face the consequences of their, and their opponents', decisions. Lessons are internalised and thought experiments take place. Novel outcomes emerge and 'what if' questions are asked. Players experience command activity, as far as it can be outside real operations, adverse outcomes overcome and agility developed. It is the *raison d'être* of wargaming.

4.13. The diversity of wargames that results from the combination of variants and contexts precludes a detailed explanation here of how to execute them. Execution is a bespoke activity that will vary considerably from wargame to wargame; it must be entrusted to a suitably staffed, qualified and experienced wargame team, supported as required by subject matter experts. However, common activities (which will vary considerably in complexity) are below.

- Conduct simulation and systems set-up. This can range from a map on a table to federated and distributed computer systems.
- Conduct simulation user training as required.
- Conduct pre-wargame and start-of-wargame briefs for control staff and all participants.
- Conduct the wargame.
- Capture data and analyse the wargame. Some analysis will occur during execution, some is likely to be conducted afterwards. Data capture during execution will be required in both cases.
- Conduct the after action review. These can occur during execution; they are not limited to a single end-of-wargame event.
- Collect and collate lessons identified throughout for use during the 'validate' and 'refine' steps.

Section 4 – Step 4: Validate

4.14. Validation is the term used in the Defence Systems Approach to Training Quality Standards (DSAT QS) for the process whereby training is assessed to see if it has met the requirement. The validate step has the same purpose in a wargame, be it a training or analytical game. Validation should involve the whole wargame team. All lessons identified, observations and feedback should be collated and examined for internal and external validation. The sponsor should lead on external validation (were the event objectives correct?) and the remainder of the wargame team on internal validation (did the event meet the given objectives?). The wargame might be just one element of a wider validation.

4.15. A post exercise report should be produced. This might only concern the wargame, or the wargaming aspects of a wider event that might be

included as a post exercise report annex. The following sections should be considered.

a. **Suggested refinements.** Suggestions can relate to any aspect of the wargame. Promulgation should be widespread, including to a central repository of wargaming best practice.[50]

b. **Wargame findings.** The lessons identified, observations and insights arising from the wargame should be recorded and promulgated. These should also be distributed to a central repository.

c. **Shaping factors for subsequent events.** Factors arising from the wargame that will shape future iterations in a series of games, or other aspects of an experiment, should be recorded and promulgated. The timely distribution of these is particularly important in an ongoing Integrated Analysis and Experimentation Campaign Plan 'cycle of research.'

Section 5 – Step 5: Refine

4.16. Lessons identified only become lessons learned when applied. Many wargames are iterative, particularly in educational and training contexts. In these instances, incorporating lessons identified into subsequent events is routine. More effort to achieve this is required when a wargame is a one-off, which is often the case in analytical events, even an Integrated Analysis and Experimentation Campaign Plan.

4.17. In Figure 4.1, the 'refine' arrow should flow back into the 'design' step. Time is well spent re-confirming that the existing design remains valid. Exceptionally, refinements might be made directly into the development step, but it is wise to consider a (re-)design step first to check that nothing has changed.

50 Such a capability exists in the United States but is not yet available in the UK. It is a suggestion in the ongoing Vice Chief of the Defence Staff's work strand.

4.18. Finally, and in common with all steps of the wargame process, an audit trail should be generated and maintained by documenting the suggestions made and by whom, the decisions taken and the reasons why. A key output from the 'validate' and 'refine' steps is documentation that enhances wargaming corporate memory.

Russian Naval Wargaming, 1902-03

During the 1902-03 academic year at the Nicholas Naval Academy, St. Petersburg, two captains participated in a wargame umpired by Admiral Zinovy Rozhestvensky. This simulated the naval elements of a future war with Japan.

The report from the game argued that the lynchpins of Russian naval power in the Far East were the squadrons at Port Arthur and Vladivostok, and that the best way to defeat these would be with 'a surprise attack without declaration of war', as 'under present-day naval conditions the fleet which is attacked at anchor might perish totally'. The participants had thus correctly deduced the strategy that the Japanese would use to commence the Russo-Japanese War one year later, at the Battle of Port Arthur on 8th February 1904.

The Battle of Port Arthur, 1904

Lessons. This example demonstrates the potential of wargames to be used as predictive analytical tools. While wargames cannot predict the future, they are good at showing when something is plausible (as opposed to probable) and demands consideration. It also illustrates the effect of buy-in and open-mindedness at senior levels – or the lack of it, in this case. Despite Rozhestvensky serving as an umpire, he does not appear to have paid attention to the game's final report. Any impact the game might have had was therefore lost: although the lessons were compiled, they were not acted upon as a result of the Admiral's lack of engagement.

Annexes

Annex A – Applying wargaming to Defence problems

A.1. If you are tasking or leading a wargame project, you should follow the guidance provided in Chapters 1-4. In this annex, we provide case studies that illustrate how wargaming has been applied to Defence policy-making, planning, concept and force development, education and training. Each case study briefly explains the:

- context;
- wargame activity;
- wargame variants; and
- outcomes.

