Introduction and Executive Summary

The third annual MORS Special Workshop on Wargaming, sponsored by the Defense Wargaming Alignment Group (DWAG), was a great success. The workshop was conducted October 17–19, 2017, in Alexandria, VA, on the Mark Center Campus and had more than 230 attendees from 4 countries. Keynote addresses were given by General Paul J. Selva, Vice Chairman of the Joint Chiefs of Staff (VCJCS) and Mr. Mark Herman, wargame designer, CEO of Victory Games, and Senior Executive Advisor for Booz Allen Hamilton.

The workshop had two goals: continue the development of best practices to integrate wargaming into the larger analytical process as well as improve the discipline as a whole by enhancing the skill sets of participants. To that end, the 2017 MORS Special Meeting on Wargaming included two plenary sessions, made up of four panels, nine working groups and their subsequent briefings, and a short address on the state of wargaming in the United Kingdom (UK).

The workshop format was adjusted from the traditional MORS workshop structure based on lessons learned from the two previous workshops on the topics and results from surveys. The surveys indicated that it would be a more efficient use of participants’ time to offer a range of activities to meet them at their level of expertise. In particular working groups were tasked with developing knowledge and identifying best practices from experienced practitioners. Seminars were offered on important skill sets as continuing education for wargamers and analysts. Wargames of different levels of complexity and focus were offered as hands-on experiential learning.

There was a clear demand for training and education of wargaming skills. This matched data from the Wargaming Practitioners Summit in March of 2016 where it was determined there were too few master game designers and others to keep up with the growing demand within the Departments. While the 2016 Workshop offered a number of hands on activities, particularly introductory activities for neophytes and novices, one workshop was not enough. There was even more demand for introductory events and there was an increasing demand for intermediate (apprentice and journeymen) level efforts to sustain the development of new wargame designers.
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Return on Investment

The MORS third annual special workshop on wargaming provided an excellent return on a relatively small investment on the part of the Wargaming Incentive Funds. For only $60,000, the workshop provided the defense gaming community with the efforts of an outstanding and dedicated committee of skilled event planners with wargaming expertise to lead special events and orchestrate the numerous special-topic working groups. The event was a venue for leadership to give guidance to the analytic and wargaming community, to facilitate professional networking, to provide training to a large section of the community, to advance the state of the art, and to identify best practices.

Guidance to the community

The MORS workshop plenary session offered the opportunity for senior leadership in the Department of Defense to address over 200 members of the analyst and wargaming community, and provide their insights and guidance on the challenges facing the Department and what they need assistance with. The Vice Chairman of the Joint Chiefs of Staff’s speech was not only inspirational, highlighting the value he places on wargaming and analysis to meet the needs of decision makers across the government, but also provided clear examples of the problems he wants addressed by this community. In turn, he was able to receive feedback from the community and answer questions posed directly by the workshop participants. Similarly, the heads of the analytic branches of the services were able to provide their perspectives on the challenges they face and how they intend to meet them. Members (current and former) of the Colonels supporting the Defense Wargaming Alignment Group were able to articulate their vision of where the Innovation Initiative has been and where it will go in the new administration. It is important that such venues be created so the analytic community and the Department leadership can meet and exchange ideas and information directly.

Networking

The MORS workshop provided a venue for critical networking to be completed. Participants in the last two workshops came from across the globe to meet; the opportunities for professionals to meet in such circumstances are relatively rare. It is critical for the development of the community that experts in the field meet face to face to share notes and ideas.

Workshop participants were able to hear from thought-provoking leaders on topics related to analysis and wargaming such as Mark Herman in the plenary session, and noted author and leader Dr. Peter Perla, who participated in several of the working groups. The panel of former Pentagon leaders presented how past wargaming and analysis efforts have succeeded or failed. These examples were very instructive to the group and led to several more in depth and offline conversations during breaks and lunch. The panel on psychology in wargames was also crucial, exposing analysts and wargamers to a field rarely explored, yet critical to successful games.
Advancing the State of the Art

A gathering of senior analysts and wargamers from across the department met in two working groups to advance the state of the art for the integration of wargaming and analysis.

The first working group consisted of 23 senior analysts and wargamers, who addressed the integration of wargaming into the larger analytic processes of the department and discussed what specifics they learned about this integration. These presentations were classified.

The second working group, made up of 17 senior analysts and wargamers, addressed the challenges of validity and utility of wargames to the department. They produced a significant volume of work not only in this report but also in a separate document associated with new insights on this very important topic.

Capacity Building

The vast majority of the participants took advantage of the training this workshop afforded. One of the greatest challenges to the community, as assessed by the wargaming leadership, is preparing the next generation of analysts and wargamers to meet the growing demand for quality gaming. To do this, we developed a construct to track practitioner’s level of expertise and then provided training at the level of the participant to enable their development and continuing education. ¹ This training emphasized learning by doing. While the large number of participants demonstrates the value of this workshop, there is also significant value in the number of subject matter teachers, mentors and highly knowledgeable game directors who volunteered and supported these courses, and thereby improved their own value to the community as instructors. It is said you don’t truly understand a subject until you are required to teach it to someone else. Building game cadre was a by-product of the workshop.

Fourteen Apprentice and Journeymen level participants took the opportunity to participate in the Adjudication Seminar sponsored by the Naval War College. The focus was to assist the practitioners in the selection of the right adjudication techniques, based on the purpose of the game and the required level of analysis surrounding it.

¹ The range goes from neophyte, through novice, apprentice, journeyman, to master game designer. A master game designer is defined as someone who has been paid to design, implement and run a game more than once. There are few grand master game designers, defined as someone who has met the definition of master game designer in the design of games in more than one genre (e.g. warfare, economics, ecology, etc.). Most certificate programs (such as MORS Wargaming certificate or the Naval Postgraduate Schools [NPS] Mobile Training Team [MTT]) and even graduate school programs like NPS’s Operations Research Program offer an introductory wargaming class which prepares participants to be apprentices to a master game designer.
Twenty-two analysts and wargame practitioners took the opportunity to participate in the Red Teaming Seminar sponsored by the US Army’s TRADOC. The Introduction to Red Team Techniques Workshop provided wargame practitioners with a toolbox of techniques to improve critical thinking and how to get the most out of a group. The workshop introduced and demonstrated over 15 different techniques that the participants were able to use and apply to their current projects. As a result, the participants improved their ability to ask questions, to illuminate hidden assumptions and biases, and to develop an enhanced enemy mindset.

Thirty-Four Neophytes (and 22 cadre instructors) participated in the Introduction to Wargaming session, which prepared them to be effective novices and worthy consumers of wargaming. Participants experienced a range styles and types of games. These games employed varying techniques in order to provide participants with a strong fundamental foundation while exposing them to the various gaming techniques and terminology in order that they understand what a good wargame looks like and how to use it effectively.

Twenty-Three Apprentices and Journeymen participated in the Matrix Game section where they learned how to employ this promising and important wargaming system designed to address new and emerging or ill-defined challenges (e.g. Cyber, Grey Zone conflicts, etc.) in wargames.

Sixteen Journeymen participated in Project Cassandra where they learned how to take an ill-defined wicked problem and rapidly build a wargame based on the experience of the assembled participants. One participant used his experience to design a wargame for the U.S. Coast Guard’s latest Evergreen strategic analysis process.

Twenty-Eight participants learned how to employ the Joint Wargaming Analysis Model (JWAM) tool and wargaming process used by the US Army to support Combatant Commands, Service Component Commands, Joint Staff, Department of the Army Headquarters, and Senior Service Colleges.

Nine participants learned how to play and use RAND’s Hedgemony game. Hedgemony is designed to teach defense practitioners how their choices in defense strategy and policy priorities are likely to affect key tradeoffs in force development, management and posture both in conflicts and great power competitions (“grey zone”).

Summary

In summary, it is difficult to imagine other events being able to provide as many opportunities to the Department of Defense as this workshop did for only $60,000. This is in large measure due to the volunteer effort of so many members of MORS who go out of their way to support the community free of charge. The cost for 22 cadre level MORS practitioners to spend three days of their time for just the introductory training (not to mention the preparation) would easily exceed that price. Because they did, a new cohort of novice practitioners has begun their journey towards mastery of the Art and Science of Wargaming. The price for 40 senior analysts and wargamers to support the working groups well exceed that amount. In short, the Department of Defense’s investment of $60,000, allowed the MORS professional staff to put together an event that was educational and engaging, and that truly advanced the state of the art of wargaming. In
return the DoD received material worth of order of magnitude in value above their initial investment.

Next year, MORS is prepared to conduct a special workshop on the wargaming and analysis of a very difficult topic: cyber and information in warfare. Once again MORS will provide working groups to develop new techniques and identify best practices. It will also provide training on wargaming with an emphasis on cyber and information in warfare to prepare the next generation of analysts and wargame practitioners.
Summary of Suggestions

The following is an aggregate list of suggestions from the chapters within this report. The first group of suggestions are for the Military Operations Research Society (MORS) and the larger analytic community. The second group of suggestions address what actions should be conducted externally to an analytic wargame. The last group of suggestions are internal actions to improve an analytic wargame.

MORS and the Larger Analytic Community

- Use the planning cycle employed by the lead coordinator in this Workshop as a template for future MORS workshops.
- Establish a working group on the psychology of gaming in a future workshop or symposium and test techniques in future games.
- Develop rigorous measurement techniques currently used in small group psychology analysis in wargames.
- Recruit speakers at the next MORS Special Wargame Meeting on the wargaming capabilities of potential adversaries.
- Continue working with allies in future wargames.
- Develop a US wargaming doctrine document based on the UKs recent doctrinal publication during the next wargaming workshop. The doctrine should be loose enough to enable innovation yet provide guidance for proper application, particularly for those new to wargaming.
- Conduct a Workshop or Working Group at on adjudication techniques.
- Continue to offer Red Teaming and Structured Analytic Techniques seminars for analysts to continue their education.
- Continue to balance expertise in area of emphasis of workshops (in this case, wargaming) with that of the larger analytic community.
- Conduct a survey of the analytic community to determine if additional introduction to wargaming, such as that conducted in Wargame 1 (Introduction to Wargaming Using Commercial Games) is required and desired. Invite agencies to send their analysts to the training. If the demand remains, there is a cadre which can be called upon to repeat the training as described in the Wargame 1 section or adjusted as required.
- Identify the right combination of professionals who are willing to volunteer their time to support future successful workshops. There remains a need to ensure that the MORS
community at large can be harnessed to assist with the ongoing broader objective of integrating wargames and analysis.

For the Wargaming and Analysis Team External to the Game

Educate sponsors and those involved in the game on the best practices for wargaming contained in Joint Publication 5-0 Joint Planning 16 June 2017.

Wargames require consequences for actions taken; do not call non-game events “wargames.”

Ensure the game is designed where Blue can lose, and where Red can overcome the gamed concepts.

Recruit, not invite, senior leaders to lead game cells to execute game as designed. Do not permit these leaders to derail the game in-stride to fit their non-sponsor agendas.

Playtest the game with sponsor participation or with sponsor’s empowered action officers to ensure sponsor is paying proper attention to objectives and design.

Immerse the players in the scenario and game play. Include the sponsor and key stakeholders as Red players. Do not let the sponsor or key stakeholders play Blue or be Adjudicators.

For the Wargaming and Analysis Team Internal to the Game

Consult the wargaming best practices in Joint Publication 5-0 Joint Planning 16 June 2017 before conducting game designs, etc.

Engage and use an empowered Independent Peer Review Board to examine objectives, assumptions, scenario and capabilities data, design, game play, adjudication, data collection and analysis. Make the review a formal unedited document and cite or address the comments with “actions taken.”

Minimize cognitive dissonance in the mind of the sponsor by ensuring wargame design and play is as consistent as possible with their preconceptions, while not allowing these preconceptions to drive objectives, design, game play, analysis or reporting.

Conduct wargame forensics and reporting to provide actionable recommendations.

Report ruthlessly and honestly, unencumbered by sponsor or stakeholder wishful thinking.
Wargaming Workshop Overview and Summary of Events

By Holly Love Deaton and Sorrel Mae Stetson

The third annual MORS Special Workshop on Wargaming, sponsored by the Defense Wargaming Alignment Group (DWAG), was a great success. Speakers in both plenary sessions focused on the relationship of gaming and analysis, and brought two main points to the forefront of their discussions. First, games cannot be replaced by analysis because they provide a unique space for exploring the human element in complex scenarios. Second, games cannot replace analysis; because they are driven by human decisions, games are idiosyncratic and non-repeatable. However, games can provide insights that help refine questions for analysis, and they can in turn be informed by analytical results.

Over the course of the plenary sessions, speakers raised three challenges for the wargaming community: do more to clarify the proper relationship between gaming and analysis, deepen our understanding of what makes games effective or ineffective, and do more to communicate persuasively to decision-makers and sponsors about the unique value of games.

Opening Plenary Session

The first plenary session included a keynote address by Mr. Mark Herman, CEO of Victory Games, and four panels providing perspectives on wargaming from the Services, Pentagon executives, and psychologists. A fourth panel representing the DWAG discussed DWAG’s mission, resources, and the needs they hoped the wargaming community could fill. Representatives of the Services described how wargaming and analysis functioned within their own organizations and how the speed of decision-making has changed the way the Services implement wargames. A panel of former Pentagon executives discussed the desires and needs of game consumers, and a panel of psychologists assembled by Dr. Yuna Wong of RAND provided insights into the ways that psychology could contribute to creating better games and extracting more nuanced information from the players.

Keynote Address: Mark Herman, Wargaming the Pacific

Mr. Herman covered three topics: mistakes of past wargaming, the appropriate use of wargaming, and ways that wargaming can help with today’s challenges and the new administration. Games, he argued, are “more about anthropology than mathematics.” They are a distinctly human process that allows us to explore human decision-making and understand intent.

In a theme repeated throughout the meeting, he reminded the audience that wargames are most valuable for exploring scenarios “where the enemy gets a vote.” They do not provide traditional quantitative data. Unlike models, wargames give us the opportunity to explore how other human
beings might react when we try to implement a plan. They allow us to build an understanding of an opponent’s intent and objectives. They are, he said, “more about how to prevail than how to fight.”

Games are also difficult to balance, and are usually determined by the human element. Chess, for example, is a symmetrical game: the only real difference is who goes first. However, a stronger player will win against a weaker opponent whether they start first or second, because the human element or in this case skill level, is important. The imbalances in complex wargames can be even greater, but the better player can sometimes win even with the proverbial deck stacked against them. As such, the question of who plays is critical to the outcome of a game.

Wargames should be used to consider different definitions of victory, explore conflict off-ramps, and ask what the other side cares about and how they might react to different circumstances.

“When we try to make war-games mathematical models, like a poor man’s computer model,” Mr. Herman argued, “we miss the point; we need to use war-games for what they’re good for,” figuring out how the enemy is thinking.

First Panel: DWAG Representatives

The panel opened with Garrett Heath, Division Chief of J8 SAG-D, providing an overview the DWAG. Since its creation, the DWAG has funded 58 games, has 8 games lined up for FY2018, and plans to fund more games. Their goals for the future are to continue hosting the bi-weekly defense wargaming alignment group meeting, publishing a monthly report with key insights from games they have funded as well as other games where reports were voluntarily submitted, and to continue support of the OSD wargaming repository which offers a single place to access hundreds of wargame results, insights, lessons learned, and best practices. Colonel Mark Gorak (US Army) jumped in to note that the DWAG was a “group of the willing,” all of whom have other assigned duties. “If you want something done by the DWAG,” he said, “I would challenge you to do it, and then come brief the DWAG.” He noted that this is a perfect time for gamers to propose wargames and ask for funding, as the DOD has identified wargaming as a priority.

Jon Compton of OSD-CAPE joined in to discuss CAPE’s idiosyncratic approach to analytical wargames. He discussed the value of providing a “defensible narrative” for any game, which includes not just the results of a game, but also a justification of why the results matter and how they were derived. For any gamer, no matter the context or style of the game, it’s crucial to communicate value up the chain so that leadership understands how that information was developed through gaming and its usefulness to their organization.

Mark Philips added that good game design requires input from subject matter experts. A game that doesn’t represent its topic well cannot generate valuable insights. Insights are crucial, because the future of wargaming rests on insights from past games, and, Mr. Philips noted, “The future of the DWAG will be the integration of those insights.” Mr. Pournelle asked Mr. Heath what current areas of interest would fit the criteria for DWAG funding. Mr. Heath observed that any current challenge or adversary would likely be acceptable. Col Gorak expanded on Mr. Heath’s answer by focusing specifically on 4+1 (Russia, Iran, Korea, China, and transnational violent extremism), and noting that “the interaction of those” was of interest to the DWAG. The
fund was designed not to answer questions for a specific service, but to inform the department across the board. Addressing the 4+1+3 (Cyber, space, nuclear) is the best way to get funding. His advice came with one caveat: although the fund was meant to help create global integration of solutions to all our challenges, he was skeptical of games that proposed to address many issues at once. Combining insights from multiple games is the mission of the DWAG, but games run at small scales do better when focused on smaller slices of a problem.

Mr. Pournelle followed that comment with a question about the challenge of “siloes of excellence that don’t talk to each other.” How did the panelists see the community using the incentive fund or other tools to break down those walls? Mr. Compton and Mr. Phillips also felt that games at different levels of analysis helped facilitate communication among groups focused in different areas.

Among the audience questions was an inquiry about the role of “lawyer play,” debating authorities to act, in wargames. This question prompted the panel to share one final insight about games: debates over authority can diminish the value of games by making it difficult to innovate and difficult to fail. Games are more valuable if they can help determine whether you need certain authorities, or provide justification for obtaining them. In short, games help foster innovation when they are less constrained by minutiae and rules.

Panel Two: Services and Sponsors Panel

The panel opened with a general question for everyone: how had last year’s meeting influenced their organization’s approach to wargaming? Dr. Forrest Crain leapt on the question, saying that to address the diverse issues of wargaming, the Army had chosen to focus on education, communication across agencies, and integration of civilian knowledge. He said the Army is sending staff to learn in areas other than their day-to-day military duties, and building partnerships with civilians and other forces. Dr. Akst picked up the ball saying that the Marine Corps has become focused on using wargames to explore future requirements, and has retooled their gaming to include both large and small scenarios.

Speaking for the Navy, Mr. Chuck Werchado felt that the report from the last meeting did not precipitate any changes in the Navy’s approach to wargaming, which he interpreted as a good sign: the prior year’s report had described best practices and he found his organization’s approach — an increased focus on interdisciplinary activity, and the integration of wargaming and analysis as complementary parts of a larger toolkit — to be in line with those practices. He felt this was the outcome we should want from a MORS meeting, which should further the education of practitioners rather than reinvent a discipline.

Mr. Williams, HAF/A9, spoke for the Air Force, noting that a trend in decreasing numbers of personnel and weapons systems offset by a huge increase to lethality also meant an increase in costs. However, he said, while wargames are necessary for understanding complex problems, they’re not sufficient. Analysis provides vital rigor, which ensures that results can’t be cherry-picked. For him, the important challenges facing wargamers are how to provide quality control
and get a consistent benchmark for how games are judged, how to make games more multi-domain and multi-departmental, and how to get new concepts out of games.

The chair asked the panelists to describe some of the work their services plan to do going forward. Mr. Werchado said that last year congress had chartered three future fleet exercises, with sets of overlapping recommendations. To meet this request, the Navy played through the different proposed fleet architectures with many stakeholders, against many opponents, and added those results to STORM, a program that generates model runs based on the outcome of the game. Those results were delivered to experimenters, and if they were meaningful they became the basis for exercises. For the Navy, this iterative, smaller game format increases the pace of results and they’ll continue to use it. Dr. Akst said that the Marine Corps is shifting to a new force structure focused on information warfare. They use games to explore using different forces for different scenarios and they are working on faster turnaround times; as decision-making has gotten quicker, so too have wargames.

The panel had time for one question, which focused on the trade-offs between maintaining deep expertise with long-term projects and delivering fast answers to busy executives. Mr. Williams observed that if the time is short you need to deliver short results, but it’s necessary to adequately advise the customer about the shortcomings of the product. Mr. Werchado added that a competent organization needs to have a body of work that “covers the waterfront.” He reiterated that it is on them to be ahead of the game and anticipate the needs of the decision-makers. Although executives often want to ask a question and have you only respond to that, they might not know what their next question is going to be. Dr. Akst added that it’s crucial to have executive support to protect the time and space needed for constant background studies.

Third Panel: Former Pentagon Executives

Each of the panelists was invited to describe their DOD executive experience and talk about how wargames influenced decisions (or didn’t) during their tenure.

Dr. Ewell began by saying that he never saw any programmatic impact on decision-makers from games while at the OSD. He saw games used to design and support strategic analysis and answer relatively discrete questions about DOD capabilities by refining scenarios, either through scenario selection or COA selection. Games are good for exploring situations that are too complicated to predict, he said, but by definition you cannot make a definitive, correct decision about such scenarios. “Games are really good with showing possible outcomes and really bad at predicting outcomes. Games can’t or shouldn’t validate,” but instead they should inform.

Dr. Yurchuk said that in uniform he saw variety of games, but he hadn’t seen many in an executive role. Consistent with Dr. Ewell’s experience he found games most valuable when used to address problems that were not amenable to more concrete analyses.

Dr. Chiu said in his experience, games could change a person’s mind in a way that other tools, such as studies, rarely do. It’s the best use and the hardest to pull off, due to the time and effort it takes to bring senior leadership to the table. Avoiding misrepresentation is a challenge because senior leaders need answers and lack time. As a result, leaders sometimes take game results as
absolutes, or reject them outright. Surprises are also a challenge. Although they are good for gamers and analysts, they can be confusing for decision-makers. The best way to foster good results from gaming, he said, is to educate senior leadership about what games are and are not, and what they can and cannot provide.

Fourth Panel: Psychology and Wargaming

Dr. Wong began by describing one of her own frustrations with discussions in the wargaming community: while wargaming is a human-centric activity focused on human decision-making, psychologists were rarely included in professional conferences like the prior year’s special meeting. To address this, she invited a panel of psychologists with professional wargaming experience or other related expertise to discuss the ways that psychology could inform wargaming. She then invited each panelist to explain their background, research areas, and what they felt psychology could add to wargaming.

Dr. Matos introduced himself as a retired navy surface warfare officer. He currently works in counterterrorism and specializes in organizational psychology, building training environments that use non-verbal indicators to assess progress, a technique that might be applied to wargaming. The heuristics that help make it possible to profile people might also be applied to wargaming: by using fundamental attribution theory, he feels we can better understand the players in a game, and better understand how participants are making choices.

Dr. Augustyn specializes in cognitive science. He worked in research psychology in the army, building information displays. He founded he own company and now runs wargames and consults on future technology concepts. He believes psychology can contribute formal techniques for drawing out creativity, and techniques for creating immersion. Psychology can improve wargaming by improving our understanding of player decision-making through analyses of biases and heuristics such as anchoring (creating a schema for a new environment based on the first piece of information received), availability (assigning more importance to more easily available information), and representativeness (“confirmation bias”). By better understanding the unconscious aspects of decisions, we can develop a deeper understanding of game outcomes, design better games, and develop more effective facilitation techniques.

Dr. Neal discussed two of the unique advantages of games. First, games allow players to test risky actions they would never attempt in real life, and to learn from the outcomes: they provide player-specific learning. Second, games allow observers to study the interactions among and between players and teams, and gain insight into the way scenarios shape those dynamics. While it is important for games to reflect real-world problems, in the game environment, players may react to information differently than they would in the real world. Psychology can contribute techniques to help understand those differences and mitigate against them.

Finally, Dr. Strauss provided perspectives from institutional organization and social psychology. She suggested that these disciplines could help researchers understand individual performance and the impact of group dynamics on game outcomes. These fields could help researchers evaluate games as learning tools by providing wargamers with better survey and assessment methods.
Following the conclusion of the opening plenary, participants spent 4 hours in the afternoon of the first day, 8 hours on the second day, and 4 hours in the morning of the third day in their respective groups: Working Groups, Seminar, or Wargames. The afternoon of the third day was devoted to the closing plenary session.

Closing Plenary Session

The closing plenary featured a short talk by representatives of Britain, who discussed the developments in their wargaming community over the past year. VCJS General Selva, USAF, then shared his views of what wargaming could offer as an intellectual tool and his hopes for what a reinvigorated wargaming community could bring to defense in the United States. The rest of the closing plenary was devoted to brief-outs from the chairs of the various panels and working groups, which are covered in detail by the rest of the reports in this publication, which were submitted by the chairs. The closing plenary also included a short hotwash and an announcement of Connections 2018, which will be hosted at the National Defense University July 17 to 20.

UK Address from Colin Marston

Mr. Marston described the state of UK wargaming in the past year, which is experiencing resurgence much like wargaming in the US. The VCDS is very serious about gaming and wants it at senior levels. During the past year, they ran a 4+1 game for the Vice Chairman, UK senior three star generals, and some equally senior Americans, “mark[ing] Britain’s return to senior wargames,” and the first wargame in the head office in many years.

Fostering consistent understanding across participating organizations is key to the success of the UK’s wargaming initiative. To meet this need, the UK developed a wargaming handbook. It was designed primarily as an introduction to wargaming for new practitioners and includes extensive references and several case studies, and they intend to keep updating the book with new material. Their office is also issuing a wargaming practitioner’s survey, to help benchmark the UK’s wargaming program against allied capabilities. This effort is another initiative of the vice-chief, and they have solicited senior US involvement. The UK would like to explore what the two communities can learn from each other. Mr. Marston invited DWAG and MORS members to participate in their forthcoming survey. (The survey has since been released and was shared with MORS members.)

Closing Keynote, Vice Chairman of the Joint Chiefs of Staff Gen. Paul Selva

General Selva began by contextualizing his discussion in terms of the 16 years of data that our engagements in Iraq and Afghanistan have so far given us, along with challenges from China’s economic rise and consolidated military power, Russia’s resurgence, the unpredictability of Iran and North Korea. These are complex challenges in a complex environment. What, he asked, can wargaming contribute to helping us solve these problems?
Wargames can test new concepts, and challenge old concepts. Games can challenge mythology and test the limits of current concepts and capabilities. They can provide rich intellectual material in a relatively short timeframe for a relatively low cost. Because the choices we make today will affect our military for the next 15 or 20 years, it is especially important to think critically about what our options are, and wargaming is a valuable tool for doing so.

