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Simulation-Supported Wargaming for Assessing Force Structures

COLLECTION:
WARGAMING

PRACTICE-ORIENTED ARTICLE

PER-IDAR EVENSEN
SVEIN ERLEND MARTINUSSEN
MARIUS HALSØR
DAN HELGE BENTSEN
*Author affiliations can be found in the back matter of this article

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ABSTRACT

Wargaming is a key activity for gaining deeper insight into the strengths and weaknesses of future force structures in the course of their development and assessment. For more than a decade, the Norwegian Defence Research Establishment (Forsvarets forskningsinstitutt – FFI) has supported the Norwegian Army in conducting wargames for capability planning, with varying degrees of computer-based support. Throughout this period, these have evolved from what can be described as computer-assisted wargames to more realistic simulation-supported wargames. Moreover, to get a closer understanding of the deterrent effect of the force structures, which may not be observable during the actual gameplay, our emphasis has also shifted towards replicating the planning process more properly – and especially towards monitoring the planning process of the opposing force. For example, it has been important to examine the extent to which specific structure elements discourage the opposing force from taking certain actions. In this article, we describe our evolved methodology for simulation-supported wargaming, which includes a preparation phase; an execution phase, including a joint operational planning process; and an analysis phase. Furthermore, we discuss what type of data and results we are able to extract from the wargaming sessions, and present a set of what we have found to be best practices for how to conduct successful simulation-supported wargames.

CORRESPONDING AUTHOR:
Per-Idar Evensen
Norwegian Defence Research Establishment (FFI), NO
per-idar.evensen@ffi.no

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INTRODUCTION

When developing and assessing future force structures, *wargaming* is a key activity for gaining deeper insight and better understanding the strengths and weaknesses of the force structures. Today, computer-based simulation systems let us create synthetic environments that replicate to a high degree the physical properties of the real world. Furthermore, advances in artificial intelligence (AI) and behaviour modelling have given us more realistic computer-generated forces (CGF) that can execute battle drills and lower-level tactics with a high degree of realism. Wargames can benefit from these advances. At the higher levels of the chain of command, however, AI cannot yet match human decision-makers, and planning and conducting simulated operations in wargames requires the participation of human officers.

For more than a decade, the Norwegian Defence Research Establishment (Forsvarets forskningsinstitutt – FFI) has supported the Norwegian Army in conducting wargames for capability planning with varying degrees of computer-based support. Throughout this period, these have evolved from what can be described as computer-assisted wargames to more realistic simulation-supported wargames. Moreover, to get a closer understanding of the deterrent effect of the force structures, which may not be observable during the actual gameplay, our emphasis has also shifted towards replicating the planning process more properly, and especially towards monitoring the planning process of the opposing force. For example, it has been important to examine the extent to which specific structure elements discourage the opposing force from taking certain actions – or in other words the war-preventive, or peace preserving, effect of the concept being wargamed.

Capability planning processes and high-profile wargames will always involve or attract stakeholders – for example high-ranking officers, politicians, bureaucrats, and defence industry leaders – with conflicting interests. In general, there is a risk that involved stakeholders may want to frame the wargame in a context that would render their interests favourably (Evensen et al., 2019). It is important to be aware of this problem and, crucially, *avoid the wargames becoming a battleground for stakeholder interests*. The methodology and best practices described in this article seek to reduce this problem by using simulations with computer-based adjudication, and by raising awareness of the *metagame*, or the conflict about all phases of the wargame, from preparation, through execution, and into analysis and reporting.

This article is organized as follows. First, we briefly describe the background for this work. Next, we describe our evolved methodology for simulation-supported wargaming, which includes a preparation phase; an execution phase, including a joint operational planning process; and an analysis phase. After this, we discuss the type of data and results we are able to extract from the wargaming sessions. Finally, we present a set of what we have found to be best practices for how to conduct successful simulation-supported wargames.

BACKGROUND

While wargames in various forms have been conducted at FFI for decades, the idea of conducting simulation-supported force structure evaluations first emerged when researchers at FFI started cooperating on scenarios for individual simulation-supported system assessments (Martinussen et al., 2008).