Case study 1 – Wargaming in campaign and operational planning: shaping peace support operations in Afghanistan, 2011[51]

'[Wargaming] enabled the planners to think at the strategic, operational and tactical levels identifying and developing understanding of the risks to the plan and how they should be mitigated. The tool challenged planners to think laterally, attacked group-think and challenged cognitive dissonance. The outcomes directly informed commanders' decision-making processes.'

Brigadier Gary Deakin (then Colonel),
ISAF Headquarters Joint Command J5[52]

Context

In 2011, the UK Defence Science and Technology Laboratory (Dstl)[53] deployed two teams of civilian volunteers[54] to Afghanistan to support the Headquarters International Security Assistance Force (ISAF) Joint Command (HQ IJC) military planning teams. Dstl supported HQ IJC (which was responsible for the combined Coalition and Afghan military campaign across the country) to shape future North Atlantic Treaty Organization (NATO) operations. Two major planning conferences in March and November used Dstl's world-leading computer simulation, the Peace Support Operations Model (PSOM),[55] a research-based decision-support tool for examining operations and outcomes in complex environments such as Afghanistan. Originally designed to inform future UK strategic planning, PSOM was employed by the Dstl teams in Afghanistan in a new and bespoke analytical process. This process simulated the planning, execution and assessment of

51 For more information, please see http://professionalwargaming.co.uk/PSOM-Marston.pdf and https://www.gov.uk/government/news/mod-scientists-help-shape-afghanistan-operations

52 *Operational Research Society Impact* magazine article 'Shaping Peace Support Operations in Afghanistan', 2011, pages 38-42.

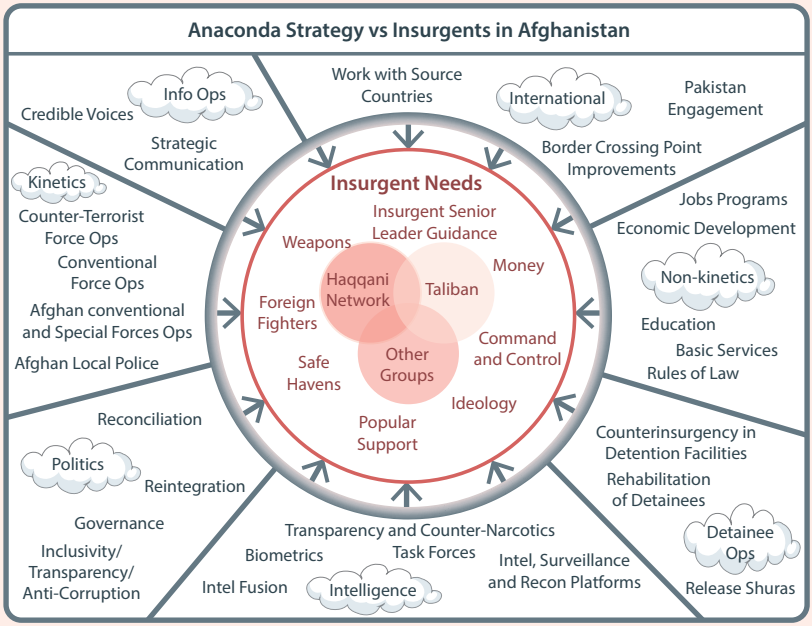
53 The Defence Science and Technology Laboratory (Dstl) is the UK's leading government agency in applying science and technology to the defence and security of the UK.

54 Including colleagues from the United States (US), led by the Joint Staff.

55 Commonly referenced and pronounced as 'Possum'.

real-world operations, giving senior military and civilian decision-makers clear direction and insights that influenced and shaped NATO operations in Afghanistan.

The core requirement for the Dstl team was to provide a way to assess the progress of future military operations and civilian-led activity across the complex conflict environment in Afghanistan. The breadth and depth of this challenge is highlighted in the diagram below, which outlines the US General David Petraeus' Anaconda strategy for dealing with insurgency in Afghanistan. The diagram became known as the **counter-insurgency donut**.



General David Petraeus' Anaconda strategy

Wargame activity

The conferences were the first of their kind to use a computer-based wargame to evaluate and refine campaign planning in Afghanistan. Delivering added value to military decision-making in a challenging environment like Afghanistan requires a comprehensive representation of its complex nature.

Dstl's PSOM computer system provided a novel analysis capability incorporating complex interactions between factors such as religious beliefs, ethnic identities, socio-economic conditions, geography and terrain, as well as political and military activity. The analysis process for each event built on PSOM's ability to simulate future military operations and civilian development activities by placing each of these complex factors in context, describing the relationships between them, and using computer simulation to provide an objective structure to track cause and effect and generate insights for decision-makers. Critically, the process used subject matter experts within the wargame to ensure their knowledge and expertise was also reflected. Within this process, military and civilian planners were able to assess the potential effects of different courses of action and test them against different challenges.