One of the major values of wargames, General Selva said, is that they develop the intellectual capacity of the players: they teach us to make intelligent inferences about how others will act in response to our choices, and to assess the costs and benefits of different actions. It is essential to have the decision-makers as both players and observers. It is even more important to publicize the results and analyses from wargames, so that a broader community can engage with them and learn from them.

Modeling is also increasingly important. Incorporating models into wargaming, and applying big data to wargaming, is the next frontier. This means both informing games with models, and using game results to build models that deepen our understanding of patterns in organizational decision-making.

Before opening the floor for questions, he noted that games that merely confirm what we already know are not valuable. “Confirming what we already know is called training,” he said, “and we do a lot of it.” For games to be valuable, they have to “push the envelope” by testing how people view themselves and view their organizations. After this final observation, the audience had time to ask several questions, all recorded below.

What did the General think of fusing logistics with operations “all the way back through the supply chain to the industrial base?” General Selva felt that logistics in a contested environment was an excellent wargame topic. He invited the audience to think about those problems in a contested environment and to imagine how additive manufacturing, computer design, 3D printing, and other technologies could change the environment.

Did the DOD have any initiatives to purposefully develop wargaming expertise? They don’t have a curriculum that creates wargamers, but they watch the talent at senior service schools. Foundational operations research skills are not being taught well enough at the undergraduate level, but wargaming involves many skill sets from other fields, and he believes it’s crucial to bring in other kinds of expertise.

What leads a consumer of games to distrust games, or reject their conclusions? When experts fight the game, or fight the question, it might indicate a problem with the game design, or with player preparation. This is a frequent problem with near-to-mid-future games, and can be handled in part with pre-readings that describe how the world of the game came into existence. If all players do the reading, and can prove it, the game will probably run more smoothly and get better results. People who demonstrate that they are not prepared should be ejected from the game, no matter who they are.

What can be done to address DOD’s aversion to failure, since good insights only come from games played in a safe-to-fail environment? We shouldn’t have expectations of wargames. It’s
important to get other barriers, like uniforms, names, and titles out of the way, to help create an environment where participants can speak freely.

What is the state of sophistication in wargames today? Dramatically lower than it was even 20 or 30 years ago. The timelines for near-to-mid future games are a good example. In the mid-90s, these games were often focused on the 2020s. Today, in the 2010s, these games are still focused on the 2020s. Effective games should be looking 20 or more years into the future.

Is the Third Offset was still an active idea in DOD? The concept of “offsetting our opponent’s asymmetric abilities” is alive and well.

How much are efforts to reinvigorate wargaming based around gaming to address specific problems and how much are they focused on creating a culture of officers that appreciate gaming? Indoctrinating talented Officers and NCOs and letting them test their ideas is a significant part of the restoration effort. General Selva said he himself had been a “pedestrian Lt. Colonel” until he had begun wargaming. “It doesn’t matter,” he said, “where you sit in a wargame. You can’t help but learn about decision processes.”
Potential Contributions of the Study of Psychology to Wargaming

This year, we invited a group of psychologists with professional wargaming experience or other related expertise, to address the gap between wargaming as a human-centric activity focused on human decision-making, and the lack of representation from psychologists. In this section, Dr. Dave Neale, a postdoctoral fellow in Play & Learning at the University of Delaware and a psychologist on this year’s panel, goes into further detail about how he believes psychology could be used to better inform wargaming. Following that, we have included a short email by Jason Ausgustyn, President of FutureScout, LLC, on his takeaways from the conference and potentials for additional advances in wargaming.

Wargames as a Learning Tool

By Dr. Dave Neale, Postdoctoral Fellow in Play & Learning, University of Delaware

One way in which psychology can contribute to wargaming is by helping us understand when and how wargaming is effective, and when it is not, and by optimizing wargaming as a tool for simulation and professional development. It is now clear from a great deal of research that games can be powerful learning tools. They do this in two connected ways:

1. The first is player-specific-learning. Games can provide important learning and development opportunities for the players themselves, by allowing them to think about the situations they face in new ways, and to practice applying a range of important skills that can later be applied to real-world situations.

2. The second is simulation. We can learn from wargames because they can allow a real-world situation to be simulated, and so it is possible to learn about that real-world situation, and the potential effects of different human actions on outcomes. This kind of learning is available to the players of the game, but also to spectators or other individuals who read a report of how different scenarios played out.

Player-specific learning can occur during wargaming in a variety of ways. When playing a game, one is freed from many of the normal constraints and consequences of actions, and so you can try actions you would never have attempted in the real world. Sometimes, you will find these actions pay off in unexpected ways. But research has also shown that games lead players to focus on different aspects of their behavior than they do when engaged in real-world activity. They pay more attention to how they are doing things, rather than the end results. They learn about their limitations in a way the real world often does not allow – we tend to avoid things we are bad at, particularly when the stakes are high. They may then also be able to learn how to overcome those limitations. We now know from a great deal of psychological research that contexts with an open and exploratory element are great for learning, and especially for learning what are often termed
‘higher order’ or ‘domain general’ skills, including flexibility, problem-solving, probability judgments and negotiation skills. Psychology can provide the means to maximize wargames for this type of learning.

*Simulation* depends on games reflecting real-world situations, and there are many ways in which they can do this. A wargame can show where particular errors and biases arise in human thinking, and then we can try ideas for reducing or using those biases. A wargame can show how people work together and think through problems, or how they respond to threats – and how they may do this in unexpected ways. The nature of a game – which is an important difference from theorizing based on examples from history – is that it is open and freeform and allows players to innovate in the moment. When they are there, in that moment, they may come up with ideas and strategies that would not have been thought of otherwise. Wargames also – very importantly – put the human into simulation in a way computer modeling cannot, and humans will often come up with ideas or responses that we cannot foresee in advance.

But there is an important distinction between human behavior during wargaming and human behavior in the real world. The utility of wargaming as a tool for prediction and analysis depends on our understanding of how human behavior in a game will differ from real-world human behavior. Imagine playing a game of chess. Now imagine playing a game of chess where your job, or your life, depended on the outcome. Games are, by their very nature, low stakes – or, at least, lower stakes than real-world warfare.

Research has shown that the way a task is cued – for example as a chore, as a game, or as a critical emergency – affects people’s attitudes, motivations and behavior while performing the task. Under some situations, people perform better in a low stakes context than in a high stakes context – they are under less stress, act more flexibly, and take more risks. Different task orientations are known to be associated with different patterns of attention. If I ask you to do the same task, but describe it as a boring chore, you will attend to different aspects of it than if I told you the same task was a game, or if the same task was a challenge with a prize of 1 million dollars. People who are cued to see a task as work focus more on the end results of their actions, and on the quantity of their output, compared to those cued to see the same task as a game. These people focus more on the process and the quality of their contribution.

Now, this may seem like a weakness in wargaming, and in one sense it is, but it is also a strength. The game context, precisely because it has a specific effect on human thinking and behavior, can lead to more creative and sometimes more effective solutions to problems than would be identified by the same people in a real-world context. Psychology can both enhance this strength – by suggesting ways in which games could optimize these kinds of outputs – and it can mitigate the weakness, by pulling out from wargaming the aspects of human behavior that generalize real-world contexts, and those that may be specific to wargaming itself.

In summary, an important way in which psychology can contribute to wargaming is through providing the means to optimize wargaming, both as a tool for player development and as a tool for simulation.
Potential for Additional Advances

Note: the following is from an Email following the workshop

By Jason Augustyn, Ph.D., President FutureScout, LLC

I'll echo Dave's comments! Yuna, thanks again for the invitation. This panel was a great idea, and I hope you and Phil are able to work more "crossover" activities like this into MORS wargaming events. We could have an entire session on how psychology might inform wargames.

For example, something I took away from this week's workshop is the potential for theories of psychological measurement to inform wargame adjudication and analysis. Much of the data in semi-rigid or free games mirrors the kinds of problems we deal with in psychology with developing valid, rigorous measurement instruments. I suspect that is fertile ground.

I also keep hearing people emphasize that "wargames aren't repeatable" which, of course, is strictly true. However, the same could be said of many psychology experiments (again, strictly speaking). The field has developed a number of sophisticated techniques for designing repeatable social science experiments that mitigate, or at least acknowledge, the wide-ranging variability you see whenever people and their ideas are the unit of analysis. Might be some inspiration there for wargaming.

Anyway, I think you've really hit on something with a lot of potential for advancing the state of the art in wargaming.
Working Group I: Wargaming and Analysis

Chairman: Jon Compton
Co-Chairman: Matt Caffrey

Executive Summary

BLUF (Bottom Line Up Front)

Working Group 1 was tasked with exploring the relationship between analysis and wargaming with the goal of suggesting how together both can provide the greatest benefit to defense. This task was accomplished by building on last year’s working group, securing talks by experts in both fields and conducting a rigorous committee of the whole/peer review when building our out brief. We found best results are achieved not by dogmatically holding to pre-determined best practices but by employing analysis, wargaming, or analysis and wargaming as each situation calls for.

Background

The relationship between analysis and wargaming has been the subject of debate long before MORS wargame special meetings or indeed before MORS. Some have claimed wargaming is simply an imprecise mode of analysis while others assert analysis is merely a method of working out the details while wargaming sets the basic strategy. Last year’s working group’s findings included the firm assertion that both wargaming and analysis are distinct fields and both make significant contributions, individually and when employed together. This year’s working group sought to establish how both could be employed the most effectively together by reviewing classified studies completed by the Services and other DoD agencies.

Day by Day

Tuesday, 17 October: During this period Working Group 1 first sought to “jell” as a group through introductions and initial discussions, and then to clarify the relationship between wargaming and analysis through briefings on the fundamentals of each.

Wednesday, 18 October: During this period Working Group 1 sought to better understand how analysis and wargaming can complement each other. Both the chair and co-chair gave talks on how wargaming and analysis can increase the military edge provided by innovation. These were followed by other talks that demonstrated the potential synergy of wargaming and analysis.
Thursday, 19 October: During the morning, Working Group 1 crafted our out brief. During the afternoon, Working Group 1 attended the out brief and provided our findings for the overall workshop.

Conclusion

Our working group established that both wargaming and analysis are only of value if they provide a relative advantage over our adversaries. That advantage will be greater if we focus on using the “best fit” technique for each situation, and if we employ wargaming and analysis synergistically when appropriate, creating insights neither could produce alone.

Recommendation

During the 2018 MORS Special Wargaming Meeting, establish a working group to draft a doctrine for DOD wargaming and analysis.

Wargaming and analysis can save lives. Whether they save lives of our citizens, allies and friends of the lives of our adversaries will be determined by which side conducts wargaming and analysis more effectively.

Objective

Our original objective was to produce an actionable product that:

- Identifies best practices for use of wargaming within the overall DoD analytic process
- Enhances rigor within DoD wargaming

Over the course of our group discussions we modified those sub-objectives. While we still sought an actionable product, we also modified our sub objectives to:

- Identify best practices for synergistic use of wargaming and analysis
- Enhance the effectiveness of DoD wargaming and analysis

In particular our group concluded that “effectiveness” is a more appropriate objective then “rigor.” While greater rigor often increases effectiveness, sometimes less rigor and more speed is the better option, especially if speed is the key to meeting the decision maker’s needs while maintaining effectiveness.

Background

The improved sub-objectives are in line with the work of the 2016 Working Group 1. That group acknowledged that the relationship between analysis and wargaming has been the subject of debate long before MORS special meetings, or indeed before MORS. Some have claimed wargaming is simply an imprecise mode of analysis while others asserted that analysis is merely
a method of working out the details while wargaming sets the basic strategy. Last year’s working group’s findings included the firm assertion that both wargaming and analysis are distinct fields and both make significant contribution individually and when employed together. This year’s working group sought to establish how both can be most effectively be employed together.

**Participation**

Working group members included master wargames designers and leading analysts. Hence, we were a working group of established experts from the Services, COCOMs, OSD and JS.

**Method**

During our initial meeting, Working Group 1 first sought to “jell” as a group through introductions and initial discussions. Our Chair Jon Compton then kicked off our efforts with an overview briefing on why and when to use wargames for decision support. His briefing also covered the most common problems with decision support wargames. Our Co-Chair Matt Caffrey followed with a talk on why and how wargaming and analysis can help create a competitive edge over our adversaries. We then sought to clarify the relationship between wargaming and analysis through additional briefings on the fundamentals of each.

The group then began a review of current analytic processes within DOD. We continued last year’s discussion on aspirations for the integration of wargaming into larger efforts by the services. We then reviewed actual executions of wargames and analytical efforts since the last working group concluded. In each case, the briefer candidly discussed the successes and disappointments of their work. This amounted to a peer review; a process all too uncommon in wargaming and almost as uncommon for analysis.

Finally, Working Group 1 crafted an overview of our findings and presented them during the out brief of the overall workshop.

**Findings**

This year’s working group reconfirmed that both wargaming and analysis are distinct fields and both make significant contributions individually, and when employed together.

Analysis is a means of answering “if then” statements: given this data, what knowledge can be discerned? Analysis identifies patterns in a sea of numbers, and produces understanding from apparent randomness.

Wargames can provide insight into “what’s next.” When there is an adversary who “gets a vote,” wargaming can help anticipate how our adversaries, and how we ourselves, may react to a given scenario.
Analysis can clarify the depicted situation prior to a wargame, increasing the accuracy of the wargame’s depiction of the “at start” conditions. Analysis can also help us make sense of a wargame’s outcomes.

Wargames can feed analysis in several ways. Wargames can provide indications of which scenarios are particularly dangerous, focusing analytical efforts. Wargaming can help clarify plausible outcomes of scenarios, providing an initial point for analysis.

Conclusion

Our working group established that both wargaming and analysis are only of value if they provide a relative advantage over our adversaries. That advantage will be greater if we focus on using the “best fit” technique for each situation and, when appropriate, employ wargaming and analysis synergistically – creating insights neither could produce alone.

Recommendations

Recruit speakers at the next MORS Special Wargame Meeting on the wargaming capabilities of potential adversaries. For wargaming and analysis to give us an edge in armed conflict, they must be more effective than the analogues techniques of our adversaries. To know if we are ahead or behind their capabilities, we need to know what their capabilities are.

Encourage our close allies to participate in the next MORS Special Wargame Meeting and in Working Group 1. Their participation in Working Group 1 will provide us with a larger net for identifying best practices.

During the 2018 MORS special wargame meeting, charge Working Group 1 to draft a doctrine for DoD wargaming and analysis. Both the practice and technology of wargaming, and analysis, is evolving too quickly for DoD regulation. Locking in the best practices of today will lock out the even better practices of tomorrow. However, a US wargame and analysis doctrine, modeled to a degree on the United Kingdom’s 2017 Wargame doctrine, would provide some guidance without being overly restrictive. The working group could write the initial draft, which would then be refined by the Joint Staff after the workshop.
Working Group II: Validity and Utility of Wargaming

Working Group Chair: Stephen Downes-Martin


[Please see Appendix A for a full list of Working Group II member bios]

Any errors, misrepresentation or misinterpretation in this document of the data produced by Working Group II are the sole responsibility of Stephen Downes-Martin.

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Executive Summary

Working Group Definitions used during Meeting – These are necessary but insufficient:

<table>
<thead>
<tr>
<th>Validity</th>
<th>Utility (can be negative)</th>
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<tbody>
<tr>
<td>• Sponsor’s objectives are suitable for gaming and drive game design</td>
<td>• Wargame is accepted as valid by Sponsor</td>
</tr>
<tr>
<td>• Wargame is played according to the design</td>
<td>• Stakeholders act on information from the wargame in a way that has an observable effect on national security</td>
</tr>
<tr>
<td>• Forensics and reporting is honest and complete.</td>
<td>• Participants gain value</td>
</tr>
</tbody>
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Mission and Objectives

Produce a corpus for the wargaming community of theory and practice which identifies:

• Characteristics of valid wargames that have utility for DoD decision makers
• Barriers to the inclusion of these beneficial characteristics into wargames
• Characteristics of malign wargames that deceive DoD decision makers
• Mitigations of these malign characteristics from ill-intentioned wargames
Key Takeaways

Examining benign gaming provides best practices and lessons learned. However, every phase of wargaming, from initial contact between game sponsor and wargaming organization, is vulnerable to malign deception. At best, malign deception is driven by the good intentions of influencers believing they are right and that anything that might contradict them must be avoided. At worst it is driven by careerism, corruption and hostility to other military communities and services. Examining malign gaming provides additional wargaming principles dealing with conflict of interest, intellectual fraud, self-deception, political imperatives and outright careerism. Malign games actively exploit the environment of time crunch, career pressure, resource constraints, and the beliefs and opinions of sponsors, stakeholders, and players, while poorly designed and executed benign games are exploited by this environment.

External – Engage with the Sponsor and Stakeholders:

- Ensure the event is a wargame with the possibility that Blue can lose and the gamed concepts can be overcome by Red, do not call non-game events “wargames.”
- Recruit, not invite, senior leaders to lead game cells to execute the game as designed. Do not permit these leaders to derail the game in-stride to fit their non-sponsor agendas.
- Playtest the game with sponsor participation or with sponsor’s empowered action officers to ensure sponsor is paying proper attention to objectives and design.
- Immerse the players in the scenario and play. Include the sponsor and key stakeholders as Red players. Do not let the sponsor or key stakeholders play Blue or be Adjudicators.

Internal – Work within the Wargame Organization and its Chain of Command:

- Engage and use an empowered Independent Peer Review Board to examine objectives, assumptions, scenario and capabilities data, design, game play, adjudication, data collection and analysis.
- Minimize cognitive dissonance in the mind of the sponsor by ensuring wargame design and play is as consistent as possible with their preconceptions, while not allowing these preconceptions to drive objectives, design, game play, analysis or reporting.
- Conduct wargame forensics and reporting to provide actionable recommendations.
- Report ruthlessly and honestly, unencumbered by sponsor or stakeholder wishful thinking.
Working Group II Main Report

Mission and Objectives

1. **Produce a corpus for the wargaming community of theory and practice which identifies:**
   - Characteristics of valid wargames that have utility for DoD decision makers
   - Barriers to the inclusion of these beneficial characteristics into wargames

2. **And, in addition, identify:**
   - Characteristics of malign wargames that deceive DoD decision makers
   - Mitigations of these malign characteristics from ill-intentioned wargames

The hypothesis for this second pair of items is that the opposite of a “valid and useful wargame” is not an “invalid and not useful wargame,” it is “a wargame that appears valid, and deceives the decision maker into making poor decisions based on the game.” Looking at valid and useful games gives us characteristics to seek, and the behaviors, which interfere with those characteristics, to avoid, i.e. best practices and lessons learned. By looking at wargames that are deliberately designed to be malign (deceptive), we may identify additional characteristics to explicitly avoid in wargame design that are not obvious from looking at a list of characteristics to seek.1 Furthermore, in nearly all cases of scientific fraud, three risk factors have been identified as present:

1. The perpetrators “knew, or thought they knew, what the answer to the problem they were considering would turn out to be if they went to all the trouble of doing the work properly;

2. The perpetrators were under career pressure

3. The perpetrators were working in a field where individual experiments are not expected to be precisely reproducible”2

These risk factors are clearly present in both wargames and the decision making that the wargames inform; to claim otherwise is to deny human nature and the purpose of the various existing DoD auditor agencies and activities. Note, however, that the presence of risk factors...

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indicates that there is a need to deal with them; their presence does not prove that “malignity” is present.

Our Process

We sought working group participants who were either expert analysts with wargaming experience or expert wargamers from a wide range of organizations. They were recruited by requests to the leadership of DoD, the services, and the personal networks of members of MORS and Wargaming Communities. We interpreted "expert" to include recent hands-on experience doing, not simply leading such experts. Unfortunately, we were unable to recruit USMC wargamers or analysts despite approaching leadership of the Marine Air-Ground Task Force Integration Division, Operations Analysis Directorate of the Marine Corps Combat Development Center, and the Wargaming Division of the Marine Corps Warfighting Laboratory. It appeared the workload of those organizations during the same time as the workshop prevented their participation. A wider outreach to the MORS wargaming and analytic communities for USMC participation was not successful. In future workshops we hope to rectify this missed opportunity. Following recruitment, we employed a disciplined normative approach. ³

Before the meeting

Group members were provided with materials to read before the meeting. These consisted of papers written specifically for the Working Group as well as previously published material: ⁴

- “Characteristics of Games that Make a Difference”, COL Matt Caffrey
- “Recent Wargames Executed by the USEUCOM”, LTC Gil Cardona
- “Dramaturgy, Wargaming and Technological Innovation in the US Navy”, Dr. Thomas Choinski
- “Wargaming to Deceive the Sponsor: Why and How”, Dr. Stephen Downes-Martin
- “Characteristics of Games that Make a Difference”, Dr. John Hanley
- “Playing War”, Chapter 6 (Conclusions), Dr. John Lillard
- “Wargaming the Atlantic War”, Draft 20170924, Dr. Paul Strong

³ We used a disciplined normative approach using Language Processing™, Silent Clustering and Formal Debate, as it has long been proven they give superior results than those obtained from ill-disciplined methods such as brainstorming or BOGSATS. See for example “The illusion of group productivity: A reduction of failures explanation”, Barnard Nijstad, Wolfgang Stroebe & Hein Lodesijklärk, European Journal of Social Psychology, 36, 31-48 (2006). For a general overview of how brainstorming has long been debunked see “Groupthink: The brainstorming myth”, Jonah Lehrer, The New Yorker, January 20, 2012 online at http://www.newyorker.com/magazine/2012/01/30/groupthink (last accessed 11/18/2017) and references contain therein. For details on Language Processing and Silent Clustering see the “Language Processing Method” manual at https://goalqpc.com/?s=Language+Processing (last accessed 11/18/2017).

⁴ A copy of these materials is included in the supplemental report titled “Wargames that Demonstrate Validity and Utility”
Team members were requested to think about the following questions and bring their thoughts with them to the meeting:

- What does validity and utility mean when applied to wargames?
- What were the characteristics that led to success of past games “that made a difference?”
- What additional characteristics might be in play today and in the future?

**During the meeting**

The Working Group engaged in an open discussion addressing the question “What do validity and utility mean for wargames?” using their wargaming experience, the read-aheads, and their intelligence.

The group then split into two parallel teams of eight people, each led by one of the Chairs of the working group as an additional team member. Using Language Processing™, Silent Clustering, and Debate, each team addressed the question “What are the characteristics of games that made or can make a difference to the DoD?” Team A (Benign Wargames) addressed the question from a positive sense, i.e. identifying characteristics of well-intentioned games to which decision makers’ paid attention and doing so turned out well. Team B (Malign Wargames) addressed the question from a negative sense, i.e. characteristics of ill-intentioned games to which decision makers’ paid attention and doing so turned out badly due to the game itself.

Each team then used Language Processing™, Silent Clustering and Debate to address the following questions. Team A (Benign Wargames) addressed, “what gets in the way of obtaining the characteristics of well-intentioned valid wargames to which DoD decision makers pay attention?” Team B (Malign Wargames) addressed the question “how we can mitigate the characteristics of ill-intentioned games which deceive the decision maker to incorporate their invalid insights into their decision making?”

The two teams recombined, briefed and challenged each other on their work, identified immediate top-level takeaways and created the Working Group out-brief to the Meeting.

**After the meeting**

After a few days to several weeks, Group members wrote short papers on “what validity and utility means for wargames” following careful consideration of the products and discussions that took place during the working meeting. These papers are an integral part of the Working Group product and are included verbatim in this report.

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5 We had sixteen slots plus two facilitators and had to turn away several qualified applicants ... We were one short due to a last-minute injury ... We restricted each team to eight people based on the observation over many years that in groups of more than eight people the additional people do not effectively contribute while adding to the time taken to execute the process ... It is better to create parallel teams either addressing the same or complimentary questions.
**Reporting**

The read-ahead papers, product from the face to face working group meeting, and the follow-up short papers are all products of the working group and are included in this report to provide an integrated and complete record of the working group.

**Working Group II Members**

<table>
<thead>
<tr>
<th>Team A (Benign Gaming)</th>
<th>Team B (Malign Gaming)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael Anderson</td>
<td>Rebecca Dougharty</td>
</tr>
<tr>
<td>Gil Cardona</td>
<td>Stephen Downes-Martin</td>
</tr>
<tr>
<td>Tom Choinski</td>
<td>Fred Hartman</td>
</tr>
<tr>
<td>John Hanley</td>
<td>John Lillard</td>
</tr>
<tr>
<td>Keith Morris</td>
<td>Roger Meade</td>
</tr>
<tr>
<td>Peter Perla</td>
<td>Merle Robinson</td>
</tr>
<tr>
<td>Vincent Schmidt</td>
<td>Gary Schnurrpusch</td>
</tr>
<tr>
<td>Bill Simpson</td>
<td>Gene Visco</td>
</tr>
<tr>
<td>Tim Wilkie</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First</th>
<th>Last</th>
<th>Organization</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
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<tr>
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<tr>
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</tr>
</tbody>
</table>
Characteristics of Benign and Malign Games

The group split into two parallel teams of eight people, each led by one of the Chairs of the working group as an additional team member.

First, each team addressed the question “What are the characteristics of games that made or can make a difference to the DoD?” Team A (Benign Wargames) addressed the question from a positive sense, i.e. identifying characteristics of well-intentioned games to which decision makers’ paid attention and doing so turned out well. Team B (Malign Wargames) addressed the question from a negative sense, i.e. characteristics of ill-intentioned games to which decision makers’ paid attention and doing so turned out badly due to the game itself.

Second, Team A (Benign Wargames) addressed “what gets in the way of obtaining the characteristics of well-intentioned valid wargames to which DoD decision makers pay attention”, while Team B (Malign Wargames) addressed the question “how can we mitigate the characteristics of ill-intentioned games which deceive the decision maker to incorporate their invalid insights into their decision making?”

After proposing answers to the questions each Team used “silent clustering” to cluster the items into a 1st level, then discussed what those clusters meant and agreed titles for them. After that each Team again used “silent clustering” to group their 1st level clusters into a 2nd level, then debated the meaning of the 2nd level and agreed titles for those clusters. Note that some 1st level clusters are stand-alone, the teams chose not to cluster them into 2nd level clusters.
Team A: Benign Games

**Characteristics of Benign Games**

**Question:** What are the characteristics of games that made or can make a difference to the DoD?

Address the question from a normative active but positive sense, i.e. how would you generate well-intentioned games to which decision makers’ paid attention and doing so turned out well.