The first time an interactive, brigade-level simulation system using semi-automated forces (SAF) was used as basis for a wargame at FFI was in 2010. In the project Future Land Forces, the performance of five fundamentally different land force structures were evaluated through a series of computer-assisted wargames (Hoff et al., 2012; Hoff et al., 2013). The goal was to rank these structures based on their relative performance. In addition, the wargames revealed several strengths and weaknesses inherent in the evaluated structures. While the simulation tool we used was quite simple, it was useful for keeping track of the movement of units and calculating the results of duels and indirect fire attacks.

Following this, FFI supported the Norwegian Army in conducting several simulation-supported wargaming series for capability planning, both on-site and at the Norwegian Army Land Warfare Centre. The wargames have been two-sided (Blue/friendly and Red/opposing), closed (with limited available information), and run at the tactical and operational levels, and the simulated operations have included land forces sized between a battalion and a brigade on each side.

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The total number of players has been anywhere between 10 and 100, and the duration of a wargame has varied from a day to two weeks. Figure 1 shows a picture from a simulation-supported wargaming session at FFI in 2014.

Figure 1 Simulation-supported wargaming session at FFI in 2014.

Since 2010, our wargames have gradually evolved from what can be described as computer-assisted wargames, using very simple simulation models, towards simulation-supported wargames with more detailed and more realistic simulation models. In addition, to get a closer understanding of the deterrent effect of the force structures, which may not be observable during the actual gameplay, our emphasis has also shifted towards replicating the planning process more properly, and especially on monitoring the planning process of the Red force. Figure 2 illustrates the evolution of our wargames.

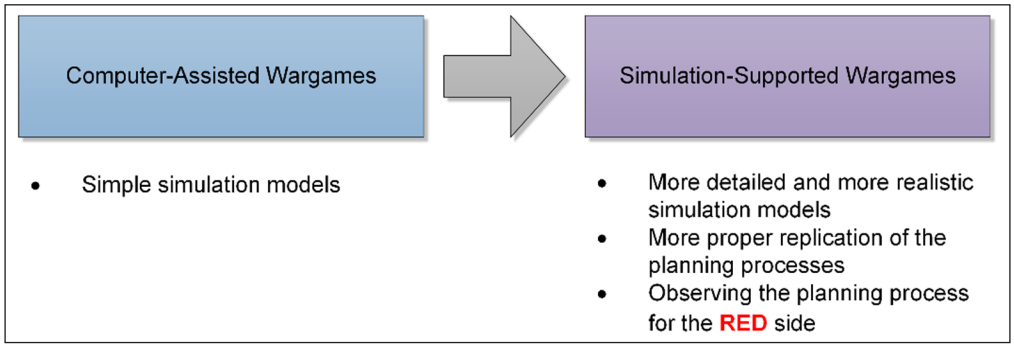

Figure 2 Evolution of our wargames.

The value of using computer-based simulations to support wargaming lies first and foremost in having a system to automatically keep track of the forces, to calculate the detections of their sensors, and to evaluate the results of duel situations and indirect fire attacks. In addition, computer-based simulations are well suited for realistic representation of uncertainty and *fog of war* by adding filters on the ground truth.

METHODOLOGY FOR SIMULATION-SUPPORTED WARGAMING

Wargaming is an essential tool for developing, testing and analysing new force structures. Through wargaming it is possible to gain insight into how well-suited a force structure is for a given scenario, and to reveal the structure's strengths and weaknesses. Having a good execution plan is, however, paramount for conducting successful wargaming experiments and getting the most out of the collected data from the events. In this section, we describe our methodology for simulation-supported wargaming, which has evolved through our experiences with planning, execution, and analysis of wargaming experiments over the past 10 years. We will also discuss the context around wargames and the process of planning and organizing a wargaming event, which may be viewed as a *metagame*.

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There are several books and guides for wargaming in general (Perla, 1990; Appleget et al., 2020; Burns, 2015; United Kingdom Ministry of Defence [UK MoD], 2017). The methodology described in this section is specially tailored towards analytical wargaming for supporting the development of future force structures. Typically, we use this methodology to assess and compare the performance of different force structure alternatives, which may vary with regard to the *composition of materiel and equipment*, *tactical organization*, or the *operational concept*.