Wargame variants

The wargame conferences centred on semi-rigid, computer-assisted adjudication. Interactions during the month-long turns were first determined rigidly using PSOM, but then could be moderated or overruled by the human adjudication team. Each conference involved approximately 20 control staff and 100-150 military and civilian players with every cell represented (except brown – see below): red, orange, green, blue, black and white. The blue, green and white players comprised strategic-, operational- and tactical-level planners, with support from external civilian agencies, embassies and elements from the Afghan National Security Forces (ANSF). Thousands of entities were simulated, with military force elements represented at company level. Within PSOM, the civilian population (brown cell) was simulated as a set of discrete agents with their own decision-sets and information properties (PSOM is a semi-agent-based model, the brown cell being simulated by the computer). This was a closed game, with players collecting intelligence from various sources. One central bird table and a network of computers provided shared situational awareness. The game was dynamic, with an open-ended narrative driven by the player decisions and how they reacted to the consequences of these.

General Karami, Chief of the Afghan National Army and General Scaparrotti (then Lieutenant General), Commander ISAF Joint Command, at a daily wargame briefing, before determining the strategic direction to all the participants for the next day's activity

Reception/outcomes

COM IJC summarised the output of the 2011 Afghanistan planning conferences as follows: 'You have raised issues that a coalition and combined team, hundreds of thousands strong, have not thought all the way through to the finish. That early catch will save many lives as well as be critical to the success of the future campaign.' Brigadier (then Colonel) Gary Deakin representing the British Army commented in 2014: 'The use of the wargaming tool PSOM enabled commanders and their planning staffs to objectively visualize the likely outcomes of the transition campaign plan for Afghanistan. Almost 3 years on, and having been in involved directly or indirectly in the Afghanistan campaign since, I have frequently observed events and trends which were identified as key risks to the plan in the wargaming. This is the most effective tool for wargaming at the higher levels I have experienced.'

Case study 2 – Planned force testing

Context

The Defence Science and Technology Laboratory (Dstl) conducts regular analysis of scenarios and their associated campaign plans as part of the planned force testing process (formerly known as Future Force Development) for Ministry of Defence (MOD) Head Office. These are large-scale pieces of analysis work that have five phases:

- prepare;
- strategic planning;
- campaign planning;
- campaign execution; and
- analysis.

The outputs of each planned force testing contribute to the evidence base used in Strategic Defence and Security Reviews to shape the structure and tasks of the UK Armed Forces. In addition, the analysis results and insights are used by commands to inform decisions regarding capability planning, equipment programmes and lower-level structures.

The strategic planning phase identifies military response options, which are taken forward to the campaign planning phase for course of action development and wargaming. Initial analysis and testing occurs in this phase, supported by elements of the wargame system, but not involving a full wargame. Dependent on the outcome of campaign planning, either the complete set of courses of action or a sub-set is taken forward to the execution phase for detailed examination. The purpose of the execution phase wargame is to:

- evaluate the course(s) of action;
- identify the key risks, assumptions, issues, dependencies and opportunities; and
- generate data in the form of a campaign narrative for the subsequent analysis phase.

The analysis phase entails more focussed and detailed analysis using operational analysis tools. This occurs in the months following the execution wargame.

Wargame activity

The planned force testing execution wargames generally occur over a two-week period. The operation plan(s) produced during the planning phases is executed. Members of the planning teams are present during execution and act as wargame players. The wargames are played in a series of turns, the length of which and their context are tailored to the analytical requirement. Typically, three to four turns are enacted each day. Each turn involves a declaration of intent and concept of operations by each cell, followed by the execution of each cell's stated plans and then a calculation of outcomes. Once all players' plans have been enacted and interactions resolved, a consequence management phase translates these into geopolitical responses and tracks the perceptions of population groups. Each turn is then followed by a recording and planning period, during which:

- players revise plans ready for the next turn;
- players capture their personal insights and observations for analysis; and
- analysts ensure that the required 'force variation testing' (how alternative force structures or capabilities may have altered their plan) and other data has been captured for the subsequent analysis phase.

Wargame variants

The wargames use semi-rigid adjudication, driven primarily by a manual simulation, although some computer-assistance is used, in the form of simple spreadsheet tools. Results are presented transparently to allow all participants the opportunity to comment. Should moderation be required to ensure objectives are met, the game controller (GameCon) (the Dstl event lead) will do this after an open discussion between players.

The number of sides is determined by the scenario. This can include multiple red, orange and black cells, some of which have sub-cells. All cells are given freedom of action to develop and execute original plans, but the wargame system imposes constraints. Land force elements are generally represented at battle group (or equivalent) level. Maritime force elements are represented as task groups, then as individual platforms (ship or submarine) when more detailed simulation is required. Air force elements are aggregated into force elements at readiness (FE@R), typically of approximately one squadron. Special Forces and intelligence, surveillance and reconnaissance activities are represented by effect, not by force elements. The wargame is generally open, although a semi-open or even closed mechanism could easily be adopted. All force elements are generally placed on a central bird table, and players use common sense and military judgement to assess the level of intelligence that would be available to them. Where useful, this is discussed openly and red teamed.

Outcomes

The primary planned force testing execution wargames output is a narrative describing the course of the campaign (or campaigns if multiple versions are played through). This can be augmented with vignettes, with more detail of specific activities. Players' insights, plus the overarching risks and issues arising from executing the campaign are captured. The campaign narrative is illustrated using photographs and PowerPoint as appropriate. All of this is used as a basis for subsequent analysis when more detailed analytical work is conducted, leading to a number of reports and recommendations. Examples of specific outcomes, which are then evaluated in further studies, could include:

- evaluation of air campaign variations against differing air defence environments;
- evaluation of detailed urban operations options; and/or
- identification of technology variations on specific actions or engagements within the campaign.