<table>
<thead>
<tr>
<th>Normative form of Characteristic</th>
<th>1st Level Clustering</th>
<th>2nd Level Clustering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Game’s purpose and objectives are clearly stated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Game design clearly answers a specific question.</td>
<td>A1. The game objectives drive the game design.</td>
<td>Iterate purpose and objectives with sponsor to address actionable questions.</td>
</tr>
<tr>
<td>Game design clearly links desired learning objectives to game’s product.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design team anticipates and helps shape sponsor question.</td>
<td>A2. Use game facts and objectives to set expectations with the decision maker.</td>
<td></td>
</tr>
<tr>
<td>Explicitly express all SME counsel, citations and assumptions at each milestone and in the deliverable to maximize study integrity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Game design team sets achievable expectations with the decision maker.</td>
<td>A3. The game addresses a decision maker’s major concern and provides innovative ways to address it.</td>
<td></td>
</tr>
<tr>
<td>The game addresses a decision maker’s major concern and provides innovative ways to address it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Properly specify the state of the world (scenario) using well founded data and information.</td>
<td>A4. Setting is plausible and clearly explained</td>
<td>Create the game context to set the stage for play that addresses the questions.</td>
</tr>
<tr>
<td>Base the wargame on a plausible scenario.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create and deliver a clear, concise and credible Road to War &amp; Situation briefing.</td>
<td></td>
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</tr>
<tr>
<td>Consult relevant SMEs to inform the design and conduct of the game.</td>
<td>A5. Consult relevant SMEs to inform the design and conduct of the game.</td>
<td></td>
</tr>
<tr>
<td>Scope the game to support the appropriate level of analysis of the problem.</td>
<td>A6. Scope the game to support the appropriate level of analysis of the problem.</td>
<td></td>
</tr>
<tr>
<td><strong>Normative form of Characteristic</strong></td>
<td><strong>1st Level Clustering</strong></td>
<td><strong>2nd Level Clustering</strong></td>
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<tr>
<td>------------------------------------</td>
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</tr>
<tr>
<td>Design and rehearse the game with actual participants to ensure the objectives and the data collection plan are achievable.</td>
<td>A7. Involve participants before the game.</td>
<td></td>
</tr>
<tr>
<td>Rehearse participants within their teams to ensure they understand the game book.</td>
<td>A8. Involve stakeholders and sponsors throughout the timeline.</td>
<td>Involve stakeholders and players to refine the design and execution process.</td>
</tr>
<tr>
<td>Decision makers trust those involved in the game.</td>
<td></td>
<td></td>
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<tr>
<td>Produce the game report in time to fit the decision maker’s decision cycle.</td>
<td></td>
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<tr>
<td>Involve the sponsor from design through final report.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involve the right mix of people (including backgrounds necessary to fully address the question).</td>
<td>A9. Recruit and utilize players for their expertise.</td>
<td></td>
</tr>
<tr>
<td>The players accurately reliably represent the tastes and beliefs of those in the roles that they represent; ideally the decision makers themselves.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Players have the right level of experience and are in the appropriate role.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Players are experts and are recognized as such by the decision maker.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use design to identify weak points and play test to break and then fix those weak points.</td>
<td>A10. Failure is an option.</td>
<td>Tailor adjudication tools and methods to sponsor objectives and players.</td>
</tr>
<tr>
<td>Base game adjudication on a written set of rules approved by the sponsor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rules and adjudication represent decisions at the appropriate level of fidelity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deal with unintended negative lessons so that the participants do not take them away.</td>
<td>A12. Participants take intended positive actionable lessons from the game.</td>
<td>Post-game interpretation and reporting leads to positive actionable results.</td>
</tr>
<tr>
<td>The participants act on their findings from the game.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goals and results are concisely articulated.</td>
<td>A13. Generate high quality after action reports.</td>
<td></td>
</tr>
<tr>
<td>Use language, terminology and format familiar to the sponsor to ease acceptance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capture the knowledge generated by the game in a manner suitable for dissemination and disseminate it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normative form of Characteristic</td>
<td>1st Level Clustering</td>
<td>2nd Level Clustering</td>
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<tr>
<td>---------------------------------</td>
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</tr>
<tr>
<td>Game raised controversial issues that caused the decision maker to revise his position.</td>
<td></td>
<td>A14. Confront and challenge assumptions.</td>
</tr>
<tr>
<td>Identify and test specified and implied assumptions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verify assumptions with appropriate SMEs prior to completion of game design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimize resistance by the sponsor to unexpected results by keeping him informed about game outcomes.</td>
<td></td>
<td>A15. Game play positively resonates with the audience</td>
</tr>
<tr>
<td>Game play is consistent with the preconceptions of the decision maker.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploit the power of participatory narrative to create fertile opportunities for innovation by the players.</td>
<td></td>
<td>A16. Game leverages active player participation to achieve the objective.</td>
</tr>
<tr>
<td>Participants interact to generate and capture knowledge during the game.</td>
<td></td>
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</tr>
</tbody>
</table>
**Barriers to including benign characteristics**

**Question**: What gets in the way of obtaining the characteristics of well-intentioned valid wargames to which DoD decision makers pay attention?

<table>
<thead>
<tr>
<th>Barriers</th>
<th>1st Level Clustering of Barriers</th>
<th>Applied to 1st Level Clustering of Benign Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission creep occurs when stakeholders demand more from the wargame than it was designed to support.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sponsor has a poorly framed the problem.</td>
<td><strong>Sponsor not properly engaged or supportive.</strong></td>
<td>A1, A2, A8</td>
</tr>
<tr>
<td>Sponsor is preoccupied with the scenario and does not pay enough attention to the objectives, coupled with the failure of the design team to focus the sponsor on articulating the objectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Game sponsor is not fully engaged throughout the wargame cycle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military organizations and members are not wired to fail and thus resist games in which it is possible for Blue to fail.</td>
<td><strong>Careerism by players.</strong></td>
<td>A9, A10, A12</td>
</tr>
<tr>
<td>Blue not allowed to fail; the weak points of the concept or “the thing” being gamed is not researched by either the developer of “the thing” or the wargame designer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wargame participation has no effect on future career path or position selection.</td>
<td><strong>Wargames require more time ahead of the game than stakeholders are willing to give.</strong></td>
<td>A7, A9</td>
</tr>
<tr>
<td>Time constraints with day jobs reduce the capacity for participants to engage before the actual game.</td>
<td></td>
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</tr>
<tr>
<td>Required and desired SMEs are a high demand low volume resource.</td>
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</tr>
<tr>
<td>Player expertise is not always recruited or utilized, SME is often limited and in high demand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The setting may take multiple wargames to fully capture the context.</td>
<td><strong>Game scenario insufficient to handle game objectives.</strong></td>
<td>A4</td>
</tr>
<tr>
<td>The emerging geo-political situation is changing at too rapid a pace to understand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The scenario or setting is selected to support traditional service procurement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barriers</td>
<td>1st Level Clustering of Proposed Mitigations</td>
<td>Applied to 1st Level Clustering of Benign Characteristic</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Developers of the concept, equipment or COA being gamed rarely address their own assumptions, making it hard for game designers to identify and question them.</td>
<td>Assumptions not properly addressed.</td>
<td>A4, A11</td>
</tr>
<tr>
<td>It is hard to specify the capabilities and effects of new technologies being gamed with respect to other elements in the game. Owners of these technologies are sometime unwilling to commit to specific effects and outcomes.</td>
<td></td>
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</tr>
<tr>
<td>Findings that were not the result of player interaction are included in the AAR as a player finding.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report generation is not looked upon as exciting.</td>
<td>The DCAP and Reporting Plan is poor or lacks sponsor support.</td>
<td>A13</td>
</tr>
<tr>
<td>Lessons learned and game outcomes are not captured or recalled accurately and are not included in the report.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full game report is rarely read, stakeholders preferring the analytically invalid hot wash briefing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor game design, materials and dynamics disengage the players.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Game design or setting are unimaginative or perceived as ridiculous and so the game fails to engage players intellectually or emotionally</td>
<td>Players are not properly managed.</td>
<td>A9, A12, A14, A15, A16</td>
</tr>
<tr>
<td>Participants are selected based on expertise from the past rather than potential for future influence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants exclusively use what they know and do not leverage discoveries or direction of SMEs and analysts.</td>
<td></td>
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</tr>
<tr>
<td><strong>Barriers</strong></td>
<td><strong>1st Level Clustering of Proposed Mitigations</strong></td>
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<tr>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>Inexperienced or less capable design teams do a poor job identifying key assumptions and building game dynamics to force players to confront them.</td>
<td></td>
<td>Game design is poor. A4, A8, A10, A11, A13, A14</td>
</tr>
<tr>
<td>Concepts and capabilities are given or available to Blue without Red’s knowledge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive for a “turn the crank” (models, simulations, games) process to provide an answer instead of information and learning.</td>
<td></td>
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</tr>
<tr>
<td>Wargaming organizations use a single or limited set of predetermined adjudication techniques.</td>
<td></td>
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</tr>
<tr>
<td>Adjudication rules and processes and analysis for after action reports are not able to extract the full range of DOTMLPF recommendations.</td>
<td></td>
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</tr>
</tbody>
</table>
Team B: Malign Games

*Characteristics of Malign Games*

**Question:** What are the characteristics of games that made or can make a difference to the DoD?

**Intent:** Address the question from a normative active but negative sense, i.e. how would you generate ill-intentioned games to which decision makers’ paid attention and doing so turned out (or will turn out) badly for them due to the game itself.

<table>
<thead>
<tr>
<th>Normative form of Characteristic</th>
<th>1st Level Clustering</th>
<th>2nd Level Clustering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build the game at an inappropriate level for the game’s objectives (for example a tactical game to answer an operational level question).</td>
<td><strong>B1. Build in a mismatch between the game’s focus and objectives</strong></td>
<td>Construct the game to produce malign results.</td>
</tr>
<tr>
<td>Mask biased outcome intentions by making the game’s objectives too general.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design the game to omit critical elements from game play.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliberately make the game’s clock rate, number of turns planned or time-period covered by the scenario inappropriate for the game’s objectives.</td>
<td><strong>B2. Manipulate time, space and scope to influence game’s trajectory.</strong></td>
<td></td>
</tr>
<tr>
<td>Utilize game boundaries to exclude or minimize significant competing alternatives (for example exclude cyber and EW from a missile targeting game).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use invalid or irrelevant assumptions in the game design.</td>
<td><strong>B3. Manipulate the game’s assumptions to generate a malign result.</strong></td>
<td></td>
</tr>
<tr>
<td>Narrow the scope of the game to a predetermined course by overly restricting the game’s assumptions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misrepresent assumptions or add unneeded assumptions to produce malign results.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When interpreting sponsor’s objectives add unnecessary topics and elements that diverts the players away from the real objectives and onto predetermined results.</td>
<td><strong>B4. Construct game teams in such a way that they obstruct the sponsor’s objectives.</strong></td>
<td>Staff and structure the game to encourage players to exert inappropriate influence on game play.</td>
</tr>
<tr>
<td>Construct player teams using their known biases about the topics being gamed to push the game trajectory down a malign path</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploit or amplify the pressure on the game’s sponsor by his or her community to prove the gamed concept is valuable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select for players or control people with a vested interest in a specific game output.</td>
<td><strong>B5. Enable the game sponsors and players to exert inappropriate influence on game play.</strong></td>
<td></td>
</tr>
<tr>
<td>Allow the game’s sponsor to lead the Blue team.</td>
<td>Normative form of Characteristic</td>
<td>1st Level Clustering</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>---------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Design the adjudication process to avoid or give preference to preselected outcomes.</td>
<td>B6. Influence game flow by manipulating control and adjudication.</td>
<td></td>
</tr>
<tr>
<td>Control team arranges for critical elements to be omitted from play by manipulating Red and Blue actions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place the advocates of the concepts being gamed on the adjudication team.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclude the target decision maker from the design process and game until the final briefing.</td>
<td>B7. Design the game to disconnect decision makers, players and objectives.</td>
<td></td>
</tr>
<tr>
<td>Design the game to produce insights that are not actionable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design the game to steer players away from the sponsor’s objectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exaggerate and under-play capabilities to bias players’ decisions.</td>
<td>B8. Misrepresent the capabilities of entities within the game scenario.</td>
<td></td>
</tr>
<tr>
<td>Omit and adjust data dealing with fundamental physics.</td>
<td></td>
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<tr>
<td>Use black box simulations during adjudication.</td>
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<tr>
<td>Fail to properly immerse players into challenging game play so they disengage and therefore are distracted from noticing deceptive game processes.</td>
<td>B9. Exploit sponsor and player lack of experience and engagement.</td>
<td></td>
</tr>
<tr>
<td>Excluding real SMEs in the systems and concepts being gamed from the adjudication team.</td>
<td></td>
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<tr>
<td>Populate player cells with people who lack specific detailed expertise in the systems and concepts being gamed.</td>
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<tr>
<td>Design the game and data to prevent transparency and auditability.</td>
<td>B10. Drive game’s trajectory by obscuring key elements of game data and process.</td>
<td></td>
</tr>
<tr>
<td>Introduce biased data or algorithms in a non-transparent manner.</td>
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<tr>
<td>Introduce bias for certain “successes” in the adjudication process to minimize those elements.</td>
<td>B11. Distort player perceptions by in-stride manipulation of data.</td>
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<tr>
<td>Emphasize non-core and irrelevant information by manipulating visual game components and feedback.</td>
<td></td>
<td></td>
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<tr>
<td>Ensure uneven data collection to skew interpretation.</td>
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<tr>
<td>Omit critical topics when interpreting game objectives and when designing and implementing the game to slant game outcomes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omit or shade elements of play from the narrative report that do not support the desired malign result.</td>
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</tbody>
</table>

Manipulate data collection, production and reporting to deceive game participants.
<table>
<thead>
<tr>
<th>Normative form of Characteristic</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Level Clustering</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Level Clustering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit access to and flow of critical information using classification barriers</td>
<td>B13. Exploit and distort the information flow between players, analysts, decision makers and sponsors.</td>
<td></td>
</tr>
<tr>
<td>Create misunderstanding using language and cultural barriers (between services, communities within services, etc.)</td>
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</table>
Mitigation of malign characteristics

Question: How can we mitigate these characteristics from ill-intentioned games that made or can make a difference to the DoD?

Intent: Address the question from an active normative sense, i.e. how would you protect games from deceptive practices? Apply the question to the 1st level clustering of the malign characteristics.

The team used the Characteristics of Malign Games to explore possible mitigations (i.e. barriers to including malign characteristics into wargames), and proposed twenty-nine, each of which addressed one or more deceptive practices. The proposed mitigations fell into seven broad areas listed below. Some of these mitigations will be resisted on the grounds that they are onerous, costly and time consuming, or that the characteristics of malign games are not a problem for the DoD. The first argument against implementation is addressed by the trade-off between the importance to national security of the game and the cost of ensuring the game is valid. The second argument assumes away human nature and the history of intellectual fraud when money, careers and stakes are high.

<table>
<thead>
<tr>
<th>Proposed Mitigation</th>
<th>1st Level Clustering of Proposed Mitigations</th>
<th>Applied to 1st Level Clustering of Malign Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test and document links from every element of game to sponsor’s objectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test and document why time, space and scope support the sponsor’s objectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Document assumptions and obtain their impact on the game from the design, control and analysis team leads.</td>
<td>Rigorously test the logic linking game design to sponsor objectives, using external peer review if necessary.</td>
<td>B1 – B3, B8</td>
</tr>
<tr>
<td>Do a sensitivity analysis on questionable assumptions.</td>
<td></td>
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<tr>
<td>Document capability assessment assumptions used for the game and the logic linking those assessments to the game’s objectives.</td>
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<td></td>
</tr>
<tr>
<td>Use an external peer review board to examine game design.</td>
<td>Establish and use an independent empowered external peer review board.</td>
<td>B1—B3, B6—B8</td>
</tr>
<tr>
<td>Use an independent peer review board to examine, approve or reject assumptions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use independent peer review board to examine the ability of the game design to properly address the sponsor’s objectives for the game.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Mitigation</td>
<td>1st Level Clustering of Proposed Mitigations</td>
<td>Applied to 1st Level Clustering of Malign Characteristic</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Obtain and use independently derived data and document its level of validation, or if this is not possible submit the data to an independent review.</td>
<td>Establish Quality Assurance plan for data used in the game as part of the design and the DCAP.</td>
<td>B8, B11, B12</td>
</tr>
<tr>
<td>Establish transparency for all data used in the game.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Submit data for external analysis by independent analyst team.</td>
<td></td>
<td></td>
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<tr>
<td>Use an independent external archive with change log function.</td>
<td></td>
<td></td>
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<tr>
<td>Document data collection points, types of data, and purpose of that data in the DCAP.</td>
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</tr>
<tr>
<td>Obtain unambiguous written guidance from sponsor on game objectives and level of war.</td>
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<tr>
<td>Conduct a separate decision game for decision makers (i.e. an executive level shadow game after the game and based on the game flow of events).</td>
<td>Engage the Sponsor and Stakeholders.</td>
<td>B1 – B8, B12, B13</td>
</tr>
<tr>
<td>Ensure the sponsor’s Red Team staff engages with the game design team.</td>
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</tr>
<tr>
<td>Incorporate the decision maker, sponsor or senior representative into Red player team.</td>
<td></td>
<td></td>
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<tr>
<td>Identify and document all jargon, areas of cultural difference, and potential conflicts of interest between the communities and stakeholders involved in the game.</td>
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<td></td>
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<tr>
<td>Assign honest brokers from external organizations to each player team.</td>
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<tr>
<td>Use an independent experienced wargamer (team?) to aggressively monitor game staff and cells to provide quality assurance of performance.</td>
<td>Use an independent monitoring team during the game.</td>
<td>B5, B6, B10 – B13</td>
</tr>
<tr>
<td>Use independent external analysts as monitors during the game.</td>
<td></td>
<td></td>
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<tr>
<td>Use a supernumerary data collector with analysis expertise to monitor data handling and collection.</td>
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<td></td>
</tr>
<tr>
<td>Proposed Mitigation</td>
<td>1st Level Clustering of Proposed Mitigations</td>
<td>Applied to 1st Level Clustering of Malign Characteristic</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Incorporate and recruit advisors from business and industry gaming, fraud investigators, and psychologists into the wargaming organization.</td>
<td>Expand DoD Wargaming Organizations perspectives and expertise by including SMEs from a wide variety of industries.</td>
<td>B1, B7</td>
</tr>
<tr>
<td>Provide outside industry perspectives to the wargame’s government and technical teams.</td>
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<td></td>
</tr>
<tr>
<td>Actively construct player teams using invited mix of military and technical experts; do not use “pick up teams” or people imposed from outside. Review teams with sponsor.</td>
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<td></td>
</tr>
<tr>
<td>Allow game directors to re-allocate players between teams if they see an imbalance or potential conflict of interest.</td>
<td>Retake control of the construction, mix, and quality of Player Teams from the Sponsor.</td>
<td>B4, B5, B9</td>
</tr>
<tr>
<td>Identify stakeholders with conflict of interest or predispositions to a desired game output and take these into account when allocating players and when analyzing and reporting game outputs.</td>
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<tr>
<td>Specify standards for players and enforce them. Do not accept pick-up teams or players imposed by Chain of Command. If this is not possible, document the lack of experience and its effects in the final game report.</td>
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<tr>
<td>Run multi-stage games and rotate players between cells between stages.</td>
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</tbody>
</table>
Summary Conclusions

Examining benign gaming provides best practices and lessons learned. However, every phase of wargaming, from initial contact between game sponsor and wargaming organization, is vulnerable to malign deception. At best malign deception is driven by the good intentions of influencers believing they are right and that anything that might contradict them must be avoided. At worst it is driven by careerism, corruption and hostility to other military communities and services. Examining malign gaming provides additional wargaming principles dealing with conflict of interest, intellectual fraud, self-deception, political imperatives and outright careerism. Malign games actively exploit the environment of time crunch, career pressure, resource constraints and the beliefs and opinions of sponsors, stakeholders and players, while poorly designed and executed benign games are exploited by this environment.

**External – Engage with the Sponsor and Stakeholders:**
- Ensure the event is a wargame with the possibility that Blue can lose and that Red can overcome the gamed concepts. Do not call non-game events “wargames.”
- Recruit, not invite, senior leaders to lead game cells to execute game as designed. Do not permit these leaders to derail the game in-stride to fit their non-sponsor agendas.
- Playtest the game with sponsor participation or with sponsor’s empowered action officers to ensure sponsor is paying proper attention to objectives and design.
- Immerse the players in the scenario and play. Include the sponsor and key stakeholders as Red players. Do not let the sponsor or key stakeholders play Blue or be Adjudicators.

**Internal – Work within the Wargame Organization and its Chain of Command:**
- Engage and use an empowered Independent Peer Review Board to examine objectives, assumptions, scenario and capabilities data, design, game play, adjudication, data collection and analysis.
- Minimize cognitive dissonance in the mind of the sponsor by ensuring wargame design and play is as consistent as possible with their preconceptions, while not allowing these preconceptions to drive objectives, design, game play, analysis or reporting.
- Conduct wargame forensics and reporting to provide actionable recommendations.
- Report ruthlessly and honestly, unencumbered by sponsor or stakeholder wishful thinking.

**Working Group II Papers**

In accordance with best practice for normative processes, after the meeting working group meeting members wrote short papers on “what validity and utility means for wargames.” The
papers run in length from an extraordinarily insightful single paragraph to several pages of valuable insights.\footnote{Authors retain full and sole rights to the content of their specific papers.} 

Gil Cardona  “Thoughts on Wargaming Validity and Utility” \hfill 49

Thomas Choinski  “Wargaming, Innovation and the Motivation to Take Action” \hfill 50

Stephen Downes-Martin  “Validity and Utility of Wargames” \hfill 52

John Hanley  “Validity and Utility of Pseudo-Experimentation Using Wargames and Combat/Campaign Simulation” \hfill 54

Frederick Hartman  “Validity and Utility of Wargaming” \hfill 70

John Lillard  “Thoughts on Malign Wargaming” \hfill 72

Roger Meade  “Wargaming Validity and Utility” \hfill 73

Peter Perla  “Thoughts on Wargame Validity” \hfill 74

Merle S. Robinson  “Ensuring the Validity and Utility of Wargames” \hfill 79

Vincent Schmidt  “Scientific Perspective of Validity and Utility of Wargaming” \hfill 81

Gary Schnurpusch  “Wargame Validity-Utility Thoughts” \hfill 83

Bill Simpson  “Validity and Utility of Wargaming” \hfill 86

Gene Visco  “Final Thoughts on Malevolence, Malfeasance and Misfeasance in Wargaming” \hfill 89
Validity is an imprecise measure of how well the wargame is designed to answer the central question and objectives. The measure of validity for Wargaming is imprecise because it is a much more complicated than a binary answer as to whether a wargame is valid or not. Most participants walk away from a wargame either feeling fed by their participation or wanting more. If the wargame sponsor, the key vote in terms of validity, leaves a wargame feeling fed and objectives met, then that wargame should be considered valid. Conversely, if the wargame is poorly designed or executed to where the central question and objectives are not met, then that wargame is not valid.

Wargame utility is simply a measure of how much work the results of the wargame generates upon post game analysis and “feel.” Wargames must not be conducted to serve as a vehicle for justifying pre-game perceptions but rather as tools to identify shortfalls, risks and topics that require further study. Wargames are fantastic vehicles for challenging assumptions and if after conducting a wargame participants “feel” as though their pre-game notions were challenged, then that is the mark of a useful wargame. Wargames cannot be treated as the culminating event for a particular problem set but rather another part of the cyclical process of plan improvement.
Working Group 2 (WG2) delineated the value delivered by current wargaming activities. Nevertheless, given the renewed interest in wargaming, growing research and its role in helping to navigate through today’s complex emerging geo-political situations\(^1\), WG2 would benefit by highlighting the value delivered from another vantage point. The accelerated adoption and diffusion of innovation in the Department of Defense (DoD) serves as this vantage point.\(^2\)

Decision-making assumed a privileged position during WG2’s value-based discussions on wargaming, yet decision-making does not fully address return on investment (ROI) concerns for all wargaming events. The motivation to take action serves a privileged position for wargames focused on innovation. Decisions without the motivation to take action remain dormant. The adoption and diffusion of innovation requires action. The human situational interaction fueled by wargames stimulates the motivation to take action that delivers a ROI.

Scholarly research indicates that the motivation to take action derives from four levels of human interaction engendered by wargaming, two levels external to the wargame and two levels internal to the wargame.\(^3\) The first level of external human interaction occurs when stakeholders and game designers formulate the purpose of the game by defining the problem. Identification and delineation of the problem provides an initial return on investment. Two levels of internal human interaction lead to other returns on investment. The first level of internal human interaction occurs when participants prepare for the wargame. Wargames staged to advance innovation require participants to assimilate new technologies, as well as operational concepts to employ them. In addition, participants conceive novel concepts of operation throughout the conduct of the wargame within the second level of internal interaction. They also purge inferior courses of action while shaping technologies and distinguishing concepts for external action. The second level of external human interaction entails the selection and communication of alternative courses of action to work up within the “circle of research,” i.e., prototyping, experimentation, etc. These external actions provide ROI by helping stakeholders navigate their way forward and through complex emerging geo-political situations. Human interaction characterized by the engagement between the four disparate communities that shape technology (science/engineering, acquisition, doctrine and warfighting end use) improves ROI. Wargames help stakeholders formulate problems; moreover, wargames chart plausible courses of action to act on.


Human interaction and the ensuing motivation to take action assume a privileged role when activities in the DoD conduct wargames focused on innovation. Participants and stakeholders must take action on the courses of action distilled from the wargame to achieve the return on investment for the accelerated adoption and diffusion of innovation.
Stephen Downes-Martin  
“Validity and Utility of Wargames”

A. What does Validity and Utility mean when applied to wargames?

**Validity** means the wargame had the following characteristics:

- It had objectives that were suitable for gaming
- The game design was tailored to the objectives
- The game was executed according to the design
- Other characteristics (for example suitability and expertise of players, agendas not being imposed, adjudication based on reality and not wishful thinking) are part of the game design.

