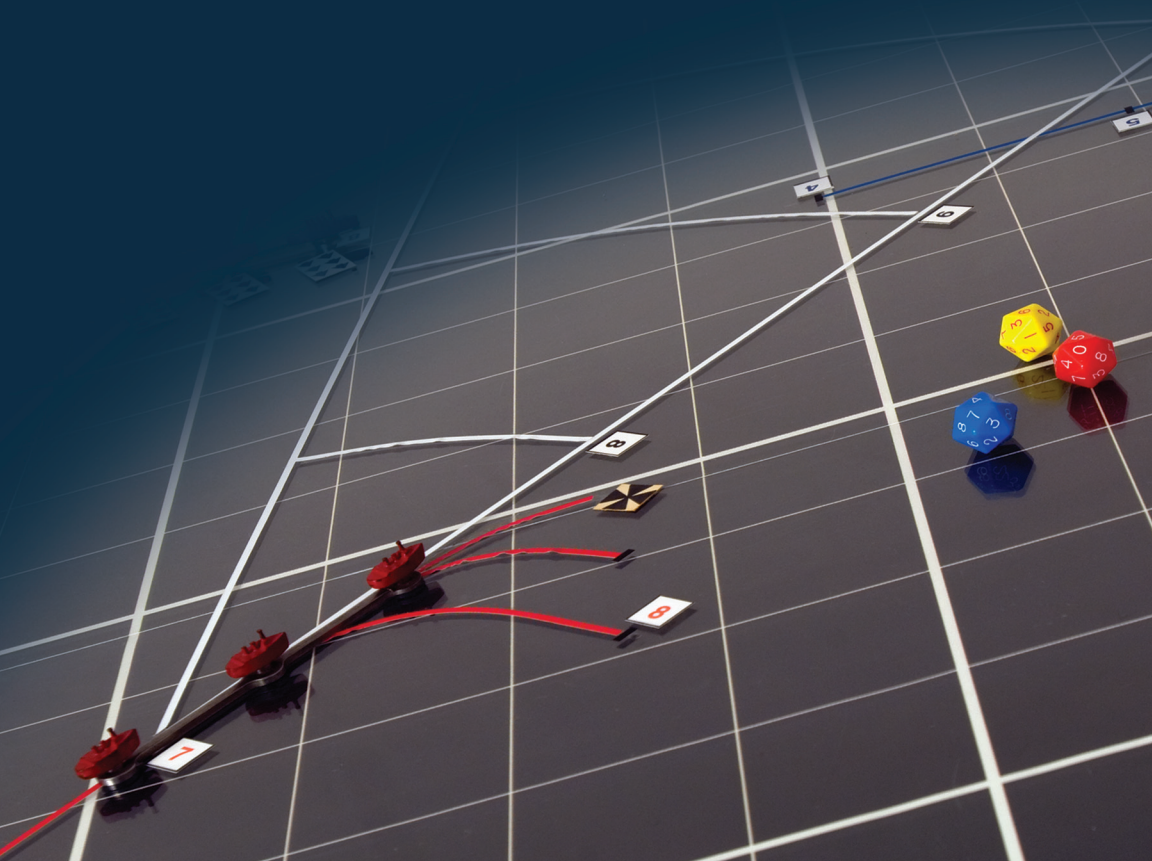
A Guide for Professional War Gamers

War Gamers' Handbook



War Gamers' Handbook

A Guide for Professional War Gamers

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Table of Contents

List of Figures

Foreword

Many people do not understand war gaming today and some view it only in the context of models, simulations, and computers. While these are tools to be used, military war gaming is about human decision making and providing information to senior leaders to make better-informed decisions. This handbook is about what it takes to organize and conduct war games to enable those decisions. It is about operational-level war gaming; it is about analytical war gaming; and it is about how to produce war gaming results that are relevant and useful to senior navy leadership including the Chief of Naval Operations and fleet commanders. Taking war gaming from an idea through to completion requires significant intellectual effort, creativity, and a willingness to address complex problems for which no solution is readily apparent.