Case study 3 – Chatham House, Palestinian Refugee Crisis, 2008

Context

In 2008, Chatham House ran a 'negotiation simulation' role-play game to explore possible future Middle East peace negotiations on the Palestinian refugee issue. This was part of a broader three-year project 'The Regional Dimension of the Palestinian Refugee Issue'. It was financed by the UK's Foreign and Commonwealth Office, the European Union and the Canadian International Development Research Centre. The game was intended to explore the bilateral, regional and international issues involved in reaching an agreement on the refugee issue, as well as the challenges of implementing such an agreement once it had been reached. The purpose of the exercise was not to use simulation for teaching or training purposes *per se* (although people certainly learned things), but rather to offer new perspectives on one of the most difficult dimensions of the Israeli-Palestinian conflict. An important objective of the game was to identify issues that might arise in future negotiations, so that appropriate preparation and policy research could take place in advance. The control team had a sense that the parties, in focusing on the political and legal aspects of the issue, had overlooked some of the practical economic and social challenges – challenges which, if not adequately addressed, could potentially derail any future agreement.

Game activity

More than 35 participants took part in the game, including researchers, journalists, activists, former officials and officials (acting in non-official capacities) from the Middle East, Europe and North America. The teams represented 19 different regional actors. The scenario was set in a hypothetical near-future of October 2008. It was designed to establish conditions under which participants could engage the substance and mechanics of a possible refugee deal, and was not necessarily intended to be a 'realistic' projection of current events. Meetings and interactions were conducted at the behest of player teams, and there was no fixed timetable,

or pressure to end discussions. The scenario presumed the following two things.

- A shaky ceasefire endured across the Gaza border, punctuated by occasional outbreaks of violence.
- Against all expectations, Israeli and Palestinian negotiators have produced a draft peace agreement. The Israeli and Palestinian teams could seek mutually acceptable changes in this. However, they were also to propose how it would be implemented, and secure support from refugees, host countries, and the international community to do so.

Game variants

The primary game mechanism was role play. Although the game was moderated by a three-person control team, adjudication was consensual/minimal; participants determined their own responses to all interactions. While some information was available open-source, the game was closed because players could disclose as much or as little information to other actors and factions as they wanted. Control maintained a website on which it posted scenario information. The website was also used to post simulated news stories during the event. There was no fixed turn length; players were not pressured to end meetings – as long as they met their given objectives.

Outcomes

The most important outcome was that the game indicated that the parties had conducted inadequate technical preparation on the issue in real life. This spurred considerable work over the next few years, with the game influencing the refugee issue policies of many participating actors. The game was sufficiently realistic that, at one point, the Palestinian team asked to be allowed to call Ramallah to get negotiation instructions from the actual Palestinian leadership. Chatham House produced a report on the game, highlighting the issues raised.[56] The Foreign and Commonwealth Office held

56 Chatham House, *The Regional Dimension of the Palestinian Refugee Issue' Simulation Exercise Report* 23-25 June 2008.

a one-day follow-up meeting a few months later to examine these in greater detail. They included the:

- importance of communication and perception: 'If you don't have a communication strategy, others will steal a march and you will lose control';[57]
- failure of knowledge management within foreign ministries and aid agencies;
- challenge of the multilateral aspect of the refugee issue, and the need to engage host states and international donors more effectively; and
- need to market ideas to stakeholders: refugees on the ground were, and felt, excluded from the process.

57 *Ibid*., page 10.

Case study 4 – Headquarters 3rd Division Exercise IRON RESOLVE 2014 and 2015

'[Wargaming] was fundamental to exercise delivery as it provided the central Excon control mechanism for dynamically coordinating all synthetic wrap activity. Injects were inserted at the appropriate time/space (not predetermined by a fixed MEL/MIL), and were used to reward success and punish failure. As all Excon SMEs were present, [the wargame] ensured all injects were collaborative and that 2nd and 3rd order consequences were considered.'

Maj Marc Tyers,
Headquarters 3rd Division,
SO2 Collective Training 6

Context

Exercises IRON RESOLVE 2014 and 2015 (Ex IR 14/15) were two consecutive divisional-level command post exercises. The same scenario was used in both, with events in 2015 building on the 2014 end of exercise situation. Ex IR 14/15 was designed to test the 3rd Division Headquarters in war fighting against a near-peer enemy. It used the decisive action training environment (DATE) scenario. The exercise had six phases, executed over the two years':

- shape;
- deter;
- seize the initiative;
- dominate (a 'wicked' urban problem);
- stabilise; and
- enable civilian authority.

The training audience was the entire 3rd Division Headquarters staff plus attachments, operating in a distributed headquarters using real command and control systems.

Wargame activity

The overall Ex IR 14/15 was a command post exercise: a conventional one-sided wargame. **The novel element was a 'wargame within a wargame' used by exercise control (EXCON).** The purpose of this was to pre-consider likely events to shape the exercise and coordinate EXCON activity. The 'EXCON wargame' was held **the day before** the wargamed events were presented to the training audience via a live common operational picture, reports and returns, injects, role play and so forth.