**Utility** means the wargame had the following three characteristics:

- It informed national security related decisions in a way that enhanced mission success, i.e. increased the probability of achieving the objectives of the decision at some combination of reduced cost, casualties and time
- It was accepted by the sponsor or other senior leaders as valid
- Senior leaders acted on the information from the wargame(s)

B. What were the characteristics that lead to success of past games “that made a difference?”

Not all of these are present at the same time:

- In general, the absence of pathologies as listed in the literature
- Senior leaders were facing real death and destruction in the real world
- Senior leaders, real planners, and decision makers played the game, and were allowed to lose
- Highest ranking officer played Red
- Game was repeated and refined multiple times, not a “one-off”
- Senior leaders played many games and played in repeated games. They became skilled at playing and saw the link between the games and the real world.
- Senior leaders focused on results, not avoiding embarrassment (to themselves or their communities)
- Games focused on decision making process, not on specific decisions
- Games linked warfighters, science & engineering, doctrine and acquisition
- Games were not in a vacuum; they linked to analysis, conferences, and other activities.

C. What additional characteristics might be in play today and in the future?

- Computers are used and abused more, and there is an institutional bias by DoD against wargaming in favor of exotic and expensive technology that is encouraged by contractors with financial interests involved. The flip side of that are lazy processes -- such as brainstorming -- being promoted as wargaming by contractors and accepted by DoD because they are fast and not intellectually hard.
Psychology of gaming and decision-making is better understood now, but the results of the research are not being explicitly incorporated into wargame design to the same level of skill that similar, or analogous, knowledge is used by video game designers. Wargaming needs to catch up.

D. What is a “Malign Wargame?”

A malign game is one that deceives the sponsor into thinking it is valid, into acting on the game’s insights, but those insights lead to reducing mission effectiveness. This is not a game that is poorly designed and the sponsor is ignorant or unintelligence, this is a game that fools the intelligent, dedicated and experienced leader into making mistakes.

The hypothesis is that the opposite of a “valid and useful wargame” is not an “invalid and not useful wargame”, it is “a wargame that appears valid and deceives the decision maker into making poor decisions based on the game.” Looking at valid and useful games gives us characteristics to seek and behaviors that interfere with those characteristics to avoid. By looking at wargames that are deliberately designed to be malign and deceptive, we may identify additional characteristics to explicitly avoid in wargame design that are not obvious from looking at a list of characteristics to seek.

Risk factors for malign games do not mean the game is malign, just that these factors must be examined in case the game is malign. Unfortunately, malign games do not come with a label! Some risk factors are:

- Game sponsors or Players are under career pressure for results
- Game sponsors or Players think they already know the answer
- Game is a one-off, or hard to repeat
- The game sponsor or other stakeholders are on the adjudication team
- The game sponsor or other stakeholders are on the (only) analysis team
John Hanley
“Validity and Utility of Pseudo-Experimentation Using Wargames and Combat/Campaign Simulation”

Pseudo-experimentation involves improving understanding and exploring innovations using a simulated “world”, rather than the real world. As computers have become more powerful, Military Operations Research has uncritically adopted computer simulation over gaming as the principal means for informing resource allocation and operational decisions in the belief that it is more valid and useful. Computer simulation even displaced much of the analytical effort involving observation and analysis of operations in the field, which provided the origins of Operations Research. This paper offers some cautions regarding the valid use of large combat/campaign simulations and perspectives on the power and limits of games to promote a new conversation on the subject.

Validity of the Simulation
Games such as baseball have key features of competition:

- Teams
- Terrain (field features)
- Choice (batting and fielding lineups, pitch choice, play choice, plays, swing or not, etc.)
- The information available when making a choice (outs, strikes/balls, private signs to the pitcher and batter, etc.)
- Sequences of moves (strikes/balls, home and away, innings, etc.)
- Strategy; the selection of courses of action (small ball/long ball)
- Outcomes of each move describing the state of play (outs, runs, hits, errors, etc.)
- Overall pay off (win or lose)

Games also have rules that affect the play and umpires to oversee the rules. Some rules are firm and well understood, others are firm and not well understood, and some are conventions (e.g. stealing bases when leading by a large margin is frowned upon).

War – acts of force (increasingly gray) to compel one’s enemy to do one’s will – has the same key features as games. However, each feature is more varied, and the rules are subject to change with fewer effective enforcement mechanisms.

In addressing the validity and utility of wargames, the implicit questions are “for what purpose” and “compared to what?” Games used strictly for training presume that the questions and correct answers are known. They are used to rehearse actions and determine the extent to which the players know the answers to contingencies that have accepted solutions. More interesting is the use of wargames to explore strategy, operations, tactics, and DOTMLPF-P for anticipated
contingencies or to explore future alternatives to existing systems and practices. Since one cannot experiment by conducting wars, wargames and combat/campaign simulations provide means for conducting pseudo-experiments using a simulated “world.”

Both computer and game simulations begin with a complex reality – the real world. Those observing this “world” use their perceptions and beliefs to create an abstract conceptual model of the competition that forms the basis for simulation. The first question regarding validity is the extent to which the simulated “world” captures relevant features and accurately represents phenomena of the real world. Are the actors (including nature) who affect outcomes of the competition represented? Does the simulation capture terrain that will affect choices and outcomes? Are actors allowed the choices that they could make in the real world? Do the actors have the information that they would expect to have in the real world? Are the rules governing the outcomes of actions accurate? Etc.

Objectivity and rigor are attributes of validity. Objectivity is a result of inter-subjectivity; i.e. all using their subjective perceptions in observing an object agree on its attributes. For example, observers could observe a coffee cup and agree upon its color, size, weight, etc. The validity of games are enhanced by having teams of subject matter experts involved in the design, play, adjudication, and findings from a game who can question aspects upon which they agree and disagree to arrive at more objective judgment. A way to check the objectivity of campaign and combat simulations is to have different teams model the same contingency, or have a team use different models. Should different teams model the phenomena the same way, their simulation satisfies the criteria for objectivity. Should they differ substantially, their simulated “world” is not objective. Analytic teams using more than one model on the same problem have benefited from learning considerably more about the problem, and the models and modeling assumptions within them, than they learned from one model. Simpler models amenable to manual calculation, such as Salvo Equations, can be understood widely, whereas computer models involving thousands of variables require independent review to meet objectivity standards for validity. One must carefully question the validity of proprietary simulations.

Rigor requires using appropriate precision, not more precision. As Aristotle said, “A well-schooled man is one who searches for that degree of precision in each kind of study which the nature of the subject at hand admits.” Appropriate precision depends upon the nature of the indeterminacy involved in the phenomena being simulated.

Combat/campaign simulations using mathematical models are either deterministic or stochastic. Deterministic models typical of the exact sciences provide point solutions/predictions. Probability distributions provide the solution/prediction for models of phenomena involving the

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1 DOTMLPF-P is doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy.
statistical/stochastic indeterminacy associated with random variables. Indeed, to save calculations and time many models are pseudo-deterministic in that they use expected values as a statistic to characterize otherwise random phenomena rather than Monte Carlo or Markov models that select values of random variables from the probability distribution the phenomenon or state of the “world” modeled during each run.

Frequently modelers add detail to make their models of the “world” more accurate. Rarely does one see an estimate of the variance or deviation of the possible results. An estimate of the deviation in outcomes of a quantitative model is the error of a typical variable times the square root of the number of variables. For example, an analyst using a computer simulation with 5000 random variables having an error of about 10 percent can be confident that the answer is accurate within a factor of about 7.\(^3\) Figure 1 illustrates how adding variables actually adds to the deviation in possible outcomes when striving to increase the accuracy of the model and suggests that fewer variables provide the greatest accuracy, in addition to being easier to understand.

Figure 1: Accuracy of Combat/Campaign Models

Finding accurate data to use in combat models is challenging. Dean Emeritus Wayne Hughes (Captain, USN Retired) provides comparisons of data from structured exercises to combat data illustrating factors of 3, 5, 7 or more between the results. And then factors such as the timing and rate of interactions, the speed with which an enemy can react, the effects of an enemy’s readiness and training, etc. are largely unknowable.

Work on deterministic chaos and complexity over the past several decades has shown that human behavior is not random. It occurs in bursts and follows power laws. Power law distributions challenge typical statistical approaches in that one can calculate a mean, but the standard deviation is infinity. The law of large numbers does not apply. This further complicates estimating confidence factors for models using expected values.

John von Neuman and Oskar Morgenstern developed a theory of games and economic behavior to deal explicitly with the strategic indeterminacy resulting from the choices of multiple actors. Unique solutions in Game Theory are rare. Most solution concepts provide sets of solutions. These sets involve equilibria for discrete choices and core sets for choices involving continuous variables. Statistical/stochastic indeterminacy may be embedded in the game, adding to complications for calculating solutions and representing predictions.

Table 1 (see next page) summarizes these types of indeterminacy, specifications for calculation, Operations Research techniques, and solution characteristics. In general, as indeterminacy increases, detailed analysis is useful for eliminating infeasible solutions, but cannot provide a point prediction. Once infeasible solutions are eliminated, selection of a particular solution is a matter for the decision maker, not the analyst. Inaccuracies in any specifications – particularly those misrepresenting the nature of the indeterminacy inherent in the phenomena modeled – erode the rigor and validity of the model.

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4 Hughes, (2012). Prediction: An address to the Military Application section of INFORMS.
Table 1: Techniques for the Resolution of Indeterminacy

<table>
<thead>
<tr>
<th>Nature of the Subject</th>
<th>Deterministic</th>
<th>Statistical Indeterminacy</th>
<th>Stochastic Indeterminacy</th>
<th>Strategic Indeterminacy</th>
</tr>
</thead>
</table>
| **Features**          | 1. State space clearly defined  
2. Persistent data  
3. Units of measure understood  
4. Relationships determined  
5. Initial state known | 1. State space clearly defined  
2. Persistent data  
3. Units of measure understood  
4. Probability distributions known | 1. State space clearly defined  
2. Persistent data  
3. Units of measure understood  
4. Relationships determined  
5. State transition probabilities & rates known, and are Markovian | 1. Conflicting interests  
2. Players specified  
3. Information conditions specified  
4. Probability distributions for “moves of nature” specified  
5. Player tastes and beliefs known  
6. Players consistent and logical (rational) |
| **Techniques**        | Mathematic Analysis and Programming  
Monte Carlo, Regression, Analysis of Variance | Markov, Monte Carlo | Game Theory |
| **Solution Characteristics** | Unique solution  
Unique distribution | Unique distribution | Nash Bargaining set (2 players)  
Core of solutions (≥2) |

Deterministic and statistical/stochastic models and Game Theory require well-specified problems to formulate predictions and rarely admit learning and adaptation.\(^5\) Deterministic and statistical/stochastic models embedded in a simulation require a rational means for incorporating human variables. Wargaming and rehearsal of concept exercises have been used effectively to inform the representation of human decision in some computer-based campaign simulations.\(^6\)

Warfare is in a class of phenomena involving “wicked problems” with large measures of structural indeterminacy. In wicked problems, the boundaries of the problem, the elements included within, and the relationships between those elements are poorly understood. Analyzing wicked problems first requires a theory of the phenomena under study. As Clausewitz wrote:

\(^5\) Bayesian approaches are an exception, but are difficult to implement in large scale models.
Theory will have fulfilled its main task when it is used to analyze the constituent elements of war, to distinguish precisely what at first sight seems fused, to explain in full the properties of the means employed and to show their probable effects, to define clearly the nature of the ends in view, and to illuminate all phases of warfare through critical inquiry.7

Combat and campaign outcomes depend upon many, varied interactions with feedback and learning. Campaign analysis as taught by Wayne Hughes at the Naval Postgraduate School, Operational Design developed by John F. Schmitt and adopted in Joint Operational Planning, and scenario planning are techniques for articulating a theory to simulate “worlds” for pseudo-experimentation.8

 Whereas combat/campaign simulations reduce elements of a complex contingency to a set of cause and effect relationships, games synthesize interrelationships between participants and features of the contingency under study. Interaction of participants enhances the objectivity of games in ways rarely achieved through the interaction of teams of analysts.

Games provide a bridge for bringing together embedded deterministic, statistical, and stochastic phenomena for adjudicating outcomes of player’s choices and expose aspects of structural indeterminacy not previously appreciated. Like other forms of inquiry and analysis involving large measures of indeterminacy that eliminate infeasible solutions, gaming historically has been useful in exposing infeasible, inadequate, unacceptable, or incomplete courses of action when faced with an intelligent adversary; in exposing factors that will govern successful strategies; in enriching an appreciation of logical adversary courses of action; and in exposing knowledge required for better planning and analysis.

Repeatability and Validity

Distinguishing between a game and a play of the game is important when discussing the validity and utility of game and combat/campaign simulations. The distinction is akin to discussing the game of baseball and the Yankee’s/Astro’s game on 18 October 2017.

Superficially, computer simulations appear to be more objective than games, and thus their results more valid. Different analysts can run a computer simulation with the same input and repeat the same output whereas multiple plays of a game will produce different outcomes. In games, different players will make different decisions, and even if the same players are in the

lineup, they will learn from their previous play and make efforts to improve their performance. The fact that the game is not repeatable does not reflect on the validity of the game. Have any two baseball games ever been exactly repeated? No war has. Since wars and battles never repeat, can a computer simulation that always produces the same outcome be said to be a more objective, and thus valid, representation of competition and cooperation than a game?

Models involving non-linear dynamics, such as Lanchester equations, exhibit deterministic chaos where the minutest difference in inputs will produce wildly different outcomes over time.9 Though the model is deterministic, the outcomes are chaotic. Weather models are an example of how such models can provide only short-range predictions. The solution space is an attractor. Statistics on attractors is an open area worthy of more research for understanding how frequently nearby the system will be in nearby states, given that they never repeat.

Whereas combat/campaign simulations reduce elements of a complex contingency to a set of cause and effect relationships, games synthesize interrelationships between participants and features of the contingency under study. Interaction of participants enhances the objectivity of games in ways rarely achieved through the interaction of teams of analysts.

The validity of a play of the game, or the calculation of a model, depends upon whether design/rules of the game were followed. A game where one of the teams “threw” the game by making mistakes to allow the other team to win invalidates the game. Similarly, participants in wargames whose objectives differ from game objectives and are reflected in their play invalidate the play of a wargame. The validity of a calculation also requires that rules of mathematics and logic be followed correctly. One may have created a valid game or computer model “world” for pseudo-experimentation that is executed invalidly.

Though a game played only once follows one set of players’ decisions and adjudications describing a course of action for each team, the participants in the game discuss, make and observe the wisdom of each decision at each move. Thus, while playing one course of action, they explicitly and implicitly consider many branches.

Historically games played only once have been very useful for highlighting factors that govern the outcome of a battle or campaign; even though one play of a game can no more predict a specific outcome any more than one play of a baseball game can predict the score and player injuries of a following game. As with computer-based combat/campaign simulations pseudo-experimentation, the validity of lessons taken from a game depends upon accurately characterizing the precision of the results.

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Utility of Pseudo-Experimentation

Utility of Games

For centuries, militaries have found games useful for exploring and developing courses of action, developing concepts for future forces, and familiarizing officers and troops for warfare. More recently, the non-military use of gaming has grown.

Gaming has demonstrated predictive value. Early gaming at the Naval War College anticipated tactics and predicted the outcome of the Russo-Japanese war. Russian and German gaming in planning operations in World Wars I and II accurately identified opportunities and weaknesses realized in subsequent operations. German and Naval War College gaming between is legendary for anticipating the character of future campaigns, developing operational schemes, and promoting the development of technology and systems to conduct the campaigns. During the war in Vietnam, the U.S. Joint Staff’s Strategic Analysis and Gaming agency anticipated the Tet offensive, though it did not affect how national command authorities pursued the war. Many other examples exist.

Beginning in the 1980s, the Chief of Naval Operations’ Strategic Studies Group used gaming as its primary technique for exploring shortfalls in existing war and contingency plans and developing alternative courses of action in the form of innovative strategic and operational concepts and tactics. Their work in 1981-1983 quickly changed war plans and informed the Maritime Strategy. To explore future U.S.-Soviet relations after the fall of the Berlin Wall, in February 1990 the Group conducted a wargame based on an Iraqi invasion of Kuwait and Saudi Arabia. Though the Red team had to work from first principles rather than follow previous scripts, the game accurately anticipated factors driving the Soviet response. It also highlighted operational issues involving strategic lift for U.S. and coalition forces, the Navy having too few precision weapons, and others that occurred as forces deployed for operations beginning in July 1990. Having been reassigned to a battle group in the Persian Gulf, the SSG’s intelligence officer sent back for the game books he had prepared, which had better intelligence than he was able to obtain in theater.

In the early 1990s, the Group exploited a “path gaming” technique employed by Mr. Andrew Marshall at the Office of Net Assessment in the Pentagon (along with Royal Dutch Shell scenario planning techniques) to anticipate the security environment 20 years into the future. While predating the general use of the term “cyber” and specific terrorist groups like Al Qaeda, this work accurately anticipated trends informing the development of naval capabilities. Given the mission of naval warfare innovation in 1995, the Group used gaming to develop operational concepts for future fleet architectures and weapons using emerging technologies that are just coming to fruition today. The Chiefs of Naval Operations always encouraged the Group to be

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innovative. The Group used a saying attributed to T.H. Huxley that: “Every new idea begins as heresy and ends as superstition.” They found that time from heresy to common wisdom took about five years for operational concepts using existing forces and at least ten years when they proposed developing new force structures and weapons; e.g. unmanned vehicles, rail guns, etc. The Naval Postgraduate School has also used gaming to explore alternative fleet architectures.

Again turning to Clausewitz:

*It is immensely important that no soldier, whatever his rank, should wait for war to expose him to those aspects of active service to amaze and confuse him when he first comes across them. If he has met them even once before, they will begin to be familiar to him.*

The value of wargaming at the Naval War College and by the German Wehrmacht for preparing officers for World War II is part of the legend. Though the games did not anticipate tactical details such as kamikazes, torpedoes, and radar, and could not anticipate atomic weapons, they did present many features that prevented surprises during the course of campaigns.

U.S. Joint doctrine calls for staffs to prepare alternative courses of action (COAs) for the adversary’s most likely and most dangerous potential COAs, if time is available, along with a set of criteria for assessing those COAs. Knowing what the adversary could do to achieve its objectives, and which is “most dangerous” is often difficult to discern before conducting games, as the adversary must consider difficult tradeoffs often not apparent without more careful analysis from its perspective. Schmitt and Kline have documented that commanders and their staffs rarely have the time (or interest) in gaming multiple adversary COAs in the preparation of any single contingency plan even when conducting deliberate planning, and in actual crises often have time only to rehearse their concepts mentally. The authors’ experience at a combatant command is that higher authority prescribes planning scenario, the commander provides the strategic concept and, and the staffs involved in planning for large contingencies have time to explore only a few variations of the many prescribed planning assumptions.

Rather than tasking staffs to come up with multiple COAs, Ross, Klein, et al. recommend a Recognitional Planning Model (RPM) as a more natural and faster way to arrive at adequate, feasible, acceptable, distinguishable and complete courses of action. The commander provides

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13 Joint Publication 5-0, V-35.


15 Joint Publication 5-0 calls for COAs with these “characteristics, V-28/29.
the initial COA for analysis, rather than the staff generating alternatives for the commander to consider. Alternative COAs, if needed, are derived in overcoming problems discovered when assessing the initial COA, rather than arbitrarily creating multiple COAs. The analysis shows that “the commander’s knowledge, training, and experience generally help in correctly assessing a situation and developing and mentally wargaming a plausible COA, rather than taking time to deliberately and methodically contrast it with alternatives using a common set of abstract evaluation dimensions.” The RPM process also involves fewer steps and in evaluations has reduced planning times by 20-30 percent with no apparent loss in effectiveness of the resulting plan. The Chief of Naval Operations’ Strategic Studies Group used the approach recommended by Schmitt and Kline in conducting a series of orientation, concept exploration, and concept evaluation games in their studies. Recent doctrinal publications have adopted some aspects of the RPM process.

A key feature of both the doctrinal and RPM processes is the importance of who participates in the wargaming. Joint Publication 5-0 recognizes that gaming is most effective when the people making decisions participate in gaming. Wargaming provides a common understanding that allows them to determine the advantages and disadvantages of each COA and forms the basis for the commander’s comparison and approval. Wargaming stimulates thought about the operation so the staff can obtain ideas and insights that otherwise might not have emerged. If time is available, where those involved in the planning and operations are not participants in the gaming, some means for efficiently transferring the experience derived by the gamers to the planners and commanders is required.

As in baseball, multiple plays of a game can produce some statistics. These can be valuable if the game is simple enough. However, the utility of multiple plays of a wargame is to understand the strategic indeterminacy created by the interaction of players selecting different courses of action. Drawing from Game Theory, one useful way to represent multiple plays of a game is in the form of a game tree with each branch showing the choices that the players made and the consequences of those choices on each move. Playing the game many times provides an extensive game tree filling out many courses of action and amenable to analysis of strategies that dominate or result in equilibria (where no team could improve the consequences to itself). Analysis of such trees can highlight equilibria where none of the actors can improve their outcome by selecting another course of action. The objective is not play that repeats the same strategies by the players, but to develop a greater appreciation of strategies that the players may use. Cultural norms, doctrine, doctrine,

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17 For example, see TRADOC Pamphlet 525-5-500 (January 2008). The U.S. Army Commander’s Appreciation and Campaign Design, Version 1.0, 28, and the discussion of operational design in JP 5-0, Chapter IV.
18 Joint Publication 5-0, V-32.
19 The absence of equilibrium suggests opportunities for deception.
training, etc. will constrain choices the players make. Understanding this, and the consequences of violating such constraints, enhances the utility of gaming.

Gaming stimulates creativity through play in a safe environment and discovery of approaches that were unknown or unanticipated. A strength of gaming is that it promotes innovation, even in training exercises, by suggesting alternatives to existing DOTMLPF-P, tactics, operations, and strategy. Wargames provide a forum for the integration of ideas. The representation of the contingency on maps and through supporting information provides a concrete experience that allows players to know they are talking about the same situation. The communication allows the derivation of statements that are beyond logical dispute. Games provide military officers experiential learning about the military geography, their own and adversary organizations and weapon capabilities, and likely consequences of alternative courses of action in more tangible ways than reading and memorization could provide.

Studies on the value and power of **play** show that playing games enhances creativity, communication, and understanding complex behavior governed by social rules. The studies and experience Duke and Guerts (Duke & Guerts, 2004) in conducting policy games for strategic management in a hospital, a rail corporation, the technical components industry, etc. support their assertion that gaming is a powerful method for simultaneously mastering complexity, enhancing communication, stimulating creativity, and contributing to consensus and a commitment to action.

Immersing the participants in the play of the game makes it more useful both to the players, and those observing the play of the game. The shared, concrete experience of a game facilitates consensus and the commitment to action. Having those responsible or influential in making decisions participate in a game provides a major advantage over analyses that must be reduced into a report and explained to decision makers.

**The Utility of Combat and Campaign Simulation**

Several centuries ago, Newton and others transformed science with the new idea that rules based upon mathematical equations could be used to describe the natural world. This scientific approach emphasized breaking a system down to define its underlying parts, and then trying to analyze these parts in as much detail as possible. Mathematical formulas predicting outcomes could then find out how the system behaved by running an experiment and watching what happened. This use of mathematics underlies the extensive advances in physics, many other sciences, and engineering over the intervening centuries. As the speed of computer calculations has increased, so too has the importance of mathematical modeling in predicting outcomes and understanding complex systems.

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21 Google TED talks on play for a series of talks on useful research.
22 See Richard D. Duke and Jac L.A. Guerts (2004). Policy games for strategic management, Amsterdam, Dutch University Press for an extensive discussion of these attributes and the supporting research.
23 These parts are the state variables of the system that are necessary and sufficient to predict the future trajectory of a system.
has increased exponentially over the past several decades, experiments run on computers have increased an understanding of the value and pitfalls of mathematically modeling systems in ever-greater detail; and that simple, non-mathematical rules-based models can better simulate biological behavior.24

In the 18th century, the “enlightenment” fostered by science, led to a “vogue of mathematics” in military planning. Wargaming largely displaced this fad in the 19th century. Operations Research groups in World War II expanded the use of mathematics in developing models of phenomena they observed and predicting the effects of alternative tactics, techniques, weapons, and operations.25 Their mathematical models could be calculated by hand. They advanced topics such as search theory to the point of becoming operational decision aids. To deal with uncertainties inherent in their models, the U.S. Operations Research Group in World War II emphasized “hemibel thinking”; recognizing that improvement in the operations was unlikely unless the theoretical result from their analysis was at least a factor of three better than that observed.26

Following World War II, simulation using both wargames and computers became important to provide synthetic experience to prepare for conflicts using nuclear weapons and traditional warfare. Models and techniques developed by the Operations Research Group formed the foundations for establishing Operations Research as a discipline focused on mathematical modeling, mathematical programming (linear, non-linear, dynamic, etc.) and stochastic processes. As the Operations Research discipline advanced, so did the sophistication of the models used in combat/campaign simulations and to adjudicate outcomes in wargames.

Secretary of Defense Robert McNamara’s demand for cost benefit analysis and creation of the Systems Analysis Office in 1962 led to the use of Operations Research techniques for cost-benefit analysis before acquiring new platforms and weapons systems. In the late 1960s and early 1970s, military modelers concentrated on modeling combat and logistical processes as though they were physics problems. As computer speeds increased exponentially with Moore’s Law, these models were aggregated into ever more complicated campaign simulations, losing sight of the Operation Research Group’s cautions and methods for estimating confidence factors.

Combat and campaign simulations allowed analysts to compare alternatives quickly. They also met senior decision makers’ desires to have a staff process where scenarios for analysis could be specified and analysis conducted on a cycle responsive to annual budget and program submissions to Congress. Unfortunately, these desires led to the search for universal answer machines allowing merely varying inputs into the same model “world” to provide outputs that would drive, and ideally in the minds of the DoD staffs, specify decisions. Turning wargaming

into a staff process encumbered by centralized standards would greatly reduce any benefits that wargaming could provide.