Our methodology for wargaming experiments consists of three principal phases:

1. Preparation phase
2. Planning and execution phase
3. Analysis phase

These phases are described in detail below. The relationship between them is illustrated in Figure 3, where the planning process and the wargame execution phase constitute the core of the experiments.

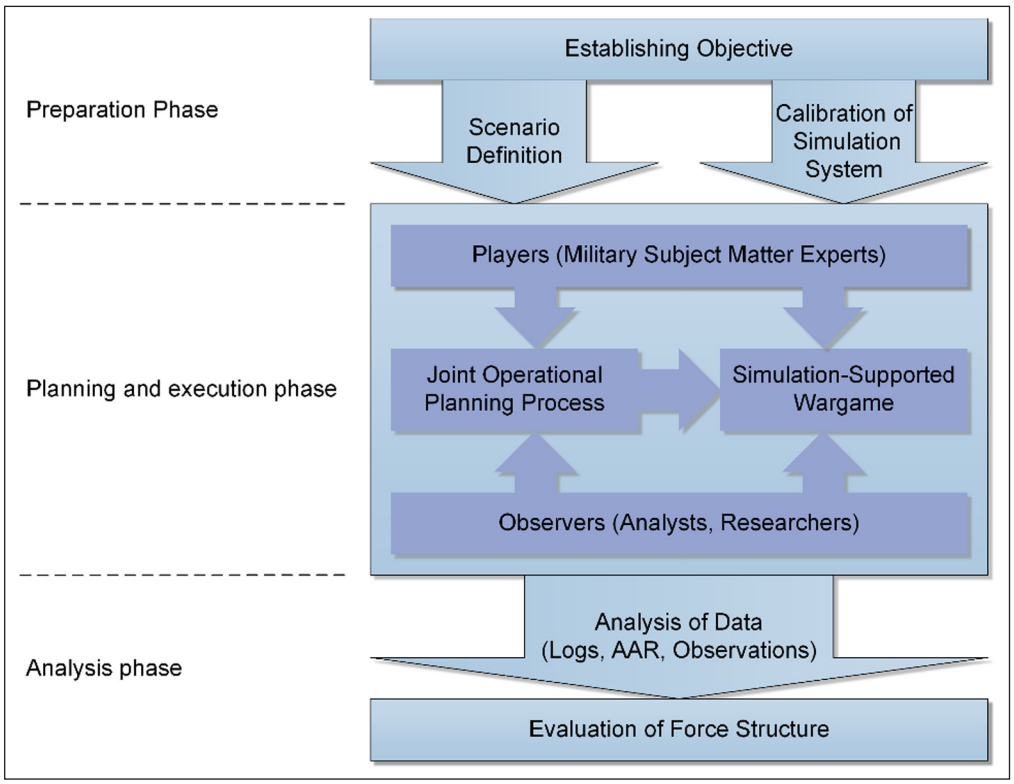

Figure 3 Illustration of methodology for wargaming experiments.

CONTEXT AROUND WARGAMES

Small countries face a dilemma when developing force structures to deter enemies with a larger pool of force elements. The enemy may observe what changes are made in the defence structure and may select other, more appropriate, elements from the pool when applying military power. For example, if the small country's force structure is specialized, in order to counter expected enemy courses of action (COAs), the enemy may choose something entirely different from the pool and the enemy COA may change dramatically.

Developing force structures is a slow and public process for all nations. Selecting units from an existing, large pool of force elements and creating new COAs is a fast and hidden process. It may seem like an impossible task for a small nation to achieve deterrence under such circumstances, but we have observed in several instances how low-cost changes to the force structure have had a big impact on the enemy's choice of COA (Daltveit et al., 2016; Daltveit et al., 2017; Haande et al., 2017). The changes to Soviet tactics in Afghanistan after the introduction of hand-held air defence missiles for the mujahideen in 1988 (Grau, 1996) is a good example of the kind of effect we have seen during the planning process of the Red (opposing) cell in wargames. Presence and posture were also observed to have a deterrent effect. In addition, society, landscape, and climate influenced the Red planning process. This all comes down to risk assessment on the enemy side during planning and development of COAs.