Ex IR 14 EXCON wargame in progress

Wargame variants

The EXCON wargame was entirely manual. Rigid outcomes were generated using look-up tables, and these were then moderated by the game controller as required. Soft factors were captured using 'Marker Tracks', and the evolving socio-political outcomes were the primary scenario drivers. The manual simulation complemented two computer systems that supported the wider command post exercise. It set the parameters within which the real-time ABACUS computer simulation operators would work. Outputs were entered into the EXONAUT Management System for action by distributed

observer/mentors as appropriate and could be used for after action review purposes. The training audience received only that information which their intelligence, surveillance and reconnaissance assets detected in the ABACUS computer simulation or was provided by EXCON. Hence the overall command post exercise was a closed wargame. Conversely, the EXCON wargame was open, because all EXCON players needed perfect situational awareness to enable a common understanding of the developing scenario to be presented to the training audience. The narrative was derived dynamically whenever possible, rather than relying on pre-scripted events and injects lists. The game controller's moderation and event steering was minimised. Hence the decisions of the training audience, combined with the actions of the EXCON cells, delivered a story-living event that met the training objectives.

Outcomes

The novel use of an EXCON wargame at the centre of the command post exercise process delivered a number of results.

- **Non-kinetic effects representation.** The multi-cell, dynamic narrative approach produced a non-kinetic ('soft') effects 'wrap-around' to complement the ABACUS computer simulation combat outcomes and common operational picture.

- **Consequence management.** Not only did the training audience face the consequences of their decisions at the tactical level, but also at the operational and geostrategic levels. This was a particularly powerful learning mechanism.

- **Prior-consideration of events and injects.** The game controller could steer the direction of the exercise and oversee the different threads and stories as they were developed by the branch experts. The all-informed coordination of these events and injects ensured scenario coherence within a dynamic story-living narrative driven by player decisions.

- **Complementary manual and computer simulation.** The combined use of manual and computer simulation leveraged the advantages, and mitigated the weaknesses, of both.

Case study 5: Royal Marines Advanced Amphibious Warfare Course

'We liked [the manual simulation] very much and wish we had had such a system in Ascension with Fieldhouse, Moore, Trant, Curtiss, Woodward, Comd 5 Bde and us sitting around the map table thrashing through possible courses of action and, hopefully, agreeing a thoroughly well-considered plan.'

Major General Julian Thompson and Commodore Michael Clapp

Context

The Royal Marines run two Advanced Amphibious Warfare Courses (AAWC) each year. These include a staff ride to the Falkland Islands, which incorporates a three-day wargame in the UK. This can be before or after the trip, but the objectives include experiencing some of the command dilemmas faced in 1982. These illustrate lessons concerning amphibious operations that remain extant. Students are typically Royal Marines and United States (US) Marine Corps majors, and the wargame is often their first introduction to joint operations at the operational level.

Wargame activity

Students first play the historical campaign period 21-28 May 1982: the landings, build-up, and break-out from the beachhead (including Goose Green). This simulates the historical reality, illustrating real lessons and familiarises the students with the wargame system. They are then assigned positions in a joint planning team as if they were on Ascension Island in mid-April 1982 conducting course of action wargames prior to a back-brief to Brigadier Thompson and Commodore Clapp, respectively Commander Landing Forces and Commander Amphibious Warfare during the actual campaign. The purpose of the planning is to: identify operational-level risks and issues during the investment of the Falkland Islands; determine the pros and cons of potential landing sites; and propose the most advantageous of these, with reasons. A notional planning team examines San Carlos, so the AAWC students consider the other historical possibilities. The students spend

one day wargaming the investment, focussing on maritime and air aspects, then one day simulating landings at various amphibious operations areas and the ensuing land campaign. They then brief the actual commanders from the Falklands War, who include Julian Thompson, Michael Clapp and Ian Gardiner (a company commander with 45 Commando).

Back brief to Falkland Islands war operational commanders

Wargame variants

The wargame is entirely manual. Rigid adjudication outcomes are used unmoderated whenever possible. Exceptionally, the AAWC Course Director makes game controller decisions to ensure that objectives are met. Hence adjudication is typically rigid, but can be semi-rigid if required. The wargame is two-sided. One or two students form a red cell, playing the Argentinians, the remainder are the blue cell (the UK Task Force planning team). The red cell is given freedom of action to develop and execute original plans, but the wargame system imposes constraints in accordance with historical reality. Combat and intelligence, surveillance and reconnaissance results generate tactical outcomes. These are inputs to operational-level 'marker tracks' that simulate the perceptions of actors and factions such as: the wider international community; the US; pro- and anti-Argentinian South American countries; and UK and Argentinian domestic populations. This occurs in a key consequence management phase. The wargame is

semi-open, with both cells planning around a central bird table. Although covert discussions take place, both sides have some understanding of the other's plans. The benefits of using a two- or three-table wargame are marginal, and significant additional time and effort would be required. The effectiveness of blue intelligence, surveillance and reconnaissance determines whether Argentinian positions are revealed.