Competition between military services over scenarios, data, models that better supported their acquisition programs led to rapid expansion of the defense consulting industry in 1970s and 1980s, fostering significant commercial interest in modeling and simulation based upon the modeling paradigm that had been created earlier: creating a positive feedback for ever larger computer-based simulations. Secretary of Defense Donald Rumsfeld created an Analytic Agenda to provide more discipline to a process that was producing huge quantities of analysis, but affecting few acquisition or other resource allocation decisions. His successor Robert Gates found the system that had emerged unresponsive to the needs of ongoing wars. When Ms. Christina Fox became Director of the Cost Assessment and Program Evaluation Office in 2009, she began deemphasizing the use of large campaign simulations.

Though large campaign simulations have a poor performance record, more tailored models and calculations embedded in wargames have been more useful. At the Naval War College in the 1980s, military officer umpires in wargames became proficient in using individual models for their warfare area. Trained primarily on the job, they came to know the limits of the models for calculating platform interactions resulting from player decisions and applied their judgment to adjudicate outcomes for situations falling beyond the bounds of the model. In annual Global Wargames, each military service employed its own models for adjudicating warfare in its domain.

The end of the Cold War led to a hiatus in classical naval combat. The models in the Enhanced Naval Wargaming System designed for fighting canonical battles involving traditional naval forces were inappropriate for adjudicating conflicts such as those in the Balkans, Iraq, and Somalia, or dealing with terrorism. As games at the Naval War College turned to these conflicts, the expertise required to use the models in the wargaming system dissipated within one cycle of military officer umpire assignments, about three years. With the prospect of classical naval combat, with some hybrid characteristics, returning, the Naval War College turned to addressing adjudication as part of each game’s design and now has many officers assigned to adjudicate their warfare areas. This has the advantage of tailoring adjudication to each game, but forfeits capturing the latest theories of naval combat in formal models that are tested in fleet exercises and operations.

Primary strengths of combat models are in representing testable quantitative theories of combat and the deep learning that accrues to the analytical team as it goes through the process of making judgments in the formulation of the model, efforts to validate data, and contrasting model results to existing intuition regarding causes and effects.

Summary

In contrasting the validity and utility of wargames and combat/campaign models for exploring courses of action for military operations and preparing forces and organizations, each has its strengths. Combat models are most useful when they involve physics, such as passive search where the object being sought is not reacting to the sensor and logistics not involving enemy
interdiction. Should strategic indeterminacy resulting from adversary and/or ally action significantly affect the outcome, gaming is both more valid and useful.

The ludic – play – aspect of gaming involving military officers having current or future roles in making decisions regarding the subject under study also provides significant advantages over analysts’ reports that the decision maker must interpret and weigh. Analysis reduces the abstraction of the “world” to distinguished causes and effects. Computational limits prevent using feedback in combat models. Games address the admittedly truncated “world” as whole. Feedback is natural. Communication in games between the participants is enhanced by the concrete context. Communications between analysts and decision makers cannot replicate the experience of a game. Creativity in computer simulations is limited by the skills of the analytical team, where the interaction of memes in games creates new ideas and shorthands for communicating those ideas. Finding examples of extensive analytical efforts affecting major resource allocation decisions is rare, where history is replete with games creating a consensus and commitment to operational courses of action.

Wargames conducted by senior military staffs have been less successful in changing policies of the political leadership once they were committed to a course of action. The momentum of the military-industrial-congressional enterprise (MICE) slows implementation of innovations resulting from wargames. However, U.S. Navy and German wargaming between the world wars led to the development of alternative forces and operations and, given a chance, can do so again.
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Frederick Hartman  
“Validity and Utility of Wargames”

What does validity and utility of wargames mean when applied to wargames?

Determining the validity and utility of wargames is very different from the work MORS did in the early 1990s determining the methods for validating models, simulations and other analysis tools. Most evident are the wide differences in design, purpose, and intended use of wargames. Additionally, the psychological and human variances that are key in most wargames are not “repeatable,” making a validation tenuous at best until final game products are determined. There has been a strong push by MORS for several decades to strive for better verification, validation, and accreditation (VV&A) of models and the certification of data. MORS developed specific definitions for each of these terms as they applied to models and simulations. The application of VV&A to models and their input data is fairly straightforward compared to assessing the validity of a wargame. Unlike the use of models and data supporting analysis, wargaming presents challenges when using “standard, defined terms” such as validity and utility, which might mean different things in the context of different functional practitioners. Those terms may be discoverable only after completion of the game. Many large military operational analyses may employ some type of wargaming to establish scenarios, set force requirements, determine needs for logistics, or even require materiel acquisition and force structure tradeoffs, etc. In one such analysis a “business game” was employed to determine alternative acquisition and support alternatives. The ability to “validate” wargames is not as simple as for some other tools, especially when they are included as key decision inputs in large Defense studies and acquisition programs. However, a good list of characteristics has been introduced in this report and is a good reference to plan for a “valid” wargame.

Wargaming as an analysis tool has a wide variety of uses that can radically impact game design and the desired outcomes. Sitting in with expert gamers during our Group 2 sessions was very educational and has prompted the conclusion that validity and utility of specific wargames is achievable only after the games are accomplished, although in a piecewise fashion each of the game processes may be deemed valid for the final game and product(s) may be deemed “not valid” for its intended objective(s) and use.

The utility of wargames also provides a diverse set of considerations. For instance, when the game objective is training, the process of walking through the wargaming might be more valuable in satisfying learning objectives than the resulting game products. Several of the senior plenary members warn that a certain significant number of the wargames may be more psychological in nature as opposed to quantitative. Such variation in wargames causes the outcomes to be more variable and not absolute in nature. The validity of a wargame may be keyed to the senior decision makers (sponsor?) perception of the credibility of the trusted players or direct participants that influence those very products.

What were the characteristics that led to the success of past games that “made a difference?”

One of the most important elements is communication at each major phase of the game to validate the emerging products with original game objectives. It is therefore important to include
the involvement of senior decision makers (or trusted agents) at each significant phase to allow peer or independent review on a continuing basis during the wargame.

*What additional characteristics might be in play today and in the future?*

There will be changing requirements that will dictate each element of the game process, the characteristics, and perhaps even change the complete nature of gaming due to psychological, or technical innovations, tools, and understanding. The time spent by Team B on malign games is valuable at several levels. One should remain aware that a clever, experienced gamer with malign intent can introduce elements that move away from validity at any phase of the game. One must therefore remain constantly alert to check that the characteristics of a valid game are visible through the process and adhered to by the leader and sponsor.
John Lillard
“Thoughts on Malign Wargaming”

A good analogy to explain malign wargaming:

There are two ways to build a metal fitting. You can either machine it from a block of metal or cast it using a mold. Group A’s work (benign) was like machining, while Group B’s method was like building the mold for a casting. B’s product is the negative of A’s, but in the end both should result in the same shape of an object.

“Malign wargames” occur when the game sponsors cannot or will not provide the resources and/or priority that the game needs. “Resources” in this case means the time and the experts to do the game design, the sponsor involvement in communicating the vision, the immersion of the players, and the time to post process result.

One of the biggest insights gained from the session was the concept of player immersion. If players are immersed in the game to the extent that they would be if it were a real situation, then their actions would correspond more accurately to the real thing. If they allow themselves (or are allowed) to be distracted during the course of the game by things like taskers from their offices, long periods between moves, and the perception that the game isn’t a high priority for the sponsor, they won’t perform properly.

The current DoD wargaming environment (especially inside the beltway) is one characterized by:

- Compressed timelines
- Limited budgets
- Overtasking of staffs
- Career progression pressures
- Bias for quick answers or responses
- Preconceived notions / opinions
- Strong personalities

All of these characterizations contribute to malign games. They can only be overcome by strong commitment and leadership from the project sponsor; commitment to providing resources and prioritizing the game; and leadership setting an example of immersion in the game and abiding by the results.


Roger Meade  
“Wargaming Validity and Utility”

**Validity** – A valid wargame includes a number of key elements. First and foremost, it must address the stated objectives outlined by the Sponsor. The game design team should guide the process of developing game objectives, as they understand the capabilities and limitations of wargames. If the game does not adequately address the objectives it is unlikely that the stakeholders will accept the results. Second, a valid game is built on valid assumptions. Assumptions are the foundation upon which the entire game is built. If the assumptions are invalid, the game will be invalid. This does not mean that the assumptions must be realistic, nor even plausible; they only need to be possible. One of the most valuable aspects of wargaming is the ability to examine improbable situations and consider issues from a fresh perspective.

The perception of validity of a wargame by stakeholders is critical – without it, the insights gleaned from the game will be wasted. A draft version of the workgroup out brief included a quote by Upton Sinclair that observed “It is difficult to get a man to understand something, when his salary depends on his not understanding it.” I was disappointed that this quote did not make it into the final draft as I think it perfectly captures the challenges facing game designers when trying to develop an intellectually honest game that meets the needs of the sponsor and stakeholders. It is a delicate balancing act, as I think it vital to win the support of the game sponsor, without pandering or allowing their institutional and cultural biases to influence the structure, and ultimately the trajectory, of the game.

**Utility** – It does not matter how valid a game is if the results are not useful to the sponsor and stakeholders. When assessing utility, we must begin by asking “useful for what purpose?” As with “validity” our starting point must be the game objectives. A valid game may prove useful in teaching players important lessons or may provide important insights. However, if the game results cannot satisfy the requirements of the sponsor then the game has failed to achieve its objective.

A second critical aspect of utility is whether the game results in some sort of concrete action. The “action” produced by the game can occur either during, or subsequent to, game execution. For example, a game designed to train or educate, produces action (i.e. training/education) during play, while a game developed to examine a question might produce concrete action with its output. Again, it is critical to accurately define what the sponsors expectations are and what they intend to do with the game.
Peter Perla
“Thoughts on Wargame Validity”

The Case for Validity

The ORSA community has a concept of validity based to a great extent on the principles of mathematics and physical science.

Mathematical validity stems from the (almost) universal acceptance of the basic definitions and axioms of the field and the rules for combining those to derive (prove) theorems that result from a logical progression of steps. The results of a mathematical derivation or calculation are valid to the extent the processes for creating them are valid. Hence, mathematical product validity stems irrevocably from process validity.

The physical sciences derive much of their epistemology from the same sources as mathematics because they often depend on mathematics in the determination of the truth of their conclusions. But it is sometimes the case that the physical sciences propose as true concepts that are beyond the reach of pure mathematics to calculate—at least at the time of the proposition. And, of course, physical science requires physical measurements rather than pure reason, introducing error and vagaries not present in pure mathematics and so introducing the application of statistical methods. Finally, physical sciences rely heavily on their accuracy at predicting the outcomes of physical events for the ultimate determination of their scientific validity. Thus, process validity, while important, may be trumped by product validity—usually in the negative sense, as when a valid process of reasoning and mathematical manipulation predict physical events which fail to occur in practice. Hence, unlike mathematics, physical science is frequently subject to revision and, indeed, revolution.

Then there is social science. This field may be characterized as applying scientific and mathematical philosophies and methods to the study of the vagaries of human behavior and performance. This application of largely formal techniques to mostly unruly subjects results in explicit concerns about the different flavors of validity. Indeed, social scientists concern themselves with several varieties of validity as described in a website targeted at sociologists: 1

- Internal validity: the degree to which an instrument, such as a survey question, measures what it is intended to measure
- External validity: the ability of results of an experiment to be generalized beyond the immediate study

In other words, the methodology must be reliable. It must help us make accurate (or at least more accurate) predictions of future results when applied in similar circumstances.

1 Because I am not a practitioner of social science nor often, I must admit, sympathetic to their ideas, I have taken the social-science description from https://www.thoughtco.com/validity-definition-3026737
True validity comes when both the instruments used and the results of experiments themselves are found to be accurate each time an experiment is conducted; as a result, all data that is found to be valid must be considered reliable, which means it must be capable of being repeated across multiple experiments.

As an example, if a survey posits that a student's aptitude score is a valid predictor of a student's test scores in certain topics, the amount of research conducted into that relationship would determine whether or not the instrument of measurement (here, the aptitude as they relate to the test scores) are considered valid.

THE TWO ASPECTS OF VALIDITY: INTERNAL AND EXTERNAL

In order for an experiment to be considered valid, it must first be considered internally and externally valid. This means that an experiment's measuring tools must be able to be used repeatedly to generate the same results.

What of wargaming?

Wargaming resides at the nexus of mathematical, physical, and social sciences, and overlays—for good measure—elements of visual, narrative, and performance art. This confluence of influences, ontologies and epistemologies creates a knotty dilemma of validities. One result is that wargame validity is a unique (at least I think it so) combination of objectivity and subjectivity.

The physical sciences (and especially mathematics) emphasize objectivity—impersonal application of established principals and strictly truthful and “accurate” observations leading to reproducible conclusions. Yet there is hidden subjectivity even in physical science. That subjectivity manifests itself in the assumptions underlying the model (usually mathematical) the scientist constructs to represent the phenomenon, as well as in the means the scientist uses to define, collect and interpret physical data. This subjectivity tends to be swept under the rug when analysts present their results by emphasizing the mathematical rigor of the calculations themselves rather than the assumptions that lay behind them.

The social sciences wrestle with the subjective more intensely because of the nature of their, well, subjects. The social scientist strives to go beyond the idiosyncrasies of individuals to derive truths about people, or specific subpopulations, in general. Returning to our sociological touchstone quoted earlier²

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² [https://www.thoughtco.com/validity-definition-3026737](https://www.thoughtco.com/validity-definition-3026737)
However, as University of California Davis psychology professor Barbara Sommers puts it in her "Introduction to Scientific Knowledge" demo course, the truth of these two aspects of [internal and external] validity may be hard to determine:

*Different methods vary with regard to these two aspects of validity. Experiments, because they tend to be structured and controlled, are often high on internal validity. However, their strength with regard to structure and control, may result in low external validity. The results may be so limited as to prevent generalizing to other situations. In contrast, observational research may have high external validity (generalizability) because it has taken place in the real world. However, the presence of so many uncontrolled variables may lead to low internal validity in that we can't be sure which variables are affecting the observed behaviors.*

When there is either low internal or low external validity, researchers often adjust the parameters of their observations, instruments, and experiments in order to achieve a more reliable analysis of sociological data.

These comments resonate with the wargaming experience. The subjectivity of wargaming permeates the entire process. But most especially it permeates the insights individuals take away from the game. For example, a wargame employing detailed, scientifically “accurate” models (as accurate as we can model such complex phenomena as those in actual warfare) and expert and experienced decision makers as players may have high internal validity in this sense. Yet, its external validity may be questioned exactly because of its reliance on unreal models and specific players. Relaxing the models and broadening the players may well reduce the internal validity of the wargame as a representation of a specific real situation, but may actually increase its external validity to tell us something true in a general sense about people making decisions during a conflict situation. In both cases, however, the actual participants in the wargame will take away from it the insights they personally derived from their experience in playing the game, synthetic though that experience may be. And to that extent they have little or no experience of a similar situation in the real world, that synthetic experience will have a greater effect on their personal insights and beliefs. Hence the danger of the often-heard shibboleth, “We proved that in the wargame.”

Some of the insights derived from participation in a wargame—or indeed from reports about the course and outcomes of a game—might well be predictions. Indeed, as Dr. Ed McGrady has argued persuasively on many occasions, games can get closer to predicting how people will act and react to circumstances far better than other techniques. There have, indeed, been studies (such as one highlighted by Major Tom Mouat of the U.K. Army³) that show this. The games

work in this way not by asking people to predict how they would react, but by forcing them actually to react, even if that action is within the context of the simulacrum of reality that is the game. A wargame is, in effect, a conflict simulation run on the human brain rather than a computer.

So how can such a human-run simulation be judged as valid and reliable? If a scientific theory or model – whether in the physical or social sciences – is really only validated by its ability to predict the future (based on its ability to “predict the past”), how is an insight derived from a wargame validated? Let us dip for a third time in that sociological well:

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**THE RELATIONSHIP BETWEEN RELIABILITY AND VALIDITY**

When it comes to providing accurate and useful data analysis, sociologists and scientists of all fields must maintain a level of validity and reliability in their research—all valid data is reliable, but reliability alone does not ensure the validity of an experiment.

For instance, if the number of people who receive speeding tickets in an area varies immensely from day to day, week to week, month to month, and year-to-year, it is unlikely to be a good predictor of anything—it isn't valid as a measurement of predictability. However, if the same number of tickets is received monthly or annually, researchers may be able to correlate some other data that fluctuates at the same rate.

Still, not all reliable data is valid. Say the researchers correlated the sale of coffee in the area to the number of speeding tickets issued—while the data may appear to support one another, the variables on an external level invalidate the measurement tool of the number of coffees sold as they relate to the number of speeding tickets received.

Can you see the connections? Let’s assume that a series of repeated plays of a single wargame (or multiple games exploring similar topics)—note, repeated, not replicated, wargaming isn’t a Monte Carlo process—using the same or different players produces dramatically different dynamics. That game is an unreliable predictor of the actual dynamics of a real-world event, but it still can provide useful, even valuable, insights into critical factors and uncertainties associated with such an event. On the other hand, suppose the same (or near enough) results show up repeatedly in games dealt NG with the same general topic (a conflict over the Baltic States, for example). Correlation does not imply causation; assessment of the underlying reasons for the similarities must relate those game artifacts to the existing real-world variables before the apparent reliability of the results can be translated into validity of insight.

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When real people make real decisions in which they take uncertainty into account, not only do they consider the implications of the possible outcomes from their own perspective (such as the concept of utility) but also they define the range of uncertainty on the basis of their own evaluation of relative likelihood of outcomes. Sometimes those subjective probabilities coincide with what we might consider objective or frequentist ones, such as the coin flip or die roll. But in a sense that consensus occurs precisely because so many of us have agreed to consent to that interpretation. But as my old friend Taleb argues, if a supposedly fair coin has come up heads a hundred times straight, I might be forgiven for doubting that it is, in fact, a fair coin!

So, when I experience a game outcome, no matter what its objective likelihood, it did in fact occur during the one-off experience of the game — just as the German blitzkrieg of 1940 did in fact occur during the one-off experience of WWII. Just as I can derive an insight from the latter unique event (such as, the integration of tactical air power and armored and mechanized ground forces can create a powerful synergy that dislocates and defeats even larger but less integrated enemies), so too can I derive an insight from the unique events in a wargame.

Subjectively, I think my insight is valid if I believe it enough to act on it when I must. Objectively, others might later evaluate my insight on the basis of whether it successfully predicted the course of future events and my decision proved somehow correct.

Quantitative analysts—the proverbial ORSAs—who attack wargames for their lack of rigor and so lack of validity are arguing from the perspective of internal, or process, validity. If you cannot show the geometric logic connecting the cause and outcome of a game writ large (they stole the strawberries!⁵) then the game cannot be valid. But in that case, no leap of creative insight that goes beyond the strict limits of standard logic would ever be valid. Yet, all real science depends on, indeed is driven by, precisely such creative leaps. What matters most in the real world is product, or external, validity: does the insight, regardless of how I got it, lead to behaviors or predictions that the real-world shows are correct or appropriate? It is here that wargaming finds its true value. Games do not predict—people do. And will. The insights produced by the game will factor into those human predictions, for good or ill. It requires both the wargaming and analysis communities to understand this fact, and to improve our ability to design, run, and interpret wargames fairly and accurately if we are to avoid the ill and harvest the good.

⁵ See *The Caine Mutiny* if you don’t get the joke.
Why the concern about validity and utility?

Wargaming’s Value: The future success of wargaming in organizations depends upon our ability to demonstrate value to sponsors and stakeholders. It is imperative we build confidence in our products by demonstrating each product considers the fundamental aspects of each case. Because wargaming’s value is greater than the sum of just its empirical parts, capturing only the concrete returns on investment (ROI) does our customers a disservice. Less tangible dividends also need to be noted where possible including:

- Those “eureka” moments where participants can articulate a new understanding of relationships/opportunities, and consequences for their actions.
- Professional networking value for participants.

As devotees of the art and science of wargaming wanting to demonstrate and share the tremendous insight the synthetic experience that well-made models can provide is part of our collective DNA. In the DoD world, this can directly correlate to saving both the money and lives of our fellow citizens. So far, our lack of precise language, lack of guidelines for due diligence, and lack of documented examples showing impact has stood in the way of wider acceptance of wargaming approaches to provide insight into real world problems.

Good design needs “Profound Knowledge”: In wargame design our artisans typically have a continuing challenge of how to apply our skills to the product as both architects and artists. This is embedded in our world because we are trying to theorize and simplify complex problems to identify their key attributes and what levers/vectors of change are important in key relationships or systems. As we strive to do this in development, aspects of almost every problem range from well understood to poorly understood. Ultimately success in this approach requires us to look at each part of our design using something close to W. Edward Deming’s “System of Profound Knowledge.” This requires:

- Appreciation of the system we want to use
- Knowledge of variation in the attributes/vectors of that system
- Understanding of the limits of what can be known of the situation
- Knowledge of how psychology impacts the situation both in and out of the game

Our goal: Our working group strove determine how to “ensure” customers get quality wargames that provide valid and usable (actionable) results. The underling concern was how to avoid fielding a wargame that could superficially appear to have validity and utility, but which failed in some fundamental way.

Our approach: Our approach was to determine how to best “ensure” the processes used in wargame creation appropriately covers all the elements of design. It is critical to point out that this approach was intended to provide insurance against numerous possible malign influences creating a critical failure in design (stakeholder bias, resource constraints, hidden agendas, etc.).
Terminology for improved understanding: One of our group insights was a recognition that we use the term “analysis” differently in various parts of our development cycle. Upon reflection, the group started using a forensic analogy to provide more precision. Use of forensic terminology such as the anatomy, autopsy, and use of forensics to ascertain relationships, insights, and lessons from each wargame seemed to help focus discussion.

Results: In essence, the improvements suggested by the working group centered on development of guidelines, checklists, and peer review. At this time, they address predominately the basic architectural approach to our craft rather than the full integration of architect and artist that makes the artisan. The focus is almost exclusively on the things easily measured and checked in the development, execution, and analysis of a wargame. Application of these process improvements represents a significant step forward in providing a minimum guarantee (insurance) to the customer of a better wargame from a journeyman-level artisan. However, this is not a substitute for use of a master-level artisan for the most complex problems.

Implications of Checklists and Peer Review: Integration of the working group suggestions into your design process will likely increase development time/cost by about 20% (in my view). This has a clear value by reducing the probability of producing a poor design not reflective of reality, executing ineffectively, and failing to produce useful analysis. Since these measures predominately focus on a subjective review of objective elements (like determining appropriate scope), these resource costs can potentially be mitigated by using an acknowledged master to conduct the peer review.

Other Cautions: None of the elements addressed by our working group dealt with deeper core issues regarding development and design for the most complex wargames. Nor did we address details regarding appropriate depth of pre-game research, how to assess proper variability in results, how to maximize player education or role immersion, or how to maximize the value of analysis (among other things).

1 The first time I heard this approach used was by Bill Lademan (Director, Wargaming at USMC) at a Connections conference. I am uncertain if he would claim to be its originator.
Vincent Schmidt
“Scientific Perspective of Validity and Utility of Wargaming”

Validity and Utility is hard to quantify from a scientific (“bench scientist’s”) perspective. A scientific Concept Owner may define a Wargame Design based on their research and experimental studies, with the intent to gather information from wargaming the Concept – information that will further improve the quality and applicability of the research.

Whereas in many cases a game is designed to capture and examine the decision processes surrounding the employment of specific well-defined assets, technologies, and tactics, an additional level of complexity is introduced when some of these wargame pieces represent completely new technologies or processes being defined and developed by the scientists who are, or work for, the Concept Owners.

This complexity is partially captured and potentially mitigated by noting the objectives of the games being designed; recognizing that what it means to play a Concept will vary according to the specific game. Two examples come to mind:

1. Games designed specifically to playtest and evaluate the definition of a new scientific Concept, such as the Air Force Research Laboratory’s Future Analytical Science and Technologies (FAST) games – when used for Concept evaluation, these games are small (~24 participants), focused wargames executed with narrowly-defined vignettes, with the intent of determining if the Concept has been defined in a way that is understandable and complete (in the sense that the information describing the Concept is sufficient to allow proper Red and Blue play and the adjudication can be applied correctly).

   In addition to ensuring the Concepts are well defined, these games allow the consideration and revision of the Concept of Operations (CONOPS) and Concept of Employment (CONEMP) for the “new” scientific Concept, providing useful feedback to the Concept Owners. Such feedback might include comments about Concept capabilities and constraints, unusual or unanticipated approaches to employing the system, and similar ideas.

   A key benefit of testing the Concepts tested in these evaluative games is that they will have been playtested in a representative environment, and modified if necessary. This dramatically improves Concept validity (and utility), and reduces the risks of the Concepts for higher-level game play.

2. Games designed to examine the decision processes under certain scenarios, when provided with specific offensive and defensive capabilities – these games are characteristic of large Title-10 wargames, and are not intended to provide “technical” feedback to the Concept Owners of scientific Concepts. In most of these wargames, Commanders (decision makers, sponsors, etc.) playing the games are provided with well-defined assets and are expected to strategize and deploy their assets to meet the mission or vignette objectives.

   In these games, a wide variety of assets is generally available for the use by the Red and Blue
Commanders, who may pick and choose when and how to deploy them. Therefore, the Concept Owners must provide well-defined Concepts with very few (if any) configuration options. (I.e., instead of “this Concept can be flown on any selected aircraft platform,” explicitly define “this Concept is installed on every F-16,” for the purpose of high-level games such as these.)

Due to their complexity and size, these games are not expected to cater to the imagination of the Commanders by enabling them to tweak and configure the options available in the Concepts; their imagination and vision must be reserved for (1) understanding the well-defined assets available to them, and (2) employing them effectively in the wargame.

The only feedback Concept Owners should expect is some explanation of if/when/how their Concept was played. In some cases, in-game logistics and events may even deny a Commander the opportunity to use a Concept. The value a Concept Owner might get from have their Concept played in these games may be completely intangible, such as visibility and recognition (vs. technical or operational feedback).

Clearly, each type event could have considerable validity and utility, but the intent of the wargame and the audience for whom it is designed are necessarily the key indicators that determine the value of the game, both real and perceived. A game that is valuable to one audience cannot be expected to be valuable to another.