In order to investigate the deterring impact of force structure changes, it is necessary to have analysts observe the planning process of the Red cell *before* a wargame, and not only during the simulated battle. Deterring the enemy from attacking is the intention of any force structure development, and the only way to observe the deterrent effect is during enemy planning.

In decision theory, risk is a necessary factor to consider to be able to make rational choices. The von Neumann-Morgenstern (vNM) decision theory is based on actors assessing choices by considering lotteries with given probabilities and outcomes (von Neumann & Morgenstern, 1944). The element of risk also needs to be present in planning processes. If the planning process of one side is known to any other side participating in a wargame, a part of the element of risk disappears. This would reduce the planning process to just assessing a known enemy COA, as opposed to assessing a spectrum of possible COAs and their probabilities. Therefore, it is important that the scenario definitions do not limit the enemy planning process, and that all planning processes are monitored – especially the enemy planning process.

Metagame

Whereas a wargame has rules when it eventually starts, there are no clearly defined rules governing the process of choosing the type of wargame and the context around it. As such, the process of planning and organizing a wargaming event may be viewed as a *metagame* – a game that may be analysed within the rules of confrontation analysis (Curry & Young, 2018). For instance, a wargame at the joint level would include participants that are traditionally rivals for funding. Participants from the air force, the navy, and the army may have differing interests when it comes to how scenarios should be formulated, what assumptions that should be made about future technology, how combat effects should be assessed, and so on. The same goes for branches within each of the domains. There is therefore a danger that the metagame may have more influence on the outcome of a force structure analysis than the actual wargame. The metagame is not limited to the wargaming execution. The analysis and the reporting afterwards is also subject to conflict of the same type that occurs during preparations. This is illustrated in Figure 4 by the metagame layer that exists outside the core methodology.