Outcomes

The AAWC comprises junior majors, whose experience has hitherto been tactical and land-focused. The Course Director considers it 'amazing' that students identify lessons identified **from game play** such as the:

- criticality of the geopolitical and military-strategic context, for example, the risk of losing UK domestic and political support following an early mass-casualty event;
- land campaign was arguably not the most important domain – neutralising the Argentinian fleet was essential;
- balance of risk between protecting the Carrier Battle Group, Amphibious Task Group, and the logistic loop to Ascension;
- importance of air superiority – promised but not delivered in reality – and the risk of prosecuting the landings without it; and
- layered defence required to counter Argentinian air attacks.

Case study 6 – The *Camberley Kriegsspiel* used at unit level

"This was seriously immersive, and it was an outstanding way to teach battlegroup tactics and the associated staff-work to junior officers; and to practice it with the more senior ones!"

Commanding Officer 2 Para, Colchester
November 2016

Context

Over two days in November 2016, during the final development stage of the *Camberley Kriegsspiel*, the officers of 2 Para took part in a two-day study period. The first day covered wargaming in general and a background understanding of the Centre for Historical and Conflict Research (CHACR)-developed *Camberley Kriegsspiel*. The second day consisted of a play-test of the rules, with two teams of young officers playing against each other using an example scenario, umpired by the Battalion second-in-command and the CHACR development team, and overseen by the Commanding Officer.

Wargame activity

The participants were presented with a battlegroup tactical problem, based on one of the example scenarios provided with the *Camberley Kriegsspiel* rules, on the afternoon of the first day. Under the supervision of their field officers two teams of young officers, representing the command teams of the opposing forces, drew up plans and produced the associated staff-work. On the morning of the second day the teams back-briefed the umpire team (and Ccommanding Officer) on their respective plans and commenced play. The gaming model ensured that players were unsighted of their opponents' plans or actions until they uncovered them through intelligence or other intelligence, surveillance, target acquisition and reconnaissance (ISTAR) activity, or through contacting opposition force elements. The over-lapping turn system of the *Camberley Kriegsspiel* ensured that, once play had begun,

neither team was able to sit on their planning laurels once the execution of their conflicting plans commenced: re-planning, re-setting and coming to terms with the unexpected were key features of the subsequent game. The teams were fiercely competitive; indeed, when 'endex' was called both teams insisted that the game should be played for several more turns as they wanted to complete the game with a more decisive conclusion.

2 Para play the CHACR *Camberley Kriegsspiel*

Wargame variants

The *Camberley Kriegsspiel* is a manual, rules-based, umpired wargame that tends towards rigid adjudication. Once players and, in particular, umpires are familiar with the generic format of conducting a wargame then much more relaxed methods of umpiring can be used, relying, instead of rules, on the judgment of the umpiring team and game controllers. This gives the wargame considerable flexibility.

Within the *Camberley Kriegsspiel* instructions pack are a number of example scenarios for players to use as they learn the system. Once players and controllers are familiar with the system, the wargame is designed to ensure that any map-based scenario can be easily drawn up to suit units' or formations' requirements. Thus the game can be used as a generic training vehicle; or it can be used to train for, or rehearse, specific activities, such as forthcoming exercises or anticipated operational deployments.

Outcomes

The playtest provided the CHACR with invaluable insights for the final production of the game before its roll-out into the Field Army. This roll-out began in Spring 2017 with a similar study period conducted with 3 (UK) Division. The rules and associated training packages are available on the Army Knowledge Exchange.

Junior officers experienced (and enjoyed) practicing tactical execution. They also, came to understand that low-level tactical staff-work was required to justify their 'ability to anticipate events' and their decisions once execution began and their opponents' actions began to impact upon their carefully-laid plans.

The initially-skeptical training audience discovered a new training tool, which they subsequently enthusiastically embraced. The draft rules were taken up by the unit and adapted to suit their own purposes and used in unit and subunit tactical training. Their neighbouring units subsequently requested similar study-days to be run for them.

Case study 7 – Wargaming in junior officer education

Context

In 2015, the Commandant of the Royal Military Academy Sandhurst (RMAS), Major General Paul Nanson, decided to use wargaming to encourage manoeuvrist thinking and enhance understanding of doctrine in an adversarial environment. He sponsored the development of a simple wargame by the Defence Academy, capable of being delivered by platoon instructors after minimal training. The game had the twin aims of familiarising the officer cadets with the tools, techniques and procedures associated with a platoon attack, and to experience executing a plan in an adversarial environment, against their peers.

Wargame activity

The wargame was placed in context with a central lecture on the value of wargaming, followed by a tactical exercise without troops (TEWT). Students were taken to a vantage point from which to evaluate a simple tactical problem at platoon level. They conducted a combat estimate and produced a plan. This process was conducted individually and then the considerations, deductions and possible options discussed as a group. After spending most of the day considering the plan on the ground, the wargame was then conducted in classrooms. The students were split into two groups, representing friendly and enemy forces, and given time to consider modifications to their plans. The wargame was then executed with instructors acting as game controllers. During the wargame, each group explained to their game controller the actions they would take over the next few minutes of game time. These were compared to the tactical disposition on their opponent's map, and a judgement made as to the outcome. The other group then responded and the game progressed, alternating between the player groups until a natural conclusion was reached. The entire game took 60 to 90 minutes, including a debrief at the end.