The challenge is to ensure that the Concept Owners (whether they are game players, advisors/subject-matter experts, or merely Concept providers) have appropriate expectations regarding the nature, content, quality, and sources of the information they obtain from participating in different types of wargames.
Gary Schnurpusch
“Thoughts on Wargame Validity and Utility”

What makes a wargame “valid?”

A dictionary definition of “validity” includes a simple “logically and factually sound; soundness and cogency.” In my experience, dominated for years by Naval warfighting operations analysis and supporting Naval wargames, I suggest wargame “validity” means:

- A realistic representation of “actual” or “likely” operations, one that conforms to suitable operations principles, and in particular is “believable, plausible, and credible.”
- Outcomes of players’ actions and choices reliably reflect players’ behavior and skills (why players must be carefully selected and assigned to wargames).
- Game elements of context and content reflect well-formed characterizations and representations and are predominantly factual; granulated carefully for the game level of play … otherwise varied and tailored only by game assumptions for content.

The “validity of a wargame” is based upon its factual, credible, or plausible foundation. That is, the elements of content and representations, such as units, combat systems, and operating principles must conform to substantiated real-world factors.

For example, in a tactical or mission game in the near-term, performance factors like weapon range, $P_{hit}$, $P_{kill}$, speed, and altitude, must reflect what weapons of the game’s epoch really are. If the game were near-term, then those factors would be best based upon current test data, tactical doctrines, and real-world experience. In contrast, employment of those weapons is a matter of players’ choices, such as salvo size, launch range, and attack axis.

In mid-term or far-term games, factors could be expected to evolve, or new weapons may just be conceptual, then performance factors must at least conform to physics and plausible capability, even when game assumptions are “stretched” to examine “what if” scenarios. Sensitivity checks prompt variable performance factors. This is okay as long as those factors are advertised as only “what if” and less factual; in such cases, the game remains credible.

In operational-level games in which precise performance factors are more often subsumed or averaged into more macroscopic factors, but derived from only realistic and plausible bases, then more aggregated factors, such as force sizes and force mixes must be based upon actual fleet sizing. As games become mid-term or far-term, force sizes and mixes must be shown to evolve from factual fleet size so as to retain plausibility in out-year force size. In contrast, force deployment, employment, locations, and maneuvering are players’ choices. Again, the “validity of a wargame” is based upon its factual, credible, or plausible foundation.

What makes wargame “utility?”

A dictionary definition of “utility” includes a simple “useful, beneficial; measures preference; represents satisfaction.” In my experience, dominated for years by Naval warfighting operations analysis and supporting Naval wargames, I suggest wargame “utility” means:
• The game as a forum has a methodological approach that is “useful” to sponsors AND players to evoke thorough and insightful products.
• The game is designed carefully to conform clearly to game objectives.
• Game lessons learned, observations, and more formal conclusions are “usable” and “applicable” to inform decisions. Whether the sponsors’ post-game decisions precisely reflect game conclusions or not, at least they were well enough informed by game play so as to be able to say the game had impact.

Further, a useful game is not derailed from its objectives by hidden adversity, maligning intentions or mechanics, such as skewed databases, poorly prepared players, or hidden agendas. A useful game moves the knowledge bases of the sponsor, game staff, and players tangibly closer to answering the posed questions that prompted the game in the first place. Moreover, game reconstruction and the game report, for examples, can show an audit trail that captures the actual play of the game, players’ thought substance, how it all led to the documented game observations, and includes minority or dissenting content that was actually in the game play. The game was thorough. Game outputs were properly derived from game inputs and actions.

It is fair to say that the usefulness of a wargame will not likely be fully known or understood until substantial time after the game is concluded, analyzed, and reported. However, a hopeful early sign is that an engaged sponsor, the game staff, and players all come away from the game with a good sense that the game was well formed, well conducted, and was reasonably credible, whether the game results bore out all members’ expectations or not. A baseball analogy may be that batters may not like the home umpire’s strike zone, but if he was consistent throughout the game and for both teams, then the game was a good game.

It is also important to focus on the documentation and portrayal of the wargame. While sponsors want to have their decisions informed quickly; and game staff want to “go to school” on game conduct, success, or flaws in preparing for the next game; and players want to learn something from their participation, the lasting payoff of a game is its longer term applicability. Documentation must be thorough, CLEARLY and COGENTLY reporting the set-up and reasons for the game, the details of the conduct of the game, the post-game analysis, and how it all led to the observations and more formal conclusions of the game. The game record must be “useful” to readers and researchers well down the road. If late follow-on readers cannot “know” the game with a high confidence of detail and understanding, then game utility is likely to be short-lived at best. A well understood, “useful” game can provide lasting lessons learned for later decision-making and perhaps can preclude playing another game to address largely the same questions … could be wasted effort which could be applied to new questions or the same questions with new, varied assumptions, conditions, or at least updating.
Maligning wargames

1. Form excessively general objective(s) that mask more specific, predisposed outcome intentions.

2. Skew game content to be played/addressed toward predisposed outcomes by limiting/omitting selected elements.

3. Select players with only narrow/off-target expertise and/or limited experience in game content areas.

4. Bias game assumptions, databases, and adjudication process/results toward preferred outcomes.

5. Edit game reports to omit observations that would be contrary to predisposed conclusions.

Preventing maligned wargames

1. Carefully formulate comprehensive objectives that rigorously capture all critical/pertinent content elements to play.

2. Ensure game staff/players have critical skills/expertise and particular experience (preferably firsthand) in game content areas; populate with senior SMEs.

3. Use independent a priori peer reviews/in-game monitoring of all game objectives, designs/game flow, adjudication processes, data collection, and analysis.

4. Keep game sponsors/decision-makers involved from design to out-briefing/reports.
Bill Simpson
“Validity and Utility of Wargaming”

**Wargame Validity**

The validity of the wargame depends on:

1. Does the wargame have purposes and objectives relevant/appropriate to the issues being addressed?

2. How faithfully does the game address the stated wargame purposes and objectives?

3. How accurately the game report(s):

4. Describes the nature of and conduct of the game.

5. States that the game did or did not met the purpose and objectives and why.

6. Reports those things originating from game development, design, execution.

7. Clearly identifies opinions and conclusions about the game and not from the game play.

8. Does the Gaming Organization have full editorial control of and responsibility for the game reports?

9. That it has a collection plan that effectively captures and evaluates the information needed to satisfy the game purpose, objectives and reporting requirements. The Collection Plan should capture both the digits and discussions to record not only the moves and results of engagements, but the situations, decisions, and considerations behind the moves and engagements.

The collection plan should not be a rigid preordained process, but an integral part of game development tailored to support the purpose and objectives of the game.

The game designer should, from the beginning of game development, consider the questions below and address what is relevant to the game:

1. What information (numerical and non-numerical) is needed to satisfy the game purpose and objectives?
   
   a. When and how will this information be generated?
   
   b. How will this be captured?
   
   c. What analysis or assessment is needed?
   
   d. What are the reporting requirements?
e. How can game design and execution accommodate and facilitate all of the above?

f. How many people are you going to need to observe and record?

g. What preparation will they need and what they should listen for and record?

2. What information should be captured and recorded?

3. The player’s decisions, i.e. what was the situation, what did they consider and discuss, and why they made the resulting decision.

4. The movements, actions, and engagements of the game forces and the results.

5. Important group discussions, issues, and recommendations including the minority opinions.
   a. Did the game go well? Are there any lessons learned or recommendations for future games?
   b. Other information as required to satisfy the objectives.

The Capture Plan must be an integral part of the game plan and approved by the sponsor.

Wargame Utility

If the wargame is not valid, then the utility is as a case study of what not to do in a wargame. The game play and outputs must provide some things useful to the participants and stakeholders. It must make available to participants something to take away from the game, such as:

- Game Information packets to go with the trip reports.
- Lists of participants
- Briefings, etc.
- The Executive Summary

Often the Main or Final Game report can take months to issue. By then the enthusiasm and interest has faded and the utility has been lost. Issuing a series of increasingly detailed reports from the end of the game until the final report, will maintain the interest in and the utility of the game. The timing, number, format, and type of reports will vary with the desires and editorial policies of the gaming organization and the sponsor. As an example, six game report options were developed and used, as needed, by Wargaming Division Quantico. They were: None, the Executive Summary, the Quicklook, the Game Summary, the Final Game Report, and the Battlebook. The formats and timing of the reports must be approved by the sponsor and included as part of the game design.

1. No report maybe required when the conduct of the game and the observations of the sponsor satisfies the purpose and objectives. This is quite common in educational / training games where the professor or instructors observe and record what is needed. (A Memorandum for the Record for the game files or archives should be considered.)
2. The Executive Summary is a one-page report issued immediately after the game. The Executive Summary provides senior decision makers with a snapshot of the game and the immediate findings or issues. The summary had four sections: The game purpose and objectives, the things being gamed, immediate findings, and post-game plans. The capture plan and/or player out briefs should be designed to provide the findings or issues in a timely fashion. Sometimes one person was designated, in advance, to collect the information, draft the report and have it approved and ready for release at the final plenary session or emailed immediately after the game.

3. The Quicklook is an abbreviated game report issued within 5 to 10 working days of the end of the game. It’s format generally contained: Introduction, Bottom Line Up Front, Game Purpose, Objectives, Methodology, Scenarios, Initial Findings, and Contact Information.

4. The Game Summary is an update that can be used to fill a large time gap between reports. There is no set format, but it can be drawn from the other three report formats.

5. The Final Game Report is a complete report covering all aspects of the game. The final game report usually contains all the products of the game including any executive briefings and game analysis.

6. The Battlebook is a multi-media CD/DVD that is produced in about 2-6 months.
Gene Visco
“Final Thoughts on Malevolence, Malfeasance and Misfeasance in Wargaming”

The list of deliberately malevolent actions, malfeasance, generated by the Working Group cannot be considered examples of Clausewitzian friction. Friction lies more in the misfeasance category. However, some of the malfeasant actions may be, by chance, misfeasance as well, hence Clausewitzian friction. In that vein, they can lead to *caveats* or assumptions that must be identified with the wargames. The assumptions are important to convey to the wargames’ sponsors, along with the games’ reports. The assumptions contribute to the sponsors understanding of the limitations and the values of the games. Assumptions are presently overlooked by wargame designers and implementers, as they are overlooked in other analytic processes related to military operations analyses.
Seminar A – Adjudication Practices

Chair: Mark Stanovich, Wargame Specialist, Naval War College

Purpose of Seminar A was to provide the Journeyman Wargamer with the knowledge to identify proper wargaming adjudication practices based on:

- Game Problem, Purpose, and Objectives
- Game Structure
- Time and Resources
- Availability of Subject Matter Expertise

Discussion

Seminar A of the MORS Wargaming Special Meeting was intended to impart knowledge to an audience familiar with wargames and wargaming concepts. That familiarity among the Seminar attendees allowed for a greater breadth and depth of discussion regarding advanced concepts and techniques of wargame adjudication. While there was no specifically identified insights put forth by the Seminar A participants, the seminar was highly productive and met MORS purpose and intent.

Seminar A Session 1 began with an Introduction to Wargaming, which provided a leveling brief and short history of wargaming, along with:

- Wargame Taxonomy and Definition
- Intellectual Underpinnings of Wargaming
- Discussion of Wargame Scope and Scale
- What a Wargame Is and Isn’t
- What a Wargame Does and Doesn’t Do

Seminar A Session 2 provided an overview of how adjudication considerations are integrated into the Wargame Project Management process. This session discussed the critical-path decisions and activities that the Lead Adjudicator must provide input to, and milestone game events in which the Lead Adjudicator should participate.

Seminar A Sessions 3 and 4 comprised the preponderance of the introduction of advanced wargaming adjudication concepts. Session 3 presented Methods and Techniques of Adjudication, during which the purpose, requirements, advantages, and disadvantages of:

- Open and Closed Adjudication Techniques
- Rigid vs. Semi-Rigid vs. Free Adjudication Methods
- Stochastic and Deterministic Methods
- Aggregated vs. Engagement-level outcomes
Seminar A Session 4 provided “how-to” instructions on running a successful adjudication of a wargame Adjudication Cell. The session covered in detail the requirements for organizing and conducting adjudication, as well as the duties and responsibilities of the Lead Adjudicator. Specifically, Session 4 addressed and explained:

- Sources of Subject Matter Expertise
- Adjudication Guidance
- Organization and Assignment
- Process Flow and Adjudication Cycle
- Linkages Between Actions
- Reporting Results/Level of Detail
- Game Time Techniques
- Resolving Disagreements
- Case Study Results- Problems in Wargames

Seminar A Session 5 was a case study on development of the Jutland Centennial Commemoration Wargame. The session discussed in detail decision-making for game structure and content, player activity, communications, umpiring, and rule set development for a classic Naval Wargame using gaming tools and techniques from 1905 and 1922, for a game played for experiential/entertainment purposes.

In addition to the sessions described above, Mr. Paul Vebber from NUWC kindly conducted a one-hour session on designing, playing, and adjudicating matrix games.

The training audience was between 12 and 14, as some participants had other obligations at the Special Meeting, causing them to miss portions of Seminar A.

As a follow-on to the information provided in this seminar, a workshop specifically tailored toward the mechanics of adjudication which allow for participants to engage in practical application of these techniques and methods may be of value in future events.
Executive summary

The Introduction to Red Team Techniques Workshop provided wargame practitioners with a toolbox of techniques to improve critical thinking and how to get the most out of a group. The workshop introduced and demonstrated over 15 techniques that the participants were able to use in, and apply to their current projects. As a result, the participants improved their ability to ask better questions, to illuminate hidden assumptions and biases, and helped develop an enhanced enemy mindset. This enhances practitioners’ understanding of the problem and the environment, leading to improved and refined wargames and, consequently, better outcomes. In the words of one participant, “So glad I had a chance to attend this seminar...Activities reinforced techniques and tools presented. Lots of great discussion and collaboration with fellow participants.”

Introduction

The purpose of the Introduction to Red Team Techniques Workshop was to give participants tools, techniques, and methods to think more critically and facilitate group dynamics to create better wargames and results. In six words, the objective was to allow participants to “ask better questions to enhance outcomes.” The program demonstrated the practical application of red team techniques and tailored the program for three specific areas: problem framing, facilitating an enemy perspective—mindset, and framing with the customer or client.

Prior to discussing the programs content, a point of clarification is required. The University of Foreign Military and Cultural Studies (UFMCS) education program focuses on the cognitive function of red teaming. That is, it is designed not only to enhance decision making and understanding of the environment but also to improve BLUE’s concepts, plans, understanding, etc. It is NOT threat emulation or active adversarial activities such as vulnerability probes, virtual or physical. The distinction will be helpful in understanding the content of the workshop.

UFMCS defines red teaming as:

A function that provides commanders an independent capability to fully explore alternatives in plans, operations, concepts, organizations, and capabilities in the
context of the operational environment (OE) and from the perspectives of partners, adversaries and others.¹

Workshop

The workshop program reflected the core themes and approaches present in UFMCS’s longer resident courses. Central to red team curriculum is the core principle, “…to escape the gravitational pull of Western military thought.”² UFMCS’s approach to change how staff officers perceive the world is built around the four pillars of self-awareness and reflection, applied critical thinking, fostering cultural empathy, and [decision support] groupthink mitigation. The workshop’s program drew from all four pillars, demonstrating practical application of techniques and methods, utilizing experiential learning and interactive activities. The activities leveraged opportunities for the participants to share and learn from each other—to co-create experiences and hone skills. Consequently, the program enabled participants to learn and utilized over 15 applied critical thinking and groupthink mitigation tools and techniques in four sessions.

The program opened with an exercise devoted to exploring self-awareness and reflection where participants explored cognitive biases and the concept of worldviews by creating a story using the same pictures. The participants appreciated how both cognitive biases and worldviews shape, limit, filter, and frame our perception and interpretation. More importantly, participants experienced how each of us perceives and interprets the world differently. This was critical in establishing a foundation for the remainder of the program. Additionally, the participants learned techniques to manage the group divergence and convergence process to facilitate groupthink mitigation and to get the most from all participants in the group, not just a select few—which are traditionally the loudest or the most talkative. Specifically, the participants learned how to encourage and integrate weighted anonymous feedback.

The second series of exercises focused on problem framing and methods for auditing the frame using red team tradecraft. For example, participants used “the 5 Whys” to uncover root cause and hidden presumptions and conducted a key assumption check on the Deputy Secretary Defense Work’s Wargaming and Innovation memorandum. A stakeholder analysis explored who else might have equities, interests, and influence. Lastly, the exercises ended with methods for problem restatement—increasing the likelihood the problem was correctly identified and framed.

The next session transitioned to aiding game developers to assist players in mitigating mirror imaging and ‘gamer mode’ by providing simple and practical activities to facilitate an understanding of an enemy perspective and mindset—fostering cultural empathy. The techniques

¹ UFMCS website: http://usacac.army.mil/organizations/ufmcs-red-teaming

² Conservation between then Chief of Staff of the Army, General Shoomaker, and Greg Fontenot, founding Director UFMCS, spring 2006.
emphasized putting the players in the affective (emotional) domain to achieve a level of cognitive empathy. The tools and techniques demonstrated in session were “6 Empathic Questions,” “4 Ways of Seeing,” and Hofstede’s Onion Model—a cultural perception framework.\(^3\)

The session ended with a brief overview of additional resources available from the US Army Training and Doctrine Command G2 and US Army related to culture and threats. The resources include, but are not limited to, a virtual replication of the world wide web, review of prevailing Russian and Chinese strategic thought, and current adversary tactics, techniques, and procedures (TTPs).\(^4\)

The final session allowed the participants to apply methods and techniques they learned to their own problem sets. The participants developed individual approaches to current or future activities and then critiqued and improved each other’s approaches using red team tradecraft and TROIKA—a liberating structured designed to provide more candid and constructive feedback in groups of three.

**Outcome**

The outcome of the program matched its intent. Participants left with a toolbox of techniques to improve critical thinking and how to get the most out of a group. They have the ability to ask better questions regarding problem framing and fostering an understanding of an enemy mindset. All of which results in more effective game designs, a richer experience for the players, and improve post game analysis and assessment. A snapshot of the participants’ feedback from the sixteen-hour seminar is below:

“So glad I had a chance to attend this seminar...Activities reinforced techniques and tools presented. Lots of great discussion and collaboration with fellow participants.”

“I thought the tools taught to us were valuable and relevant to my current job.”

“Seminar was much different than I expected, but overall was very happy with content instruction, and time allocated”


“It was beneficial to give successful real world examples of when these techniques were used and made a difference.”

“If you are not red teaming, you are setting yourself and your organization up for failure...Learn and apply red teaming tools.”

“As usual for red teaming classes, I come out of it wishing, I was in the 18-week course.”

The red team techniques introduced during the workshop can improve the quality of wargaming throughout the Department of Defense by improving processes to ask better questions and illuminate hidden assumptions and biases. This enhances practitioners’ understanding of the problems and the environment, leading to improved and refined wargames and, consequently, better outcomes.
Wargame 1 – Introduction to Wargaming Using Commercial Games

Chair: Mr. Michael W. Garrambone, InfoSciTex Corporation, a DCS Company
Co-Chair: Mr. Bret R. Givens, Solutions through Innovative Technologies, Inc.
Co-Chair: Mr. Dan C. Caudill, Aerospace Systems Directorate, Air Force Research Laboratory
Bulldog: Mr. Donald H. Timian, US Army Retired

Executive Summary

Based on the MORS response to a recommendation in the Wargaming II Special Meeting the objective of Working Group 5 was to instruct novices in the basic fundamentals of wargames and other conflict simulations and to provide direct experience as participants in such games. The games selected for this working group (Drive on Metz, Wings of War, Pandemic, and AFTERSHOCK) were all highly successful commercial games which insured a quality of game design, very good scenario preparation, tested rule sets, and a history of unbiased praise from the general public and within the gaming industry.

The Working Group 5 cadre consisting of 22 members of the MORS gaming community, taught and directed games to the 33 attendees, providing 16 hours of intense game instruction and gameplay. The attendees came from 17 different agencies of the Departments, defense contractors, and international community. Everyone who participated, both cadre and attendees, learned from this experience. Specific learning objectives were cited and attendees provided confirming dialogue in their after-action reviews. While instructors rotated duties with varying schedules, attendees in general were present for all instruction and gaming events. As always, kudos to the MORS Office for their great support is in order. While many thought this particular endeavor was way too difficult to do, we were wrong. For all that ran the event; it may be OK to resume sleeping and eating again.

Introduction

Working Group 5, Wargame 1: Introduction to Wargaming Using Commercial Games was designed to provide instruction to novices and those unfamiliar with the basic structure of and inherent value of both military wargames and other conflict simulation games. The intent was to provide attendees with fundamental gaming instruction, introduce the mechanics of specific commercial games, and have attendees participate as players in these games. Participants, now immersed as players, were engaged in debriefing these games thereby validating their learning while building confidence in their ability to progress to more sophisticated gaming levels.
Synopsis

This working group was promulgated on recommendations from the MORS Wargaming II Workshop that called for structuring its next wargaming workshop to better address the community’s needs for training and educating at all gaming participant levels. Working group 5 was designed for novices and consisted of 16 hours of intense instruction and game play. Twenty-two game-savvy volunteers across the DoD taught and directed a series of well-designed commercially successful games to thirty-three registered and several infiltrator attendees. Participants received nine formal lecture/conference presentations on gaming fundamentals including player instruction on the four commercial games. Players gained seven hours of “stick time” at player tables with four to eight participants as either adversaries or dedicated team members per table. Overall, 55 attendees engaged in this working group as instructors or players—and everyone learned. The groups enjoyed outstanding MORS support and were honored by requests for presentations and future professional contacts.

Working Group 5 Overview

This working group was a follow-on to the successful wargame instruction provided at the MORS Wargaming II special meeting from the previous year. At that meeting we provided a single eight-hour tutorial with concentration on one single wargame. Sixty-five students attended that session with responses indicating it was well received and a valued learning experience for wargame novices. Recommendations from Wargaming II led to the instantiation of working groups tailored to instruct at various wargame levels (novice to professional) with more active participation in well-designed and highly instructive military wargames and other interactive conflict simulations (non-military games). The mission of this working group was to design 16 hours of instruction incorporating training and active participation in four different types of games. With emphasis on highly structured training, strong content and solid analytical rigor, a course design and a cadre of gaming experts were assembled to teach and provide an enjoyable learning experience. The course design was limited to four time blocks in which to emphasize basic gaming knowledge, game overview, game play, after action reviews, and overviews on select wargaming models, tools, or techniques. While MORS has supported wargame-working groups for nearly five decades, these volunteers joined from the schoolhouses and back corners of the gaming world to provide in-depth instructors and unique and talented game directors.

Purpose and Objectives

Working Group 5 was to introduce novices to the structure and value of wargames, to review wargaming fundamentals and demonstrate the mechanics of select commercial games through game participation and after-action reviews. For this limited period of time, learning objectives were to ensure attendees:

- Know the special vocabulary of wargames
- Know the seven elements of wargames
- Understand the importance of wargaming
• Be familiar with the wargame as an event
• Gain experience in individual and team play
• Know the many military and other uses of wargames
• Be familiar with models and tools used to support wargames

The Four Games

Four commercial games were employed, one in each of the assigned four-hour time periods beginning on Tuesday afternoon following the first morning’s plenary session. Games were:

• Drive on Metz (Dunnigan), WWII ground warfare in the French Lorraine Region
• Wings of War (Angiolino & Paglia), WWI early aerial combat in Northern Europe
• Pandemic (Leacock), Cooperative-Competitive teamwork to combat world-wide diseases
• Aftershock (Brynen & Fisher), Interagency cooperation-conflict in a humanitarian crisis

Facility Notes

Working Group 5 held all four sessions at the Hilton Mark Center Hotel each day of the workshop. This was ideal for these unclassified sessions although it would have been better for having separate rooms for any sophisticated competitive team play (e.g., Drive on Metz). Adversarial team separation allows for undisclosed strategy/tactics discussions vise the seminar approach employed when teams are limited to a single room. For novices, this single room arrangement was perhaps better since they could hear their opponents “thinking out loud,” providing the rationale for each of their game-turns.

The Game Training Cadre

The Working Group 5 “Cadre” was made up of seasoned gamers from various government agencies, military defense contractors, academic institutions, and private consulting firms. In addition to being military analysts, nearly all had served as strategic or tactical game directors, or were incorrigible long-term wargamers with extensive multi-faceted gaming experience. These 22 volunteers served as primary instructors, select game leaders, and game directors over the 16-hour training period. A complete list of the Cadre with Point of Contact information can be found in Appendix B: Cadre Listing for Working Group 5 Personnel. This cadre came from the following agencies:

• InfoSciTex Corporation, a DCS Company
• Aerospace Systems Directorate, Air Force Research Laboratory (AFRL)
• Strategic Planning, Center for Army Analysis (CAA)
• US Army Command and General Staff College (CGSC)
• Center for Applied Strategic Learning, National Defense University (NDU/CASL)
• Army Test and Evaluation Center (former Chief, USA Retired)
• Naval Surface Warfare Center
• Office of the Secretary of Defense/Cost and Program Evaluation (OSD/CAPE)
• Solutions through Innovative Technologies, Inc.
• Booz, Allen Hamilton (BAH)
• Center for Naval Analyses (CNA)
• AT&T
• Military Simulations LLC.
• The Analytical Group
• The MORS Office

Formal Lessons and Game Instruction

The following lessons, including orchestration of game play, were provided to the training audience by various members of the Working Group 5 Cadre.