This is truly the world of the war gamer—dealing with those ill-defined problems that commanders and their staffs cannot get their arms around and have neither the time nor even an idea of how to address. Thus, the war gamer must be able to dig deep into the tool kit to find a way to examine the problem and provide actionable information to the commander and staff. That tool kit is really the art of war gaming—it means the war gamer must develop a game in which humans make decisions, hold them accountable for those decisions throughout the game, and then use the data from the game to provide insights and recommendations. While the war gamer asks the players to play to win in a war game, the final analytical results are not recorded in black and white nor are they based solely on a quantitative equation. In fact, the difficulty for the war gamer is to translate data from a game that is artificial, simulated, and played on a board or computer and then to tie it to a real problem for a real commander. The ability to do this is part of the art and something that is learned over a long period of time by those who understand the value of the war gaming process.

This handbook is the result of five years of work by the faculty of this department. By this, I don't mean it took five years to write, but it captures the efforts, ideas, and processes that have been developed over this period. As such, I think it is important to describe how this department evolved to the point of developing this handbook. When I became chairman of the War Gaming Department in 2008, I had a vision of where the department needed to go and what it needed to do to get there. One of the most important parts of this vision was to establish a truly professional faculty that could design, execute, and analyze war games using a logical methodology that had a rigorous grounding in the data of the game. The

first step in this process entailed developing a thorough game design document for each analytical war game that we conducted. This step would ensure that we were creating games that were based on the sponsors' objectives, conducted to provide data on those objectives, and analyzed to provide answers or at least insights and recommendations toward achieving those objectives. This led to the second step, which was to deliver to the sponsor an analytical report on the game based on the players' actions and words as they were captured during game play. With this basic guidance, the War Gaming faculty started a transformation on how games are managed here at the Naval War College.

To produce high-quality design documents, we needed to institutionalize the methods, techniques, and processes that were critical to game design but scattered among PowerPoint presentations and different articles and books. While game design is a necessary phase, it quickly became apparent that something more was needed to continually produce high-quality, relevant results from our war games and that was a sound analytical process. This became the next stage of development for the department as we acquired software tools to help code, sort, and visually depict data from the games. To this end, our reports became more relevant, but we did not stop there. Several of the faculty recognized that analysis had to be incorporated "up front" in the game design and it could not wait until after the game was completed. Thus, we developed the data collection and analysis plan as part of the game design document and then incorporated multiple presentations on the entire analytical process into our professional development program to engage as many faculty members as possible on this.

Over the next few years, more commands and organizations recognized the capabilities that the War Gaming Department brought to help them examine very complex problems. As this occurred we developed and refined our procedures to conduct two- and multisided war games, advanced our ability to conduct war games at the operational level of war, and included emerging activities such as cyber warfare into our games. These more complex games led us to integrate knowledge management, web tools, and multitouch, multiuser technologies in order to more efficiently and effectively move, share, and capture the data from our war games. This brought about the most recent advancement, which is the formalization of the war game project management process. This process will enable the faculty to control multiple war games in different phases of development using the current capacity and resources of the faculty.

With this short description of the evolution of the War Gaming Department over the past five years and the amount of change that has taken place in the processes and conduct of war games, it should be easy to see that the next phase required capturing this data in a single document so that people had a starting point on how to attack a problem requiring a war gaming technique. Dr. Shawn Burns has done a superb job leading this effort and developing this handbook, which brings a coherence to the art of war gaming. While no single document could address the multitude of issues that war gaming encompasses, this handbook certainly establishes an excellent foundation for how war gaming is approached and conducted at the Naval War College.

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1

Handbook Introduction

Purpose of This Handbook

This book is intended as a helpful reference, supplement, and handbook for the members of the U.S. Naval War College's (NWC's) War Gaming Department (WGD) faculty, and is the first comprehensive update of NWC war gaming practice by the NWC WGD in over fifty years. The primary audience for this book is NWC WGD military and civilian faculty, especially new faculty members. Experienced faculty may also use this as a periodic refresher reference. Additionally, war gaming practitioners at other institutions, including international military war colleges such as those where U.S. NWC WGD faculty teach war gaming workshops, may also benefit from this updated war gaming reference.

Use of This Book

A comprehensive reference providing an overview of latest war gaming practices employed in the U.S. NWC WGD, this book is intended to complement the WGD's new-faculty orientation and ongoing professional development program, serving as the primary overview of current war game duties, planning, processes, techniques, and tools as currently employed. As such, this book does not provide a history of war gaming, nor does it explain every possible method of game design or analysis. Also, this book does not address commercial or hobby war game processes, is not prescriptive, nor does it describe war gaming practices used at other institutions. Game directors are responsible to the WGD chair to exercise sound judgment when applying, or deviating from, the general principles described in this handbook.