Wargame variants

The wargame was entirely manual. It used photo-enlarged military mapping and counters to represent force elements at section level and one counter for each piece of key equipment. It used free adjudication; outcomes were determined by the instructors using just their experience and military judgement. It was a closed wargame: each group had their own map with limited intelligence. Their own forces were placed on the map along with only those enemy force elements that the instructor would judge were detected.

Outcomes

The wargame confirmed the students' knowledge of weapon systems and performance, as well as the time and space necessary to carry out manoeuvres. It also quickly demonstrated the value of considering a problem from 'the enemy point of view'. It was a rare event when a friendly force plan was executed in the wargame in the same form as it had been conceived during the TEWT. Knowing that they were facing an adversary at least as intelligent as they were, and one who had considered the tactical problem for as long as they had, almost inevitably resulted in a hasty revision to the students' initial plans. The revised plans were usually more flexible and robust, which demonstrated the value of an intelligent enemy player in the planning process.

RMAS students wargaming their plan

Case study 8 – Centenary 1914 *Kriegsspiel*

Context

In January 2014, St George's House at Windsor Castle hosted a centenary academic conference on 'World War I Revisited', in partnership with the Culture Capital Exchange and the War Studies Department of King's College London (KCL). The two-day conference brought together three dozen scholars and senior military officers from the UK and overseas. Since the focus of the conference was on exploring counterfactual questions and contingent variability regarding the events of 1914, a decision was made to include a wargame of the crucial campaign on the Western front in August and September, to act as a focus for discussion.

Wargame activity

Professor Sabin of KCL designed the wargame beforehand and tested it with his postgraduate students. Professor Sabin outlined the wargame rules and procedures, then four teams, each of three or four participants played two interleaved iterations of the wargame, while the remaining participants watched the contests evolve on the master maps. The 1914 *Kriegsspiel* was dependent on the exchange of orders and feedback between the cells and control over six game turns. Each cell had a dedicated facilitator whose task was to answer rules questions, note player orders, view their resolution on the master map, and return to brief the cell ready for the following turn. The wargames were completed within 90 minutes, and after a coffee break all the participants reconvened in a plenary session for an illustrated debrief on how the wargames developed. This was followed by an extended group discussion of the implications and of plausible counterfactual possibilities within the real 1914 campaign.

Area represented in the centenary 1914 *Kriegsspiel*

Wargame variants

This was a rigid manual wargame, with all possible situations covered within four pages of rules; the game controller merely had to apply these rules. Chance was introduced through the uncertainty of the cells about enemy dispositions, so there was no need to use dice to generate additional randomisation. It was a closed, three-table wargame: each cell was in a separate room with its own map, while the evolving campaign was displayed and resolved on a larger master map. Force elements were represented at Army level, with 12 generic blocks per side each representing roughly three corps. Enemy dispositions were revealed only when either side attacked. Both cells were free to decide their strategies, with knowledge of impending blue reinforcements helping to shape the historical pattern of an initial red advance followed by a blue counteroffensive. Control was provided by one person: Professor Sabin. He was both the co-organiser of the conference and an experienced wargame designer.

Outcomes

The 1914 *Kriegsspiel* helped to inform subsequent discussion of such live historical debates as whether a different deployment, or perhaps even non-deployment, of the British Expeditionary Force would have had a decisive impact on this critical campaign. The full *Kriegsspiel* was run on several further occasions, and Professor Sabin also developed an even simpler spin-off. This spin-off has slimmed down the scenario and has just one page of rules, which could be learnt and played by two people across a table with a small screen separating their respective maps. This variant can be explained by a single facilitator, played two or three times by each pair of participants and then discussed, all within 90 minutes or less. It has been used to give hands-on experience of the potential of wargaming techniques to multiple large academic and Defence audiences, including groups of up to 100 military officers in the UK and overseas. The pre-defined character of the system means that groups can easily learn and run it for themselves, and its manual character allows them to introduce adaptations as desired.

1914 *Kriegsspiel* in use at the 2014 Army Wargaming Symposium

Notes:

Annex B – Further reading and information

Select bibliography

B.1. *The Art of Wargaming.* Peter Perla's book, with a second edition in 2012,[58] remains the most important contribution to professional wargaming. If you have limited time for further reading, this is considered essential.

B.2. *Simulating War.* Declared 'brilliant' by Peter Perla, Professor Philip Sabin's 2012 book[59] provides a comprehensive toolkit that supplements statistical analysis with wargaming.

B.3. *U.S. Navy Fundamentals of War Gaming.* Written in 1966, reprinted in 2013,[60] the guidance provided in Francis McHugh's book has stood the test of time.