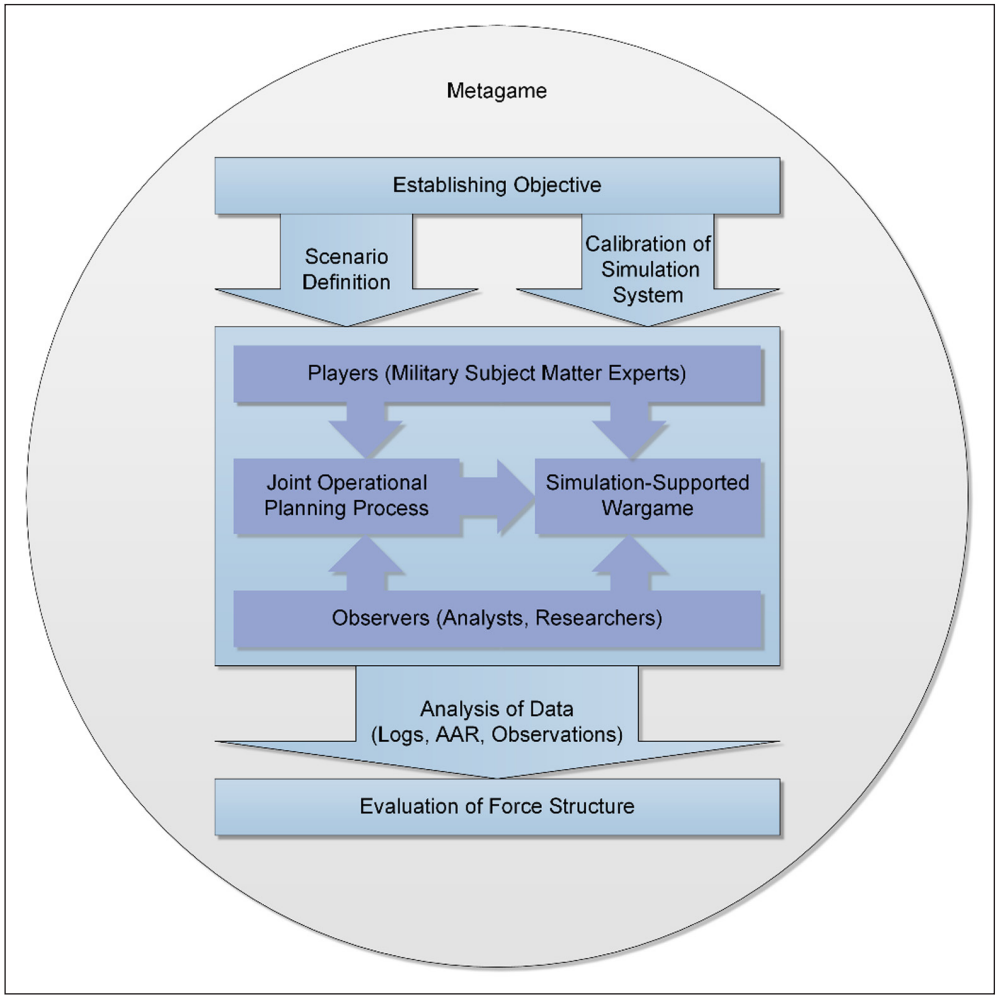

Figure 4 Illustration of the metagame surrounding the methodology for wargaming experiments.

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Capability planning processes will always involve or attract stakeholders with conflicting interests, and defence planning and wargaming contain many examples of stakeholders fighting for turf (Evensen et al., 2019; Perla, 1990). This is especially noticeable in the preparation phase of the wargames. One possible way to counter this can be to properly separate the role invested with the power to invent changes in the force structure, and the role invested with the power to assess and accept changes. When these roles are not separated, stakeholders will try to influence what should be the objective of the wargame, and what type or style of wargame to use. In the worst case we may have a limited number of stakeholders suggesting a new force structure, and then have the same stakeholders verifying that their own ideas were good through *scenario-based discussions*. This is especially problematic if it is the cherished ideas of the stakeholders that are being assessed.

The Joint Requirements Oversight Council (JROC) is a good example of an institution that handles the turf war with a sound decision structure (Chairman of the Joint Chiefs of Staff [CJCS], 2018). The way the U.S. military separates the inventors of ideas from the power to review their usefulness is entirely in accordance with Montesquieu's principle of separation of powers, although on a smaller scale than the political. The way defence planning and wargaming have been carried out in Norway, in many cases, one will find actors both generating ideas for future force structures and assessing the same structures by participating in scenario-based discussions. Scenario-based discussions which do not include a dedicated Red cell are not wargames. Introducing Red cell players, and free and unhindered planning on the opposing side, removes some of the potential for misuse of power. A peculiar result of not wargaming proposed force structures properly has been the recommendation of force structures suboptimized to combat fixed assumed enemy COAs. By not properly wargaming such force structures, the proponents of the structural changes succeed in beating their favourite enemy COAs, but fail at challenging their own ideas.

PREPARATION PHASE

The preparation phase includes everything that needs to be done before the wargame execution phase can be started. The most important preparations are:

- Establishing a common understanding of the objective of the wargaming experiments.
- Defining the overall scenario, including the external conditions, assumptions, and limitations.
- Choosing one or more simulation systems and calibrating the simulation models.
- Defining order of battle (OOB) for Blue (friendly) and Red (opposing) sides.

PLANNING AND EXECUTION PHASE

The planning and execution phase consists of two separate activities: (1) a joint operational planning process for both sides, and (2) the simulation-supported wargame.

Joint Operational Planning Process

In this activity, the Blue and Red cells, consisting of military subject matter experts (SMEs) and officers, separately develop their initial plan for the operation based on the overall scenario and a controlled flow of intelligence information. The plans are, by preference, not a part of the overall scenario, and both sides can freely develop their own. This also means that the plans developed by the two opposing sides remain unknown to the other side.

In principle, the joint operational planning process can be done in much the same way as in reality, without any simplifications. This is an activity that should be prioritized in the same way as the simulation-supported wargame, also with regard to staffing.

During the planning process, the players must discuss different options and develop a COA shaped by the perceived strengths and weaknesses of the opposing force structure. Observing the planning process on both sides and revealing the underlying reasons for the decided COA can give valuable information regarding a force structure that may not be observable in the execution of the wargame itself. The deterrent effect of a force structure is an example of something that may only be observable during the planning process.

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Simulation-Supported Wargame

The wargame itself is conducted as a simulation-supported, two-sided (Blue and Red) wargame, where the operation is simulated in a constructive simulation system with SAF. Within game theory, this type of wargame can be categorized as a *non-cooperative*, *asymmetric*, *sequential game of imperfect information*.