Wargaming Lessons: 3 Lessons
Michael W. Garrambone
• Introduction to Wargaming
• Fundamentals of Wargames
• The Wargame Event

Game Instruction: 4 Lessons plus game play

Drive on Metz
• Dr. Thomas C. Hughes
• Mr. Mark L. Axtell

Wings of War
• Mr. Vincent D. Raska
• Ms. Lee Ann Rutledge

Pandemic
• Ms. Kaarin A. Engelmann
• Dr. Karsten G. Engelmann

Aftershock
• Mr. Timothy Wilkie
• Mr. Scott M. Chambers

Models and Tools: 3 Lessons
• Mr. Michael W. Garrambone
An Introduction to Air Warfare Models

- Mr. Michael W. Garrambone

Standard Wargame Integration Facilitation Toolkit (SWIFT)

- Mr. William J. Ellerbe

The highly versatile Game Directors included:

- Mr. Donald H. Timian, Mr. Paul W. Veber, Mr. Michael A. Ottenberg, Mr. Michael B. Dunn, Dr. Callie Le Renard, Ms. Rebecca Schaefer, Ms. Amanda M. Ritzman, Dr. Thomas C. Hughes, Mr. Mark L. Axtell, Ms. Lee Ann Rutledge, Mr. Vincent M. Raska, Dr. Karsten G. Engelmann, Ms. Kaarin A. Engelmann, Mr. Timothy Wilkie, Mr. Scott M. Chambers, Mr. Robert Holdren, Mr. Richard Phares, and Ms. Tara A. Garrambone. (Thank you all—MWG)

In preparing for this instruction a listing of the purpose and learning objectives for each of the above lessons was formally established and can be found in Appendix C: Purpose and Objectives of Presentations and the Commercial Games.

Working Group 5 Schedule

The schedule below shows the topics and the instructor-led lessons that were executed for Working Group 5.
Registered Attendees

While it is important to note that “MORS takes on all comers and proceeds to teach if only for a single attendee—after all, it could be a Patton or a Halsey,” but in this case 33 attendees were a good class size limit considering having gaming teams of from 4 to 8 “players” per table. Noting the intended audience was novices, up to 8 tables were required for some games. Attendance limitations were based on room size, “depth of” and number of available playing tables, availability to purchase “on-demand” commercial games, number of game-specific (Pandemic, AFTERSHOCK) knowledgeable teaching and game directing leaders. A total of 33 registrants signed up for this working group. As expected, many attendees had very little backgrounds in games or gaming, but most interesting is they came from wide and highly diverse sources of government. The listing below identifies the sources:

- Joint Warfare Analysis Center
- Naval Surface Warfare Center
- Department of Homeland Security
- British Embassy Washington, DC
- Defense Logistics Agency
- Headquarters Air Force/A9
- Group W Incorporated
- Federal Emergency Management Agency
- Georgia Tech Research Institute
- TNO (Netherlands)
- US Pacific Command (PACOM)
- USAF/Air Staff/Squadron Officer School
- CANA Advisors
- US Army War College
- Marine Corps Warfighting Laboratory
- US Army (no further description)
- Air Force Research Laboratory

Note that a considerable amount of learning was inherent in being a cadre member. It is important to add their 22 names and their agencies to the list of those gaining knowledge from this event.

So What Did They Learn?

Historically, the response to “What happened and what did they learn?” is the most sought after inquiry in wargaming. It is also perhaps the least clearly defined in what is of interest to the sponsors or that, which is desired to be provided by gaming agencies and game participants. To avoid this calamity for Working Group 5, the objectives for each lesson and game were cited (Appendix C). The listing clearly provides some 50 expected learning outcomes that were documented in the learning objectives. No one went away without learning these items. More importantly, attendees learned a considerable number of other gaming concepts from the lectures of the venerable cadre whether explicitly enumerated within direct dialog, or as explanations within an example. Careful cadre selection, continuous design training meetings, and extensive team correspondence assured this learning. The cadre benefited by gaining depth in their subjects, generating instructional material, interacting with the never-ending-questioning audience and extensive communing (especially as individual game directors) with others of their kind. They were responsible for setting up the games, teaching and guiding game execution. To build-in the desired quality instruction, the DoD Instructional Design (Training) System format was used in designing the training. Along with this format, the cadre provided detailed lesson plans with special instructional notes for each of the formal lessons (See Appendix D: Lesson Assignment and Execution Plans). The MORS follow-on Workshop Survey should validate the student response to the trainings.

References

“We have seen so far, because we stood on the shoulders of giants” is true, but only if the giants wrote about it. Appendix E: References contains many of books and articles used to build the lessons provided. Those listed along with the various game descriptions, game directions, notes, and videos were helpful to attaining the training objectives.
Lessons Learned

- The attendees were ideal for learning—all had very good attitudes
- Thirty-three participants at a time was a challenge
- This training event required enormous preparation time
- It was extremely difficult to provide instruction and gaming on four different games
- Great effort went into finding specific gaming and teaching expertise
- Luck and numerous coordination calls pulled this off
- It was beneficial to have done similar training events like this before
- There were some students who were late add-ons and expected losses along-the-way
- Experience at orchestrating similar MORS events was valuable to this effort
- Still hard to believe it could be done, but alas, yes
- Also, yes, it was worth it

Recommendations

- Survey to see if this training is needed and an audience can be assembled to be taught again
- Use this information to garner agencies to provide their novices, best, and brightest
- If needed, start to build a cadre of leaders and gamers to cover this extensive training
- Solicit those cited to reapply their expertise to this endeavor
- Use this document to guide future instruction
Wargame 2 – Matrix Games

Working Group 6: Wargame 2

The objective of working group six was to train participants in matrix game techniques. To us this meant that we should give the group an idea of what matrix games are, how to use and build them, and a chance to play and run them. We drew heavily on materials provided by MAJ Tom Mouat (MBE) who ran this working group at the previous MORS Special Session on Gaming.

To summarize the working group:

- We had 16 participants, all of whom stayed for the entire 2.5 day session.
- We interspersed playing matrix games with training on what is a matrix game, how to run a matrix game, and how to design matrix games.
- For the last day participants got to design their own matrix game, and take turns running it.

Matrix games were first developed in the US in the 1980's as a form of structured role-playing.¹ They were focused on the hobby community and often presented at conventions. More recently these techniques came to the attention of the professional gaming community through a series of books and lectures by MAJ Mouat.² Matrix games are seen as a useful tool due to their apparent ease of construction, short execution time, simplicity of recording, and focus on player expertise and decisions.³ Matrix games have been used in defining technology requirements, exploring courses of action in operations, and in helping communities design infrastructure. The flexibility of matrix games means that they can be applied to a virtually unlimited range of topics. In addition, matrix game techniques can be used in other types of games, for example in adjudicating player actions. Matrix games can also be a useful tool for training students in game design and execution techniques.

¹ Chris Engle created matrix games in 1988 as a way to expand hobby role-playing into entities other than single characters (e.g. countries).
² For an online reference on matrix games see: http://www.mapsymbs.com/wdmatrix1.html. . . . Tom's books are available on Amazon as John Curry and Time Price MBE, Matrix Games for Modern Wargaming Developments in Professional and Educational Wargames Innovations in Wargaming Volume 2, 2014; and John Curry and Time Price MBE, Modern Crises Scenarios for Matrix Wargames, 2017. . . . Tom and Prof. Rex Brynan also have published the Matrix Game Construction kit available on Game Crafters: https://www.thegamecrafter.com/games/magck-matrix-game-construction-kit

³ Most of these assumptions are incorrect: for example designing and executing matrix games requires considerable skill in designing the scenario, framing the roles, and controlling player interactions. . . .
Our working group started with an overview of matrix games. A couple of points stand out:

- Interest in gaming, not just matrix games, is taking hold amongst both our allies as well as potential competitors. This comes together in a picture of MAJ Mouat training several hundred Chinese participants on wargaming. Comparing his audience to the entire attendance at the MORS special session suggests an imbalance in interest in learning about games.

- Matrix games can be a way to address several issues in gaming:
  - Accounting for non-kinetic effects. There are some things, such as training, morale, efficiency, cohesion, and other factors that are difficult to adjudicate using fixed techniques. Matrix games allow you to address those factors in a reasonable and traceable way.
  - Matrix games allow you to conduct meetings in a more structured, and engaging, way. Instead of a meeting about a subject you use a scenario and role playing to engage the participants.
  - Technical arguments can dominate some forms of games such as kinetic operational or tactical games. Given our limitations in what we know about our own systems performance, much less threat systems performance, matrix games can allow you to cut through some of the debate and lack of understanding to examine actions and implications instead of capabilities and limitations.

- Structured role playing games, like matrix games, are not a common gaming format. Of the few other examples we have the 1976 GDW classic *En Garde*, as well as the more recent crop of hidden knowledge games such as *Secret Hitler*, *Werewolf*, or *Coup*.

The key things to understand about classical matrix games are that players have very flexible roles, each player gets one argument per turn, and adjudication is focused on understanding player arguments and creating a shared narrative.

We then played the cyber matrix game "All Your Secrets Belong to US" in order to demonstrate matrix play to the participants and help them understand how matrix games work.

Our next session dove into more detail about matrix games and covered considerations to take into account when designing matrix games. Our key points during this session were:

- Control, scenario, and player roles are critical to a successful matrix game. More so than in many other games.
- The scenario should be tailored to the player roles and how the situation would unfold in the real world.
- Player roles need to be both comparable in terms of influence in the situation and have agency within the context of the scenario.
- Control requires
  - Enough knowledge about the subject matter to evaluate and guide player arguments. This is important when you have players that don't understand the subject matter.
  - The ability to manage player behavior.
  - Enough skill to think on your feet and judge player arguments in or out of bounds in real time.
The combination of the need to get the scenario and player roles right so that players have agency in a situation that makes sense and the need for real time control make matrix game design a deceptively difficult project.

We also discussed adjudication in matrix games. There are many different ways to adjudicate matrix games, but they all emphasize moving the narrative along with enough accuracy to keep the players invested in the game. Matrix game adjudication techniques involve the players giving input into the overall outcome. This technique can be useful for many types of games, not just matrix games.

In the same vein we also discussed the variety of variants you can create using matrix game techniques, including introducing more rigid rules and formality in the game as well as using matrix techniques in meeting facilitation.

Another reason for matrix games popularity is the ease of documenting the game. The structured style lends itself to transcription, and the need to carefully articulate your arguments for and against a position provide post-game analysts the opportunity to evaluate decisions and narrative trajectories carefully.

After the section on design, Paul Vebber and Anja Van der Hulst each ran a group of participants through the matrix game Baltic Lightning. Baltic Lightning is a game that explores the options of NATO, the US, and Russia during a crisis in the Baltics. It has a kinetic component, and is therefore useful in demonstrating how matrix games can be incorporated into operational level wargaming.

In the final session participants divided into two groups and spent several hours designing their own matrix games.

A group from the USAF was attending the conference in order to work on a matrix game relevant to their command. Their game focused on resource allocation amongst the staff components at a major command. How would the various departments divide up a limited pool of manpower, funding, and other resources in order to allow the command to accomplish its mission objectives? Participants designed and executed a matrix game where the primary focus of each player role was in arguing for resources, and justifying the argument. As resources became less available the arguments had to become more compelling in order for them to be distributed.

The other group designed and executed a matrix game on information operations in Venezuela. Player roles were sketched out, working to ensure both agency and compatibility between the various player positions. Players represented the US, Venezuela, and various OAS states along with the US military and others with equity in the situation. The players innovated in this game by having one player represent a variety of roles during the game. Each turn the die would determine whether this player was the weather, another actor, or some other element of the environment. The player would then argue from the perspective that they had been assigned by the die roll. This allowed the designers to have "random" elements in the game, but in a thoughtful and intelligent way. After the game was designed the participants then each took a
role, and alternated controlling the game. As they played the game they also identified modifications to it, and had progressed quite far with the design by the end of the class.

In summary the working group did what it set out to do: introduce the participants to matrix gaming, and give them a chance to design and execute a matrix game with the help of experienced game designers.
Wargame 3 – Project Cassandra

Overview

Run as one of the wargames during the October 2016 MORS Wargaming Special Meeting, Project Cassandra returned for the 2017 meeting. In keeping with the “learning by doing” theme of the overall conference, Project Cassandra again gave participants an introduction to a number of short, group methods that eventually culminated in the participants designing and playing their own wargame. In the process, Project Cassandra went over some basic scenario development, liberating structures, Structured Analytic Techniques (SATs), narrative analysis, and matrix gaming. Additional background on these methods is found in the 2016 Wargaming Special Meeting report. The two co-chairs went over each method that was introduced, ran the participants through them, and then discussed them with the group. The goal was not only to familiarize participants with different group methods, but to have them compare and critique them as well.

Session and Results

Project Cassandra ran for four, four-hour sessions. Session 1 on the afternoon of Tuesday, October 17 covered an overview, introductions between participants, and a brief discussion of the readings on teams. Readings covered how some teams within Google outperformed others, and what made for good and bad wargaming teams within the U.S. intelligence community. Discussion also covered the microstructures and design elements behind liberating structures, and participants used liberating structures such as 1-2-4-All, Impromptu Networking, and Nine Ways to introduce themselves, and the reason they were attending the workshop.
Session 2 on the morning of Wednesday, October 18 began with a presentation of the 2015 ONA summer study, “Reconsidering Resources.” The study questioned commonly held views that future conflict will be driven by resource scarcity, and instead presented a number of results showing evidence of resource abundance and dematerialization in key sectors. This offered a segue into a brief discussion on a SAT known as Key Assumptions Check, and an introduction to the CIA tradecraft primer on SATs. The group also used another common SAT, structured brainstorming, to generate ideas around a focal question: “What are the national security implications of a dematerializing world?” Participants brainstormed using Post-It notes (divergent thinking) and generated individual ideas before grouping them into categories (convergent thinking). Using gold start stickers, participants then voted on the ideas that they felt were the most important to explore.

*Project Cassandra Photo 1: Participants used post-it notes to brainstorm ideas before voting on which ones to explore*
Session 3 on Wednesday afternoon covered scenario development. The group went into the use of the liberating structure Critical Uncertainties, an approach that is the same as the SAT Alternative Futures Analysis. Taking the two axes that the group felt were the most important, participants created four potential futures scenarios: scenario A where there was a world of controlled information and low social cohesion; scenario B with controlled information but high social cohesion; scenario C with information freedom and low social cohesion; and scenario D with information freedom but high social cohesion.
Participants broke up into groups to add details to these scenarios. Participants were asked to give their scenario a name, and to specify the scale (national, international, etc.), the timeframe, the location, antecedent events, and the general themes.

After choosing one of the scenarios, the group brainstormed the actors that they felt would be key in the scenario. Actors that the group selected were: the U.S. government, activists, corporations, and the entertainment elite. The group broke up into teams again for each actor, and wrote out their actors’ objectives, means, helpers, blockers, sender (entity or conditions that provide the background rules and values), and receiver (entity or conditions where the rules or values are manifest). The intent was for participants themselves to generate the actors, goals, and conflicting viewpoints that they would then wargame.
Project Cassandra Photo 4: Participants brainstormed key actors in their scenarios

Session 4 on Thursday morning was the matrix game, using the information actors generated the previous day and creating the physical components of the game from the Matrix Game Construction Kit. Participants used the “Pros and Cons” system of matrix adjudication and played two rounds. Under this adjudication system, for their turn, each team had to specify an action that they were taking and list the reasons why they would be successful. Other teams then weighed in with reasons the team would not be successful in their action, and results were adjudicated by die roll. Teams were given different levels of resources according to their relative advantages, and turn order was determined as teams volunteered to take their turn. The session ended with a brief game hotwash, and feedback from participants about the Cassandra process.
Project Cassandra Photo 5: During the last session, participants used the Matrix Game Construction Kit to create the physical components of their game, which they then play tested.
Wargame 4 – Joint Wargaming Analysis Model (JWAM)

Chair: Colonel Chris Kirkman US Army, Chief of Campaign Wargaming Division, Center for Army Analysis

Objective

Demonstrate the Center for Army Analysis’s JWAM process in order to help participants: (1) gain an appreciation for modeling modern, conventional conflict at the operational level of war and (2) understand game complexity and playability tradeoffs.

Introduction

The Center for Army Analysis (CAA) manual wargaming process for conventional conflict is one of the primary tools available to the agency to perform pre-computer modeling campaign analysis. The purpose of the Joint Wargaming Analysis Model (JWAM) is to allow analysts to test and evaluate operational courses of action (COA) alternatives while simultaneously enabling them to develop a high level of familiarity with a particular area of operations (AO). This allows CAA to identify requirements, limitations, opportunities and risks involved with operations in the AO.

CAA conducts numerous wargames each year in support of commands and organizations at all echelons to include the Combatant Commands, Service Component Commands, Joint Staff, Headquarters Department of the Army, and Senior Service Colleges. Often these wargames provide insights and observations to the planning staffs, which lead to updates and/or revision of the operational plans. The Army also used this process to test employment of future operational concepts and weapon systems.

Execution

The working group consisted of a total of 25 personnel including 10 CAA employees and 15 participants from various organizations across the Department of Defense. A quick self-survey indicated that 10 participants rated themselves as apprentice and 5 as journeyman. The following provides a summary of the execution of the workshop:
Day 1 – Provide an overview JWAM and Battle Tracker.

We provided a detailed introduction of the 12-step JWAM game sequence and the mechanics of the Battle Tracker. The Battle Tracker is an Access database used to adjudicate the results of the manual inputs of the game play.

Day 2 – Provide a Mission Analysis / Course of Action (COA) brief and conduct test play and game play.

The working group was split into two teams, a Red Team and a Blue Team, and each player was designated a position with a specific role and responsibility to execute during the game play. Once the teams were organized, CAA provided an unclassified Mission Analysis and Course of Action brief of a scenario based on a limited Russian incursion into Estonia in order to seize the capitol of Tallinn (see graphic below). The group then spent the morning working through the game mechanics with the workshop participants functioning in their assigned roles. In the afternoon the group launched into full-fledged game play.

Day 3 – Continue game play.

The group spent the morning of the workshop’s third day continuing the prosecution of the operational scenario they had begun the day before.
Results

At the conclusion of the workshop, all participants declared the event to have been a success with most saying they had never experienced a wargame like the JWAM method before. The participants were most taken by the model’s expansive representation of the joint fight and the tightly coordinated linkages between the different wartime domains (land, air, sea).
Wargame 5 – Hedegemony

Impressions of the Wargaming Workshop from USMC Operations Analysis Directorate, Marine Corps Combat Development Center

By: William J Inserra, Civilian USMC william.inserra@usmc.mil

[Editor’s note: The workshop chair requested input from any participants in an effort to gain additional perspectives, not just those of the working group chairs, etc.]

1. Item: Workshop Coordinators Initiative, Intent and Achievement

Discussion.

The workshop coordinator(s) who volunteered their time and professionalism toward the ‘learn by doing’ theme should be commended in their efforts to achieve those intended objectives.

Recommendation.

Identifying the right combination of professionals who are willing to volunteer their time serves as a standard for future successes. While the intended approach for the ‘learn by doing’ has merit and warrants implementation i.e. the MORS Wargaming Course certification; there remains a need to ensure that the MORS community at large can be harnessed to assist with the ongoing broader objective of integrating wargames and analysis. ¹

2. Item: MORS office support capability

Discussion.

The MORS staff once again has demonstrated exceptional versatility with a ‘can do’ approach that enabled the workshop to be feasibly supportable to a successful event. The lead workshop coordinator’s astute planning cycle – early and often – enable sufficient lead time and coordination for MORS to achieve its necessary supporting tasks.

Recommendation.

The planning cycle used by the lead coordinator to coordinate tasks was effective and should be used as a template for future MORS workshops.

¹ Note from the Workshop Chair: Both of the Working Groups were composed of senior analysts from the MORS community and wargamers from the Connections community (many are members of both, as are the chairs).
3. Item: Alignment of Workshop Objectives with Keynote Speaker (VCJCS) Expectations

**Discussion**

There appeared to be a disconnect between the VCJCS Keynote address for what he assumed the MORS community was doing to integrate, leverage and exploit the analytic best practices, methods, models and tools to help with the integration of wargames that are intended to contribute to the intended end state of ensuring analytically defensible POM assessments.

**Recommendation**

Consideration should be made to align the Keynote speaker expectations with the Wargame Special Session objectives and agenda as early and often.


**Discussion**

The challenge remains to ensure the integration of wargaming and analysis. While the theme to ‘learn by doing’ is commendable the VCJCS Keynote address reveals that the MORS community missed an opportunity to have equitable influence and contribution across the workshop. Each of the working groups were chaired and led by the Wargamer SMEs, who given the agenda were appointed in positions to decide who was qualified or not qualified to participate within their groups. 

**Recommendation**

In the future when MORS is tasked with running a workshop with the continued desired end-state to improve the integration of wargames and analysis, it will be prudent to ensure an integrated balance of analysts and gamers as co-chairs for each working group.


**Discussion**

Regarding the Objective: ‘Identify best practices for the use of wargaming with the overall DoD analytic process,’ and the Method: ‘Review of the current analytic process.’ Unfortunately, absent a leveling brief orientation to establish a common understanding of the ‘overall DoD analytic process’ and the notion of a ‘Wargaming Integration Process’ the ambition in pursuit of a realistic ‘actionable product’ was unreachable. Acknowledging this is a difficult problem;


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Note from the Workshop Chair: Both of the Working Groups were composed of senior analysts from the MORS community and wargamers from the Connections community (many are members of both, as are the chairs).
conceptual products were produced as a recourse. Albeit, after listening to the other service presentations it became apparent that there are numerous wargaming and analytic centers of excellence. Unfortunately, there does not appear to be any deliberate integration that is being conducted across the still stove-piped wargaming and analysis communities. As a result, it is uncertain how far the ‘actionable-integration’ ball was moved down the field closer to the end-state that calls for analytically defensible POM Assessments that have accounted for the integration of wargames that have tackled the 3rd Offset Challenges that the analytic community is ill suited to address.

Recommendation. While integration across the USMC wargaming and analysis communities also have significant room for improvement, CD&I has made substantial advancements during FY17 that warrant ‘actionable’ consideration. OAD’s unprecedented demonstration of introducing JWAM and SWIFT into a service Title X wargame enabled data collection, open adjudication and the transition of service baselined DPS data products for follow-on uses to include wargames, studies and analyses.

Figure 1. Actionable Integration of Wargame and Analysis
OAD’s integrated approach to support wargames include contributions across: Pre-Game efforts: Authoritative data (LF3), STORM runs, JWAM database, SWIFT laydown, Battle Book; During Game efforts: JWAM SME refinements, SWIFT COP, data capture with SWIFT and Battle Tracker; Post-Game efforts: Story board actions and results, ‘by-turn’ force laydown, analysis of air and maritime attrition, inform STORM excursions, preliminary insights and findings, refined Strike EAB concept, enabled Congressional Demo, analytic annex to wargaming report, baseline data for CoL follow-on wargames, studies and analysis.

OAD’s contribution to our post MW17 iterative wargaming and analysis resulted in the production of ‘baseline-data’ that has directly transitioned into our STORM-Energy study, Log Metrics Study and the next cycle of Title X wargames.

Regarding an ‘actionable’ integration of the ‘wargaming process’ and the ‘analytic process’ we must first define each. OAD initiated a RAND study that addressed 6 viable ‘use-cases’ for Wargames that support: 1) Concept Exploration and Development, 2) Capability Development and Analysis, 3) Science and Technology, 4) Senior Leader Decisions, 5) Operating Forces COA Development, and 6) Training and Education. The broader DoD Analytic Process is presumed to include the requisite levels of analyses that adhere to the DPG use of DPS to meet the desired end-state of ensuring an analytically defensible service POM Assessment at the DMAG. Figure 2 (see on next page) provides a notional representation of the level of integration between the wargaming process and the analytic process that would take place during Phase I of the PPBE process to ensure the transition of actionable analytic data and products into the CBA process, which produces that MCEIP (Marine Corps Enterprise Investment Plan) in support of the service POM.
The bottom right portion of Figure 2 demonstrates the iterative analytic wargame approach that we implemented as the Gold Standard for integrating wargames and analysis. OAD’s 2017 analytic-wargame contributions resulted in the production of comparative analysis across a series of 5 iterative wargames (EW17/MW17) that enabled a defensible Warfighting function capability assessment that will serve to inform POM20.
## Appendix A

### Working Group II Bios

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**Michael Anderson**

Michael Anderson is a computer expert and wargame designer. He currently serves as a Booz Allen contractor supporting wargaming of OSD CAPE. Mr. Anderson served as the primary researcher for one SBIR contract - MeNTAT (computerized training for fifth generation fighter pilots) and the developer for two other SBIR projects - CyberWar XXI (extensible, multi-layered, near-future conflict analysis system) and Crisis XXI (COIN/counter-terrorism doctrine analysis system). He has designed a dozen published commercial board wargames, specializing in novel resolution systems and subject matter approaches.
Gil Cardona
I am a US Army Simulation Operations Officer currently serving as the Wargaming Branch Chief at US European Command, Stuttgart, Germany. In the past 16 months, I have coordinated and executed six wargames, all with the emphasis upon Operational Planning (OPLAN) development and refinement to synchronize activities and identify gaps/shortfalls in the plan. This past summer, we conducted a simultaneous Operational and Strategic wargame to synchronize an OPLAN at the Operational Level of War while executing a parallel Strategic game intended on de-escalating the conflict through political-military means. Previous to my service at US European Command, I worked at the US Army Special Operations Command where we developed the Silent Quest series of wargames. These wargames looked beyond the Future Years Defense Program (FYDP) to influence Command decisions with respect to Army Special Operations force structure, programmatic and technology investments.

Tom Choinski
Tom Choinski is the Deputy Director for Undersea Warfare at NUWC Headquarters. He previously served as the Head of the Emergent and Transformational Systems Division, Science Advisor to the CNO’s Strategic Studies Group and other leadership positions at NUWC. He has over 38 years of experience in government and industry encompassing innovation, management, engineering, research and development. Tom has served as a subject matter expert for wargames, workshops and concept exploration events conducted by the OSD Office of Net Assessment, Naval Warfare Development Command, CNO’s Strategic Studies Group, RAND and Naval War College. He developed courses in innovation strategies and has published/presented more than 60 papers on topics including innovation, unmanned systems, undersea warfare, digital signal processing, microwave design, ethics and autopoiesis expressed through art. The National Society of Professional Engineers selected him as one of the Top Ten Federal Engineers of the Year in 2008. He received a Meritorious Civilian Service Award for his contributions to the CNO’s Strategic Studies Group. Tom defended his Ph.D. dissertation on Dramaturgy, Wargaming and Technological Innovation in the U.S. Navy: Four Historical Case Studies at Salve Regina University. He earned an MBA from RPI, an MSEE from the NYU Polytechnic School of Engineering, a BEE from Manhattan College and completed an MIT Seminar XXI fellowship in Foreign Politics, International Relations and the National Interest. Tom holds DAWIA level III certification in program management from the Naval Postgraduate School, as well as one in systems engineering. He received his professional engineering license from New York State.