Further information

B.4. Connections UK. In 2013, the first Connections UK conference was run by a team of volunteers who recognised that there was a requirement 'To advance and sustain the art, science and application of wargaming' within UK Defence. The purpose of Connections UK is to bring professional wargame practitioners together to share and spread best practice. The conference hosts delegates from the military, Defence analysis, business, emergency services, humanitarian organisations, academia and hobby wargaming communities. These include many international delegates. This same community supports efforts to reinvigorate wargaming across Defence.[61] The Connections UK website[62] provides a central repository for a range of useful wargaming information, including presentations, reading packs and links to other wargaming sites.

58 Curry, J., *Peter Perla's The Art of Wargaming: A Guide for Professionals and Hobbyists*, Second Edition. 2012.
59 Sabin, P., *Simulating War: Studying Conflict through Simulation Games*, 2012,
60 McHugh, F., *The Fundamentals of Wargaming*, US Naval War College, 3rd Edition, 1966.
61 For example, in 2015 Commandant Royal Military Academy Sandhurst was a keynote speaker. For more information see http://professionalwargaming.co.uk/2016COMDTRMAS.pdf
62 Available at http://professionalwargaming.co.uk/

B.5. PAXsims. The PaxSims website contains information on the:

- development and effective use of games and simulation-based learning concerning issues of conflict, peacebuilding, and development in fragile and conflict-affected states; and

- policy application of gaming and simulation techniques.

B.6. Establishments. The following organisations can provide advice and guidance on wargaming.

- The Dstl Wargaming Team.
- The Defence Academy of the UK Technical School.
- The Centre for Historical Analysis and Conflict Research (CHACR).

Lexicon

This lexicon lists acronyms and terms relating to wargaming. The majority are working definitions that the Defence community can use. If the term already has a doctrinally endorsed definition, its source is shown in brackets.

Part 1 – Acronyms and abbreviations

AJP	Allied joint publication
CHACR	Centre for Historical Analysis and Conflict Research
DCMP	Data Collections and Management Plan
DCDC	Development, Concepts and Doctrine Centre
EXCON	exercise control
EXSPEC	exercise specification
GameCon	game controller
IAECP	Integrated Analysis and Experimentation Campaign Plan
ISAF	International Security Assistance Force
JDP	joint doctrine publication
MEL	main events list
MIL	master incidents list
NATO	North Atlantic Treaty Organization
PMESII (PT)	political, military, economic, social, infrastructure and information (physical terrain and time)
PSOM	Peace Support Operations Model
SME	subject matter expert

TESTEX	test exercise
TEWT	tactical exercise without troops

Part 2 – Additional terms and definitions

These additional terms and definitions are provided for general awareness.

after action review
A facilitated discussion that actively involves the training audience.

black
Colour used to represent organised and transnational organised criminals.

blue
Colour used to represent friendly or allied forces.

brown
Colour used to represent neutral actors or civilian population.

constructive simulation
Simulated people using simulated systems.

green
Colour used to represent indigenous security forces.

live simulation
Real people using real systems.

main events list
An event is an inserted major occurrence or a sequence of related incidents which fit into an exercise framework and are supported by incidents and injections designed to generate response(s) from the exercise participants.

master incidents list
An incident is an element or subset of an event. It is an action or situation that provides greater clarity to an event by using injections to bring an incident to the attention of the exercise participants for whom it was created.

model
A representation of a system, entity, phenomenon, or process.

operational analysis
The application of research and analysis methods to the systematic investigation of operational problems to assist executive decision makers. In Defence, it largely involves the application of operational analysis/ operational research to complex socio-technical problems within the MOD and in military/security operations. (Dstl)

orange
Colour used to represent armed non-state actors.

red (cell)
Colour (and cell) used to represent the opposing force(s).

red team
A team that is formed with the objective of subjecting an organisation's plans, programmes, ideas and assumptions to rigorous analysis and challenge.

response cell
NATO term for cells that represent absent superior, equivalent, or subordinate levels of command reactions during an exercise.

scenario
The background story that describes the historical, political, military, economic, cultural, humanitarian and legal events and circumstances that have led to the specific current exercise crisis or conflict. The scenario is designed to support exercise and training objectives and, like the setting, can be real, fictionalised or synthetic as is appropriate.
(NATO *Bi-Strategic Collective Training and Exercise Directive 075-003*)

setting
A geographic and strategic situation designed to provide all the conditions required to support the achievement of high level exercise aims and objectives. The setting, which can be real world, fictionalised or synthetic, is the framework on which the scenario can be developed.
(NATO *Bi-Strategic Collective Training and Exercise Directive 075-003*)

simulation
The execution over time of models representing the attributes of one or more entities or processes.

vignette
A discrete action within a scenario or wargame turn.

virtual simulation
Real people using simulated systems.

wargame
A scenario-based warfare model in which the outcome and sequence of events affect, and are affected by, the decisions made by the players.

war game
A simulation of a military operation, by whatever means, using specific rules, data, methods and procedures. (NATOTerm)

white cell
Represents national and supranational political organisations and diplomats; humanitarians; international organisations and non-governmental organisations.

Designed by the Development, Concepts and Doctrine Centre
Crown copyright 8/17
Published by the Ministry of Defence
This publication is also available at www.gov.uk/mod/dcdc

Corporate member of
Plain English Campaign
Committed to clearer
communication
235