The actors in the wargame are two teams of opposing players and a cell of umpires or adjudicators. It is important to remember that a wargame is only as good as its players. The players are military SMEs and officers. To have a balanced wargame, it is crucial not to neglect the Red cell. Done right, this type of wargame, led by adaptive and largely unrestricted thinking opponents, tends to become highly dynamic, adversarial, and competitive.

For analytical wargames, realistic simulations are important to strengthen the validity and credibility of the results. Military operations, and especially land force operations, are complex in nature, and simulations of such operations, with sufficient realism, is very challenging (Evensen & Bentsen, 2016). Moreover, simulation systems can contain errors, and human operators can make mistakes that they would not have made in real life. It is therefore important to have experienced umpires that monitor the simulation and, if necessary, make appropriate manual adjustments to the outcomes.

To some degree, the metagame also comes into play during the simulation-supported wargame. There have been examples of stakeholders withdrawing competent officers from wargames only to replace them with less-skilled personnel, most probably to reduce the credibility of a wargame that the stakeholder did not want to be successful. Other examples are umpires struggling against interventions from higher-ranking stakeholders visiting the wargame. History is full of similar examples (Perla, 1990) and Norway is no exception (Evensen et al., 2019). The clear methodological approach described here intends to counter some of the shortcomings of previous wargaming experiments.

ANALYSIS PHASE

The analysis is based on observations and data from the planning process, in addition to the observations and data collected from the execution of the simulation-supported wargame itself.

During the planning process, it is important to monitor and document the discussions closely. As the primary purpose of a defence force – in Norway, at least – is to prevent war, the considerations made in the planning process are perhaps the most important results from the entire wargame. The preventive properties of a force structure and a posture can only be observed when the enemy considers them before a wargame starts. Several alternative COAs and manoeuvres are usually considered during the planning phase. Many of these are discarded, and some are retained, for various reasons, which must be recorded. Why Red decides that a certain COA is not viable may be due to certain structure elements or expected strategy from Blue. If Red has to abandon a plan due to elements in the Blue OOB, then these elements have already proven valuable to Blue – even if these elements end up not inflicting any direct damage to Red forces during the following simulated operation.

A large amount of data may be recorded during the simulation-supported wargame. It is tempting to put a lot of importance on data such as the loss exchange ratios of various structure elements. What is perhaps more important to pay attention to during the actual wargame, are the decisions made by the commanders on both sides. If a window of opportunity arises for one of the sides, why is that? How is that side able to exploit such an opportunity? Are there any ways in which they consider exploiting the opportunity, but somehow are unable to exploit or carry through? If so, why? To collect such information, it is important that the commanders openly discuss their options. It is not only the reasons informing positive choices that are important; it may often be equally important why other choices are *not* made.

Identifying major strengths and weaknesses of a force structure and its utilization is an important part of the analysis phase. Examining the considerations made by both sides, both during the planning phase and the wargaming phase, is the best way to do this. This is not an exact science as such data are qualitative in nature. Key elements that made it possible to use a certain COA, or perhaps a missing capability which allowed the enemy better options,

are better identified by observing the considerations and decisions made by the players than looking solely at which weapon systems destroyed which enemy systems. The result of the analysis phase is an evaluation of the tested force structure.

The analysis phase may also be subject to quarrels outside the context of the agreed-upon wargame methodology. Even the report writing after the event may be influenced, when roles are not well separated, and stakeholders are allowed to disproportionately influence the process.

OUTPUT DATA AND RESULTS FROM WARGAMES

In general, we strive to capture as much data as possible from the wargaming sessions. Depending on the simulation system used to support the wargame, a variety of output data can be recorded. It is, for instance, usually possible to record how far various units have moved, how much ammunition and fuel they have used, and other logistical data. Usually, *kill matrices* – essentially a matrix showing which units on one side killed which units on the other side – are also recorded. Much other quantitative data can also be recorded. In addition to this, there is qualitative data. This includes, as noted earlier, observation of the planning process, and discussions with the players involved in the planning process. Moreover, it includes observations of decisions made during the wargame, and discussions with the players during or after the wargame.