Challenges Associated with Scholarship in the Field of War Gaming

U.S. naval war gaming continues to evolve, in spite of hindrances to scholarship in the field of war gaming. Traditional scholarly literature does not include an extensive body of war gaming literature, partly due to the ". . . self-conscious reticence of war gaming devotees and the classified nature of professional war

gaming" (Sabin, 2012, p. 16). Another hindrance to the development of war gaming scholarship is the fact that war gaming ". . . is still more a craft than a discipline . . ." (Rubel, 2006, p. 109), and the lack of criteria to determine whether games are flawed (Rubel, 2006).

Traditional academic disciplines, such as history or biology, have long-standing processes to educate and develop scholars and share ideas in discipline-specific journals. However, some fields, such as war gaming, lack such robust integrating mechanisms to share and advance professional knowledge. This results in limited published resources to serve as references for exchange among professionals and institutions. As such, this publication is an attempt to remedy the deficiency of a common written body of knowledge.

Contribution to the Evolving Body of War Gaming Scholarship

An early U.S. naval war gaming innovator, Captain William McCarty Little, adapted land-focused war gaming to the maritime environment to aid U.S. NWC students and the U.S. Navy. In *Strategic Naval War Game or Chart Maneuver,* McCarty Little (1912) described innovative war gaming concepts and processes. According to McCarty Little, while games are intended for amusement, war games are more serious and may help inform strategy and tactics involving possible loss of life and national survival. Additionally, war games are a preconflict way to test strategy. McCarty Little also described two principal categories of war games, noting that experiential war games provide value to game participants, while experimental war games provide value through the testing of plans. The basic process for organizing a naval war game as outlined by McCarty Little in 1912 continues today.

Others have also contributed to war gaming scholarship. McHugh (1966), a NWC war gamer from the mid-1930s to the late 1970s, codified war gaming procedures as then used at NWC, updating to reflect the introduction of technology into war gaming. Later, Perla (1990) provided a review of war gaming as then practiced at NWC, while commercial game designer Dunnigan (1992) provided useful tips for war game designers. Rubel (2006) described a theory of knowledge, noting war gaming's useful contribution to the creation of knowledge. More recently, Sabin (2012) described war gaming as used in higher education in the United Kingdom. Acknowledging the work of previous scholars, this handbook modestly seeks to apply their work to contemporary NWC WGD processes.

II

War Gaming Overview

Introduction

The WGD contributes to NWC's educational and research missions. Through its design, execution, and analysis of war games, the department's research and gaming focus is on providing insights into problems of interest to U.S. Navy leaders. The WGD also contributes to NWC's educational mission, sometimes through war gaming, but more often through teaching NWC course electives, or by teaching war gaming seminars to other military colleges throughout the world, including those in Azerbaijan, Chile, Colombia, Dominican Republic, Mexico, and Uruguay, among others. Yet, research and educational missions are also linked in the long term, as many of the concepts the department explores during war games end up in doctrine, and, ultimately, as part of the NWC curriculum.

The WGD conducts approximately forty war game projects per year, principally for U.S. Navy headquarters organizations, major Navy operational commands, and occasionally other DOD and U.S. government organizations. The department conducts these games using a diverse blend of professional expertise, including war gaming computer network experts, web designers, audiovisual technicians, enlisted personnel, as well as military and civilian faculty.

War Gaming Definition

War gaming is a tool for exploring decision-making possibilities in an environment with incomplete and imperfect information (Herman, Frost, & Kurz, 2009). Additionally, a value unique to all war games is the occurrence of previously unknown issues, insights, or decisions that arise during the conduct of a game. War game participants may make decisions and take actions in a game that even they would not have anticipated, if not for the game environment (Perla, 1990). Nobel prize–winning scholar Thomas Schelling saw gaming as a tool for creating insights.