Rebecca Dougharty
Stephen Downes-Martin
Dr. Stephen Downes-Martin is a Research Fellow at the US Naval War College researching wargaming (theory and practice), confrontation analysis, systems thinking, decision analysis, deception and assessments methods applied to problems at the strategic, operational and tactical levels of warfare. At the War College he worked on wargame design, adjudication and analysis teams for a range of games at the operational and strategic level. A research focus is on how to manipulate wargaming and adjudication methods to deceive decision makers, how decision makers misuse such methods to deceive themselves, how to detect such attempts and how to protect decision makers from them. He received two Superior Civilian Service Awards for his contributions to I Marine Expeditionary Force (Forward) in Helmand Afghanistan and for his research accomplishments while a Research Professor at the Naval War College. (https://sites.google.com/site/stephendownesmartin/)

John Hanley
Dr. Hanley’s experience in operations research began developing tactics and techniques as nuclear submarine officer. Following active duty, he continued to design, conduct, and analyze submarine exercises in the Navy reserve. As a Principal Analyst and Vice President at Sonalysts, Inc., he wrote fleet exercise analysis guides and the Navy Tactical Development and Evaluation Master Plan, and designed, conducted, and analyzed fleet exercises in all fleets, using the data to support modeling, simulation, and gaming. He conducted campaign analyses for the Chief of Naval Operations Strategic Studies Group and assisted the Naval War College in the development of their Enhanced Naval Wargaming System. As Program and Deputy Director of the CNO SSG, he played a major role in the design, conduct, and analysis of SSG wargames; the main technique for exploring and evaluating their concepts. He also was an active participant in the Naval War College Global Wargames in the 1980s. While pursuing his degree in operations research, he discovered that no techniques were better suited to the development of strategy and operational schemes than wargames. His dissertation “On Wargaming: A Critique of Strategic Operational Gaming” addressed this proposition, and provided analysis and critique of the Global Wargames. He went on to serve as Special Assistant to USCINCPAC; Assistant Director for Risk Management at OSD’s Office of Force Transformation; Deputy Director of the Joint Advance Warfighting Program at the Institute for Defense Analyses; Deputy Director for Acquisition Concepts in OSD Acquisition, Technology and Logistics; developed long-term comprehensive strategies in OSD’s Strategy Office; and served as Deputy Director for Strategy Management in the Office of the Director of National Intelligence. He currently is an independent consultant. He received A.B. and M.S. degrees in Engineering Science from Dartmouth College, and his Ph.D. from Yale University in Operations Research and Management Science.

Frederick Hartman
Fred Hartman has an extensive background in models, simulations and training applications with Defense related management and analysis positions in both industry and government. He has specialized in problem solving with use of modeling and simulations, assessing training systems and technical applications for over 35 years. Fred graduated from the U. S. Military Academy with a BS in Engineering and served as a Field Artillery Officer and Army Aviator in Viet Nam. After receiving an MS in Operations Research from the Naval Postgraduate School, Fred
completed several Army analytic assignments prior to leaving active duty for an industry career. Fred joined CACI, Inc. in 1981 and over the next ten years progressively grew from Department Manager to Executive Vice President by building an analysis and software development group consisting of professionals in operations research, software engineering, logistics engineering, financial analysis, and software development. In 1992 Fred became Chief Operating Officer, was co-founder and on the Board of Directors for Applied Solutions International, Inc., a technology start-up company with consulting services for Defense industries and international trade. Consulting and analysis at ASI included work for the United Nations Development Programme, Army Research Labs, and the Small Business Innovation Research Program (SBIR). Fred joined IDA in 1996 as a modeling and simulation advisor to the DUSD (Readiness) and served from 2000 to 2003 as Technical Director, Joint Simulation System and Manager, Enterprise Division of the Defense Modeling and Simulation Office. In 2003 Fred joined the Office of the USD (Personnel and Readiness) as Director, Training Transformation Joint Assessment and Enabling Capability and as Deputy Director, Readiness and Training Policy and Programs returning to IDA in 2007. Mr. Hartman continues to support the Department of Defense with strategic planning and training acquisition projects. In addition to leadership positions in modeling and simulation volunteer organizations Fred has served as a member of the Army Science Board, led a study panel for the National Academy of Sciences, Board on Army Science and Technology, and is a past President and Fellow of the Military Operations Research Society.

John Lillard
John is an Operations Analyst and naval historian who has over 30 years of experience in systems analysis, requirements development, modeling and simulation, and wargame development. After leaving active service is the US Navy in 1995, he worked in the Joint Strike Fighter program office as the survivability requirements analyst. From there he moved to Whitney, Bradley & Brown Inc. (WBB), where he spent 16 years as a manager for requirements development and eventually the Director of Modeling and Simulation. He filled the same role for 2 years at Newport News Shipbuilding, and is presently the director of the Integrated Mission and Operations Analysis business unit at Modern Technology Solutions Inc. (MTSI). He received his MS in Operations Research from Naval Postgraduate School is 1987, and his PhD in History from George Mason University in 2013. While at WBB, he designed small and large-scale wargames to develop requirements for the next generation aircraft carrier (CVNX), and for airborne surveillance systems. His dissertation, Playing War: Wargaming and US Navy Preparations for World War II, was published as a book by Potomac Press in 2016.

Roger C. Meade
I am the wargaming lead at U.S. Pacific Command; in that capacity I oversee the development and delivery of wargames to the USPACOM Staff, subordinate components and partner nations from around the Asia-Pacific. For the past three years I have been a Senior Military Analyst at Booz Allen Hamilton, where I have been under contract to the Pacific Command's wargame revitalization effort. I have designed and constructed wargames for both the Army and Navy here in Hawaii, as well as the Joint Inter-Agency Task Force West. I am the manager of the command's wargame repository and their principle advisor on wargaming in the Pacific Rim. I led a team that conducted a study of wargaming within the command that serves as the basis for USPACOM's current wargame alignment efforts. In addition to extensive experience in wargaming and military analysis, I currently hold credentials as an Assistant Professor at the
Joint Forces Staff College, where I was a member of the faculty from 2007-2010 and routinely conducted/facilitated wargames.

Roy Morris
Architect for the Air Guardian wargame series, tasked by the AU/CC, to create and execute a series of wargames exploring a hypersonic aircraft concept in less than five weeks. Wargame Director for three wargames: Joint Planning Exercise (JPEX), Joint Air Exercise (JAEX) and the Joint Wargame (JWAR), all supporting the Air Command and Staff College. These three wargames involve approximately 510 players, 30 faculty members and 5 game controllers each. Responsible for all phases of these wargames from wargame preparation through execution, to include all required game materials, reference materials, order of battle data as well as individual database for specific scenarios. Game Director for Tandem Challenge, the largest wargame ever created by AFWI. This wargame was developed, from a blank sheet of paper, from concept through execution and involved 850 Air War College and Air Command and Staff College students, 50 faculty members and 125 game controllers. Subject Matter Expert on the operational art of war, to include participation in several Title X wargames. RFI Chief for five different Unified Engagement and Futures wargames. Also filled key game positions during all AFWI-hosted events. Participated in hundreds of wargames over the past 22 years.

Peter Perla
Peter P. Perla has been involved with wargaming, both hobby and professional, for over fifty years. After earning a Ph.D. in probability and statistics from Carnegie-Mellon University he joined the Center for Naval Analyses (CNA) in 1977 as a naval operations research analyst. Over his forty-plus year career at CNA he has directed major projects, served as Special Assistant for Command and Control, led a research team for Interactive Research Products, and received the award for Outstanding Analyst of the Year in the Advanced Technology and Systems Analysis division in 2012. Dr. Perla continues to serve CNA currently as part-time Principal Research Scientist. In 1990, the U.S. Naval Institute published the first edition of his book, The Art of Wargaming. This book became a fundamental international reference on the subject (including a Japanese-language edition), and a standard text at U.S. military schools. It was republished by the History of Wargaming Project in 2011. Dr. Perla is regarded as one of the nation’s leading experts on wargaming and its use in research, learning and innovation. He has spoken at international conferences on wargaming and analysis, including presenting keynote addresses at Connections professional wargaming conferences in the United States, the United Kingdom, and the Netherlands. He has published articles and columns in both the professional and hobby wargaming press, and has designed or developed half a dozen games in the commercial board game industry. His writing has received a Hugh Nott award from the Naval War College Review and a John K. Walker, Jr. award from the Military Operations Research Society (MORS). Dr. Perla is one of the instructors for the Wargaming Certificate course sponsored by MORS, beginning in 2016. In 2017, he received the first award for Lifetime Achievement in Wargaming by the Connections Wargaming conference and was congratulated on that achievement by the CNO.

Merle Robinson
Merle S. Robinson [Wargame designer, Lean Six Sigma Black Belt; DoD civilian analyst (retired)] has over 40 years’ experience in hobby wargaming including lead operator of eight
regional wargaming conventions. Extensive involvement in conflict simulation gaming, Euro-style gaming, historical/fantasy miniatures and roleplaying. Currently lead Wargame Designer for the National Security Decision Making Game (NSDMG). Operating since 1990, NSDMG is a non-profit educational group running events on historical/contemporary periods at wargame conventions and universities. NSDMG wargames are Political, Military, Economic, Social, Infrastructure, Information (PMESII) style rooted in the US Naval War College tradition. for over 1500-2700 participants annually. NSDMG annually offers 18-30 wargames and 16-30 seminars/lectures on historical, military and political topics.

Vincent Schmidt
I am the Air Force Research Laboratory's (AFRL) wargaming lead for the 711 Human Performance Wing, one of a handful of AFRL Technical Directorate leads involved in recommending the direction and participation of AFRL in upcoming wargames. One of my roles includes effectively advertising to my colleagues the importance and value of wargaming.

Gary Schnurppusch
Gary is a retired Navy Surface Warfare Captain, an extensively experienced ORSA in uniform and in the private sector. His wargaming experience dates to the 1970s-1980s on active duty when he contributed to several Navy wargames as a player, analyst, and designer, including annual POM Games, the annual Global Wargame series, and the Tactical Command Readiness Program (TCRP) games, largely at NAVWARCOL for OPNAV and OSD PA&E. More recently in OSD CAPE Simulation Analysis Center, he supported SAC's wargaming team, such as: Navy combat adjudicator in "Tightrope Endeavor" ... an ASUW game to contrast submarine anti-ship capabilities versus air-to-surface attack capabilities; as the Red Cell Controller in "Threadbare Ultimatum" ... a political-military game; provided Red, Blue, and Green Naval warfare threats, capabilities, strategies and context for game play in a series of Europe wargames. The vast majority of his ORSA experience has been directly applied to multi-mission Naval warfare analysis, that is, modeling, measuring, and explaining operations and outcomes by using numerous ORSA tools including modeling and simulation, probability and statistics, spreadsheet and tabletop ORSA calculations. That experience involves the same skillsets as in game adjudications and same methodologies used for game designs, evaluations, and assessments.

Bill Simpson
Served at Wargaming Division, Quantico from Dec 1994 until Oct 2015 as a Wargaming Specialist where my activities included: (a) Designing, planning, executing, assessing and reporting wargames, workshops, and seminars; (b) Training incoming personnel in wargaming history, design, procedures; (c) Representing the Division to other agency and service wargaming organizations; (d) Providing technical and Subject Matter Expert (SME) support to external wargames, experiments, workshops, and related events. Adjudication experience includes being Umpire at most Navy Global Wargames both old and new from 1995 to 2011 and Senior Ground Umpire at the 2011 Global Wargame by invitation. I have designed and executed all levels of wargames at Quantico and have considerable experience incorporating adjudication into the game design and conducting adjudication during the games. Hired by the Center for Naval Analysis as a Senior Wargaming Specialist in January 2017. Editor of the “A Compendium of Wargaming Terms” posted at the MORS and Naval War College Wargaming Sites.
Eugene Visco
I bring over six decades of military operations analysis as a US Government, US Army and a defense contractor employee to wargaming. I am currently a member of the corporate headquarters staff (Enterprise Operations, Mission Development team) of Lockheed Martin where my responsibilities include operations analysis and wargaming for the corporation. My most recent hands-on wargaming experience is as a member of the game planning team, where I worked on the development of the first-ever (for Lockheed Martin) cyber wargame conducted at the Center for Innovation (aka The Lighthouse, Suffolk, VA), conducted last fall (an in-house game). During the game, I was a member of the White Team, helping adjudicate as needed. Following the game, I assisted in the preparation of an unclassified quick-response report and a second more deliberate classified report. In earlier years, at the Army’s original think tanks (JHU ORO and RAC, 1956-66) I was involved in the application of quick gaming, an approach of highly aggregate games to provide rapid contributions to decision making. In 1963 I developed Schnellspiel for use in NATO’s Central Army Group to provide a more objective umpire for FTXs and CTXs.

Timothy Wilkie
Tim Wilkie is a Research Fellow at the gaming center of National Defense University (NDU), the Center for Applied Strategic Learning (CASL). Previously he worked as a Foreign Service Officer for the Department of State, serving in Colombia and Chile. He is a graduate of the University of Chicago (AB) and The Fletcher School of Law and Diplomacy (MALD), where he wrote his thesis on the application of decision-making theories to free-form gaming. As part of CASL’s ongoing efforts to engage with the broader gaming community, he has served as the co-chair of the annual Connections interdisciplinary wargaming conference since 2012. He is currently teaching an elective at NDU on Strategic Gaming.
# Appendix B

**Cadre Listing for Working Group 5 Personnel**

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Appendix C

Purpose and Objectives of Presentations and Commercial Games (Working Group 5)

Wargaming 1

Purpose:

To address the needs of novice wargamers in learning the fundamentals of wargaming and to provide practical experience in participating in a variety of different games. Demonstrate the value of gaming as a method and technique for discovery and to understand the results of plans and decisions.

Learning Objectives:

- Comprehend the vocabulary of wargames and analyses
- Know the elements of games, game structures and sequence of events
- Understand military employment of units, systems and time and space
- Understand the interplay of corporation and competitiveness
- Interpret the value of games in generating new ideas and courses of action
- Understand the shortfalls and limitations of games and their ability to deceive

Introduction to Wargaming

Purpose:

To introduce the basic concepts associated with wargames, providing a fundamental understanding of wargame vocabulary and general gaming structure

Objectives:

- Know the primary uses of wargames
- Know the seven elements of wargames
- Understand the importance of wargame scenarios
- Be familiar with wargame models and tools
- Know the three levels of wargames
- Comprehend the many military uses of wargames
Fundamentals of Wargaming

Purpose:
To introduce the basic characteristics of wargames, game play, and wargame strengths, limitations, and misuses

Objectives:
- Know basic wargame characteristics
- Know the steps in wargame design
- Know the characteristics of good wargaming models
- Apply the concept of validity to wargame use
- Experiment with a hands-on wargame

The Wargaming Environment

Purpose:
To introduce the wargame environment; to describe the gaming process and to discuss the roles and responsibilities of the wargame participants

Objectives
- Know the operational environment in which wargames are played
- Comprehend the responsibilities of the training audience, various “cell” members
- Know the mechanics of operating within the game and the various flows of information
- Know how to be an effective wargamer

Purpose and Objectives of Commercial Game Instructions

Drive on Metz

Purpose:
To provide wargaming experience in performing the missions of a WWII Corps commander in the European Theater of Operations (ETO). Learn about the employment of combat units in a historical and training environment.

Objectives:
- Understand the basic concepts underlying wargames and how these models of warfare are designed and constructed
- Understand concepts of military organizations, mobility, command and control, firepower, intelligence, and logistics
• Comprehend the effects of mass, unity of command, terrain, attack and defense, and military tactics
• Gain experience in participating in a historical reenactment of a WWII battle to understand doctrine and the battle operating systems

Wings of War

Purpose:
To understand wargaming by examining a simple but representative and characteristic board game that simulates various aspects of air combat during WWI.

Objectives:
• Knowledge on time and space dimensions and the mobility-versatility issues in air combat
• Understand the limitations of systems used in warfighting (direct fire, maneuver, speed, communications, ISR, coordination, reliability, damage assessment)
• Gain analytical insights and generate solid technical questions for further analysis and system concept development
• Draw technological, tactical, and operational parallels between WWI and current systems

Pandemic

Purpose:
To provide role playing experience in participating as a team member within a stochastic and time sensitive game that demands individual special skills, anticipatory planning, and inter-player cooperation in order to win.

Objectives:
• Understand the basic structure of cooperative games and gain perspective on their designs and player motivations
• Understand the concepts of rapidly growing infectious disasters and key of planning, intelligence, and logistics issues
• Comprehend issues of alternate perspectives, limited working resources, time sensitivity, and the impact of global effects
• Understand the effects of time, accelerations of detrimental processes, conditions of improvement, criteria for containment
• Gain experience through participation in research, containment, plan revisions, communications, and taking immediate actions

AFTERSHOCK

Purpose:
To provide role playing experience in participating as a cooperative/ adversarial team member within a stochastic and time sensitive crisis action game that demands individual special social
and political skills, anticipatory logistical planning, and government/non-government and faction-player cooperation in order to negotiate a national emergency.

**Objectives:**

- Understand the roles and missions of the various participants
- Know the special capabilities of each of the special interest groups
- Know the geographic demands of the population and leadership issues
- Understand the implications of applying limited resources
- Understand the implications of time response in emergencies
- Know the importance of infrastructure and political presents
- Understand the flow characteristics and constraints of support materials
- Understand the political implications of security and the impact or use of media
Appendix D

Lesson Assignment and Execution Plans (Working Group 5)

Wargame 1 (WG5), Session 1: 1300-1700, Tue., 17 Oct 2017, Chestnut Room Hilton Mark Center

Session 1 Chairs: Mr. Mark L. Axtell, InfoSciTex Corporation (IST), a DCS Company
Session 1 Chair: Dr. Thomas C. Hughes, InfoSciTex Corporation (IST), a DCS Company

Initial Tutorial: Introduction to Wargaming, Mike Garrambone (50 minutes)
Objectives: (See Appendix C for details)

Wargame Player Instruction for: James F. Dunnigan’s Drive On Metz (50 minutes)
Instructors: Mr. Mark L. Axtell and Dr. Thomas C. Hughes

Playing of the Drive On Metz (DoM) Wargame (60 minutes)
Students will be divided into small groups of 2-3 players per side (US/GE), up to 6 simultaneous games
Learning Objectives: (See Appendix C for details)

DoM Game Directors:
Mr. Michael A. Ottenberg, OSD/CAPE
Mr. Bret R. Givens, Solutions through Innovative Technologies, Inc.
Ms. Lee Ann Rutledge, Air Force Research Laboratory, Aerospace Systems Directorate
Mr. Vincent M. Raska, Air Force Research Laboratory, Aerospace Systems Directorate
Mr. Michael B. Dunn, Dir. of Simulations Education, Command and General Staff College
Dr. Karsten G. Engelmann, Center for Army Analysis
Ms. Kaarin Ann Engelmann, Engelmann Consulting
Mr. Donald H. Timian, US Army Retired
Mr. Paul W. Vebber, Naval Undersea Warfare Center

DoM Out Briefing:
Instructors: Mr. Mark L. Axtell and Dr. Thomas C. Hughes
Students will out-brief their views of the game

Admin Notes.
Six magnetic boards w/ maps and unit player sets will be in the Hilton game room NLT Tue 1230
Teams will set the game up (w/GE OB) to be played on the six wooden easels
Teams of 2-3 people per side will be divided per game (teams announced in advance
Handouts on adjudication (CRT), terrain effects, rules and game dice will be available for each game. The game play will begin following the Introduction to Wargaming and DoM instruction session. Mike Garrambone will bring all the materials and briefings for player instruction for this game. MORS will provide a projector, extension cords, and a very large screen for this event. Total game time is expected to be 50-70 minutes with 10 minutes per side turn. Expect some trash talking about easy victory from the winners.


Session 2 Chair: **Ms. Lee Ann Rutledge**, Air Force Research Laboratory, Aerospace Systems Directorate
Session 2 Chair: **Mr. Vincent M. Raska**, Air Force Research Laboratory, Aerospace Systems Directorate

Second Tutorial: Fundamentals of Wargaming, Mike Garrambone (50 minutes)
Objectives: ([See Appendix C for details](#))

**Wargame Player Instruction for** Angiolino & Paglia’s Wings of War (50 minutes)
Instructors: **Ms. Lee Ann Rutledge and Mr. Vincent M. Raska**

**Playing of the Wings of War (WoW) Wargame** (60 minutes)
Students will be divided into small groups of 2-3 players per side, up to 6 simultaneous table games
Learning Objectives: ([See Appendix C for details](#))

**WoW Game Directors:**
Mr. Michael W Ottenberg, OSD/CAPE
Mr. Bret R. Givens, Solutions through Innovative Technologies, Inc.
Mr. Mark L. Axtell, InfoSciTex Corporation (IST), a DCS Company
Dr. Thomas C. Hughes, InfoSciTex Corporation (IST), a DCS Company
Mr. Michael B. Dunn, Dir. of Simulations Education, Command and General Staff College
Dr. Karsten G. Engelmann, Center for Army Analysis
Ms. Kaarin Ann Engelmann, Engelmann Consulting
Mr. Donald H. Timian, US Army Retired

**WoW Out Briefing:**
Instructors: **Ms. Lee Ann Rutledge and Mr. Vincent M. Raska**
Students will out-brief their views of the game

**Admin Notes.**
Aircraft and game card sets with terrain maps will be in the room NLT Wed 0730
Teams will set the game up both Allied and Axis to be played on the game tables
Teams of 2-3 people per side will be divided per game (teams announced in advance
Handouts on special effects, DME equipment, and game rules will be avail for each game
The game play will begin following the tutorial and WoW instruction session
Mike Garrambone will bring all the materials and briefings for player instruction for this game
MORS will provide a projector, extension cords, and a very large screen for this event
Total game time is expected to be 60-70 minutes
Please make sure the aircraft return to the hanger following this event! MWG
Introducing 1918 Aircraft during game play will be left up to the instructors


Session 3 Chair: Dr. Karsten G. Engelmann, Center for Army Analysis
Session 3 Chair: Ms. Kaarin Ann Engelmann, Engelmann Consulting

Third Tutorial: The Wargaming Event, Mike Garrambone (50 minutes)
Learning Objectives: (See Appendix C for details)

Wargame Player Instructions for: Leacock’s Pandemic (50 minutes)
Instructors: Dr. Karsten G. Engelmann and Ms. Kaarin Ann Engelmann

Playing of the Pandemic Game (approximately 60 Minutes)
Students will be divided into small groups of 2-3 players per side, up to 6 simultaneous games
Learning Objectives: (See Appendix C for details)

Pandemic Game Directors:
Mr. Michael A. Ottenberg, OSD/CAPE
Mr. Michael B. Dunn, Dir. of Simulations Education, Command and General Staff College
Mr. Scott Chambers, National Defense University
Ms. Teresa King, National Defense University
Mr. Paul W. Vebber, Asst Dir, Naval Undersea Warfare Center
Dr. Callie Le Renard, Center for Applied Strategic Learning
Ms. Rebecca Schaefer, Center for Applied Strategic Learning
Mr. Richard Phares, Booze Allen, Hamilton

Pandemic Out briefing (30 minutes)
Dr. Karsten G. Engelmann and Ms. Kaarin Ann Engelmann
Students will out-brief their views of the game
Admin Notes.
MORS Office will provide 5 additional games before Wednesday noon for game play
Instructors will set the game up four or five players to a game table
Teams of 2-3 people per side will be divided per game (teams announced in advance
The game play will begin following the tutorial and the Pandemic instruction session
Mike Garrambone and Dr. Karsten G. Engelmann will bring an additional game box
MORS will provide a projector, extension cords, and a very large screen for this event
Total game time is expected to be 70-80 minutes
There should be no fighting at the tables
Wargame 1 Session 4: 0800-1200, Thursday, 19 Oct 2017, Hilton Mark Center Hotel, Room TBD

Session 4 Chair: **Mr. Timothy Wilkie**, CASL, National Defense University (NDU)
Session 4 Chair: **Mr. Scott Chambers**, CASL, National Defense University (NDU)

Note, Introduction, but no tutorial for this session

**Game Player Instruction for:** AFTERSHOCK (30 minutes)
Instructors: **Mr. Timothy Wilkie and Mr. Scott Chambers**

**Playing the AFTERSHOCK Game** (90 minutes)
Students will be divided into either 4 person groups or 2 person to a team, 4 team groups dependent on attendance making it 4 to a game or 8 to a game. At most, there will be 6 parallel games.
Learning Objectives: (See Appendix C for details)

**AFTERSHOCK Game Directors**
Mr. Michael B. Dunn, Dir. of Simulations Education, Command and General Staff College
Dr. Karsten G. Engelmann, Center for Army Analysis
Ms. Kaarin Ann Engelmann, Engelmann Consulting
Mr. Paul W. Vebber, Asst Dir, Naval Undersea Warfare Center
Mr. Scott Chambers, Center for Applied Strategic Learning (CASL), NDU
Ms. Teresa King, Center for Applied Strategic Learning (CASL), NDU
Ms. Rebecca Schaefer, Center for Applied Strategic Learning (CASL), NDU
Dr. Callie Le Renard, Center for Applied Strategic Learning (CASL), NDU
Mr. Timothy Wilkie, Center for Applied Strategic Learning (CASL), NDU
Mr. Richard Phares, Booz Allen Hamilton

AFTERSHOCK Out briefing (45 minutes)
**Mr. Timothy Wilkie and Mr. Scott Chambers**
Students will out brief their views of the game

**Admin Notes.**
MORS Office will provide 5 additional games before Wednesday noon for game play
Mike Garrambone and Dr. Karsten G. Engelmann will bring an additional game box
Instructors will set the game up for 4 or 8 players to a game table
Player teams will be announced in advance to the students
The game play will begin following the short introductory AFTERSHOCK instruction session
MORS will provide a projector extension cords, and a very large screen for this event
Total game time is expected to be 70-80 minutes leaving time for Out briefing
Attitude and cunning thought may play a major role in this event

**Special Notes**
It is expected that instructors and game directors will provide daily comments about the Wargame 1 sessions each day. These are to be given to Mike Garrambone for consolidation in the final Wargame 1 sessions report for the End of Event Workshop out briefing Thursday afternoon.

Appendix E

Working Group 5 References.