It is often tempting to put a lot of weight on quantitative data such as the kill matrices and perhaps less on qualitative data. Quantitative data are easier to analyse and are often considered more objective than qualitative data like the decisions and considerations of the players. But it is important to remember that the quantitative data are dependent on the decisions of the players on both sides as well as input data to the model. How the players believe various units should be employed has a considerable impact on the kill matrix. Thus, although such data are quantitative, they are not more objective than the qualitative data.

Data such as the kill matrices also omit important information. While one can see which units killed which opposing units, the reasons are lost; other units, which did not directly destroy enemy units, may have been vital in creating the conditions for other units to be effective. Although certain units may have destroyed very few enemies, their presence on the battlefield may have been vital in preventing the enemy from conducting certain operations. For instance, while close air defence may not be directly responsible for the elimination of enemy helicopters, it may have prevented the enemy from using helicopters as aggressively as it might otherwise have. Thus, when analysing a wargame, one should be cautious about looking solely at quantitative data like the kill matrix. The whole picture must be taken into consideration.

Ideally, when comparing different force structures, several wargames should be conducted with each force structure, and the enemy should be allowed to alter his conduct in each wargame. One's own forces should find the "best" way to use their structure in the given scenario, and the enemy should find the "best" way to counter this strategy. Only then can one truly compare the outcome of the wargames with different force structures and conclude as to which force structure was most suitable for the given scenario. And then, of course, there is truly a wide range of possible scenarios to consider. So, while this is perhaps how comparisons of force structures should be done, time and resources will usually be insufficient for the vast number of wargames in this regard.

All models have limitations. They may be designed for a specific purpose, and be appropriate for that, but less suitable for other things. This is important to remember when considering which questions can be answered through wargames, and which questions should be investigated with other tools. Exactly what can be deduced from a wargame will depend on the model being used – but generally one should focus on those questions that the experiment was designed to answer. If other results seem to emerge from the experiment, their validity should be examined, and the results often need to be evaluated in an experiment specifically designed to investigate these emerging questions.

Wargaming is an essential tool for comparing the performance of two (or more) force structures in a given scenario. Wargames do not, however, give any precise measure of the effectiveness of any given force structure, but are suitable for identifying major strengths and

weaknesses. The effect of parameters related to specific units, like their firepower and armour, should be further examined in separate studies. Such factors, although they are important, are at a level too detailed for their impact on the outcome to be studied through the types of wargames we discuss here. Peter Perla emphasizes that "[w]argaming is only one of the tools needed to study and learn about defense issues" (Perla, 1990, p. 11). Other tools should be used to supplement the wargames and study the importance of such factors.

Wargames are often substantial events, involving a large number of people and taking a lot of time. Thus, we are usually restricted to a limited number – often only one for each force structure we are analysing. It is important to remember that the outcome of one single wargame is just that: a single possible outcome of the given situation. Things could have been done differently by players on both sides, and events might have played out differently. Slight changes could have affected the outcome of an event that was vital to the overall outcome.

BEST PRACTICES FOR SUCCESSFUL SIMULATION-SUPPORTED WARGAMES

In this section, we provide a list what of we have found to be best practices for conducting simulation-supported analytical wargames aimed at assessing force structures. Some of the best practices we have found are related to the need to handle the metagame, or the conflict about the wargame. The usefulness of such best practices may be limited to other small nations that have not separated the power to invent from the power to test force structures. The other best practices stem from the need to provide simulation support and to replace scenario-based discussions for defence structure development.

DEFINE A CLEAR OBJECTIVE

A clear purpose for the wargaming experiments must be specified early in the preparation phase and will be the basis for the design of the experiments.

USE A SIMULATION SYSTEM CUSTOMIZED FOR WARGAMING

Having an interactive simulation system with SAF that is easy to operate for the players and requires relatively few operators reduces the resources needed for, and thereby also lowers the threshold for, conducting simulation-supported wargames.

ASSEMBLE A GOOD RED CELL

A good Red cell is the key to discovering weaknesses in one's own force structures, plans, and procedures. The players in the Red cell should also have good knowledge of the doctrine of the expected opponents. We have observed that a good Red cell quickly headed off the possible tendency of our own planners to groupthink possible enemy actions.