> Games, however, have one quality that separates them qualitatively from straightforward analysis and permits them to generate insights that could not be acquired through analysis, reflection, and discussion. That quality can be illustrated by the impossibility theorem: one thing a person cannot do, no matter how rigorous his analysis or heroic his imagination, is to draw up a list of the things that would never occur to him. (Schelling, 1987, p. 436)

The WGD uses the Perla (1990) definition, which describes war gaming as ". . . a warfare model or simulation whose operation does not involve the activities of actual military forces, and whose sequence of events affects and is, in turn, affected by the decisions made by players representing the opposing sides" (Perla, 1990, p. 164). By doing so, this differentiates a war game from a training exercise, which uses real forces. The value of the war game is that decisions are not constrained by safety, rules of engagement (ROE), real-world territorial boundaries, or training objectives.

War Gaming Purpose

War gaming is a technique for exploring human decisions (Perla, 2012), with varying purposes, depending on whether the war game has an analytic, educational, or experiential focus. For analytic war games, the purpose is to gain insights into complex problems. For example, the Task Force Command and Control War Game (2009) explored alternative command and control organizational structures, resulting in player-identified positive and negative characteristics, later presented to the Pacific Fleet commander. Analytic games may assist with the investigation of certain scenarios, possibly generating new theories (Shubik, 1972). War gaming is also used when developing new navy concepts, as described in the Navy Warfare Development Command's *Guide for Navy Concept Generation and Concept Development Program*. Understanding the rationale behind decisions made in a war gaming environment may inform real-world decisions.

As contrasted with analytic games, educational games focus primarily on player learning. For example, the WGD conducts a bimonthly war game for the Senior Enlisted Academy with an educational purpose of teaching strategic planning considerations for the use of all elements of national power.

In another war gaming category, experiential games focus primarily on providing players with practice performing an activity. For example, the WGD held a tabletop exercise for the Naval Mine and Anti-Submarine Warfare Command (NMAWC) with the purpose of enabling NWAWC staff members to practice performing mine warfare staff activities. The NMAWC

staff's experiential war game activities informed development of subsequent NMAWC actions during a real-world exercise.

In conclusion, war games have several purposes. War games may provide input into the analysis of complex problems. They may also be used as tools for learning, or as tools to provide experience performing an activity. It is the responsibility of the game director, designer, and analyst to determine which of the WGD categories of events best meets the game sponsor's needs.

Types of War Game Events

There are several types of war gaming events conducted by the department—ranging in complexity from workshops to multisided war games—all intended to respond to a sponsor's problem. This section will provide an overview of the common types of war game events, with more detailed game design considerations described in chapter 3's review of the game project management process.

- **Workshop.** Workshops involve subject matter experts (SMEs) gathered to discuss a problem. Workshops have a narrow, discrete focus, and often serve as an input to follow-on WGD events.
- **Inductive game.** Inductive games begin without a pregame concept. With inductive games, the concept is discerned after analyzing game data for patterns. This type of gaming is used early in the concept development process, and makes use of open-ended brainstorming styles during the event.
- **Deductive game.** In contrast, deductive games begin with general game ideas to be tested, followed by observations collected during the game to support or refute the initial game hypothesis. This type of gaming is used later in the concept development process, after the concept is more fully developed. This is used during course of action (COA) analysis or to test a plan prior to execution. This approach may be used with other war game events noted in this section.
- **Scenario planning game.** Another war gaming technique involves gathering players to explore a problem in the context of a specific scenario.
- **Alternative futures game.** Another game approach presents players with an activity performed using several different scenarios. With different alternative futures proposed, the players try to discern key indicators that would identify which future might be developing. Results of players' responses are compared across scenarios.

- **Single-sided game.** A single- or one-sided game includes one player cell, with the opposition furnished by a control group that presents scripted scenario injects.
- **1½-sided game.** A 1½-sided game also includes one player cell, with the opposition furnished by a control group, but with scenario injects developed during game execution, versus prescripted, to force the players to wrestle with specific decisions related to game objectives.
- **Two-sided game.** As contrasted with a 1½-sided game, two-sided games involve two separate, competing player cells. The two sides play by rules that vary from restrictive to entirely free play. Player decisions from each cell are adjudicated, with results presented to the players and used to inform subsequent game play.
- **Multisided game.** Games may be designed with several competing cells. These games are referred to as multisided, or by the actual number of sides (e.g., "three-sided").
- **International gaming.** The WGD does not just conduct games, it also participates in games involving other partner nations, such as the multinational Inter-American War Game and the U.K.–U.S. Combined Operational War Game.
- **War gaming elective.** While not a war game, some WGD faculty teach a war gaming elective to the in-residence students at NWC.
- **War gaming teaching.** WGD faculty periodically visit international military colleges to present war gaming seminars in order to share war gaming expertise.