ALLOW THE OPPOSING FORCE TO ADAPT

Change in the structure of one's own force must also allow change in the structure of the opposing force. Change in force structures is a slow public process and will certainly be observed by expected opponents.

REPLICATE THE PLANNING PROCESS

Replicate the real-life planning process as closely as possible.

OBSERVE THE PLANNING PROCESS

Monitor the planning process to get a more complete picture of the strengths and weaknesses of a force structure. To document the deterrent effects of a Blue force structure, it is especially important to observe the planning process for the opposing force. Several elements in own force structures have been observed to have a deterrent effect on the operation of the opposing force, as have presence and posture. Furthermore, we have observed that society, terrain and climate also influence the planning of the opposing force.

PROVIDE SPACE AND TIME

Starting a wargame with forces in close proximity to each other may reduce it to a simple wargame of attrition. Well-developed wargames, where space and time have been provided, flow like martial arts opponents manoeuvring around each other, assessing each other's weaknesses, and looking for opportunities to strike. Assessing the ability to avoid an encounter may be just as important as assessing the ability to fight.

ALLOW UNCERTAINTY

Building a picture of what is happening takes time and is a natural part of leading military operations. The true value of certain elements in a force structure only appears when uncertainty is properly represented. The force-in-being effect, for example, can be significant. Uncertainty is best represented when the tactical situation is not visible for all and the outcomes of the battle are perceived as non-deterministic to the extent that reality is stochastic

EXERCISE VS. EXPERIMENTATION

Prepare the participants for the purpose of the wargame. When using command and staff trainers as the simulation system for supporting the wargame, some players tend to follow procedures as if it were an exercise. If the purpose of the wargame is to explore new force structure elements, COAs, or tactics, techniques, and procedures (TTPs), the players need to be encouraged to be creative when executing their tasks.

KEEP HIGH-RANKING OFFICERS NOT PARTICIPATING IN THE WARGAME AWAY

Keeping personnel not relevant to the wargame away from it, especially high-ranking officers, is important. In human-in-the-loop (HITL) simulations, the human players are part of the simulation as a whole, and visiting high-ranking officers (or others) will have an effect on the way the human players interact and how they conduct their plans. Limiting visiting personnel also reduces the chance of external influence on the results (Hoppe, 2017).

SUMMARY AND CONCLUSION

FFI has supported the Norwegian Army in conducting simulation-supported wargames for capability planning for more than a decade. This article has presented our methodology for simulation-supported wargaming and provided a set of best practices for conducting simulation-supported wargames. The methodology and best practices are especially aimed towards analytical wargaming to support capability planning.

The methodology consists of a preparation phase, a planning and execution phase, and an analysis phase. The methodology has gradually evolved over the last 10 years by using more detailed and more realistic simulation models, and by replicating and monitoring the planning process before the simulated operation to gain more insight into the deterrent effect of the tested force structures.

Our best practices for conducting simulation-supported wargames include defining a clear objective for the wargaming experiments, using a simulation system that is easy to operate for the players, having a good Red cell that is not too restricted, providing space and time so that the war does not start immediately, and providing a realistic representation of uncertainty and information-gathering. Finally, to get a more complete picture of the strengths and weaknesses of a force structure, it is important for the analysis group to observe both the planning process and the wargame itself.

Formalizing the separation of the role invested with the power to invent force structure changes and the role invested with the power to test, evaluate, and accept such changes would solve many of the problems we have seen in the defence planning. We have identified that the process of organizing a wargaming event may be viewed as a metagame. When supporting wargames with modelling, simulation, and analysis, the metagame is seen as something that happens at every level, some of which we may not have any influence over. Hopefully, this article can contribute to raising awareness about these challenges, and can provide some adjustments to the part of the metagame that we can influence.

COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR AFFILIATIONS

Per-Idar Evensen orcid.org/0000-0001-9641-4598
Norwegian Defence Research Establishment (FFI), NO

Svein Erlend Martinussen orcid.org/0000-0002-4235-0258
Norwegian Defence University College (NDUC), NO

Marius Halsør
Norwegian Defence Research Establishment (FFI), NO

Dan Helge Bentsen orcid.org/0000-0001-5989-6452
Norwegian Defence Research Establishment (FFI), NO

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