Professional Development Program

The WGD's professional development program consists of a new-faculty orientation program, usually offered twice per year, and an ongoing professional development program offered on a weekly basis.

New-faculty orientation. The new-faculty orientation program is divided into two parts, prearrival and postarrival.

Prearrival orientation. The prearrival consists of a welcome letter from the chairman and a CD with suggested readings to help orient the prospective faculty member to war gaming.

Postarrival orientation. The postarrival orientation consists of three half-days of classes followed by one day of participating in the execution of an

educational war game held at the Senior Enlisted Academy. The classes in the new-faculty orientation program are noted in Appendix D.

Ongoing professional development. In addition to the new-faculty orientation program, the WGD presents weekly professional development classes for all faculty, oriented around the major aspects of the war game project management process. It is also supplemented by other professional development opportunities as they arise. The core professional development curriculum consists of twenty-five professional development classes, noted in Appendix D. Professional development classes serve as a refresher for more experienced faculty and as introductory classes for new faculty. The WGD professional development program follows the game project management process developed by WGD faculty, depicted in Figure 1.

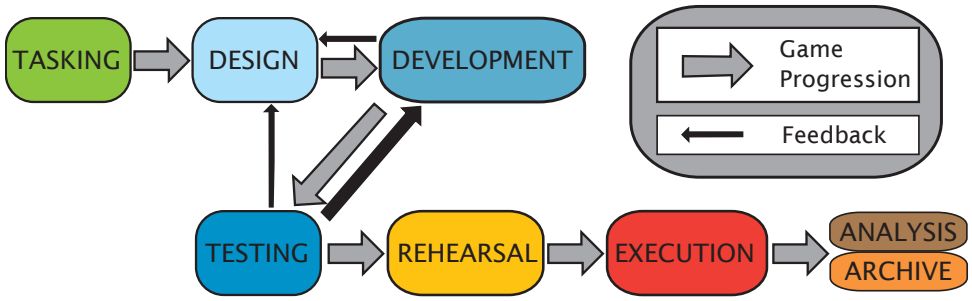


Figure 1. Depiction of the game project management process (Miller, 2013). Adapted from DellaVolpe (2012), Logel (2012) depictions.

The game project management process is the methodology that the department follows to take a sponsor's initial game request through game report and final outbriefing. The game project management process is based on a notional nine-month development cycle, accelerated or slowed based on the urgency as defined by the game sponsor, other game projects in development, and by the complexity of the project. The game project management process is further explained in chapter 3.

Conclusion

War gaming is a technique for exploring complex problems, and is a form of applied research. "Applied research is an original investigation undertaken to acquire new knowledge. . . directed primarily toward a specific practical aim or objective" (Frascati Manual, 2002, p. 30). War gaming may be useful to senior decision makers as a technique to test assumptions, possibly uncovering unanticipated questions needing resolution before policy implementation.

Creating a war game requires extensive planning and coordination, but there are no schools one may attend to become skilled as a war gamer before arriving in the WGD. Thus, the WGD manages a professional development program, guided by this handbook.

III

Creating a War Game

This chapter provides an overview of the process used for creating war games in the WGD. Game creation includes coordinating with the game sponsor, forming a game team, developing a game schedule, formulating an integrated analysis and design concept, and addressing administrative details. War game projects vary in complexity and urgency, but all follow a similar process. The game project management process helps guide war game planners through use of a common planning reference, thereby facilitating mutual understanding among WGD members.

The game project management process is used as a general WGD planning template and mental checklist, intended as a guiding construct for game management, from game inception to completion.

To further clarify, each and every game proceeds through eight phases. The game director is responsible for determining the level of effort required during each phase, and for estimating completion dates per phase in the internal proposal presented to the WGD chairman. Figure 1 depicts the phases of the game project management process.

This chapter will more fully describe typical actions that occur in each phase, an estimate of the time length of each phase, and the requirements to transition from one phase to the next. All game phase time frames are relative to a nominal, major analytical game with a nine-month inception-to-execution time line. Again, no games are "nominal" and it will be up to the game director and team to "accordion" the times as needed to fit the game.

The feedback loop, depicted in Figure 1 as Design to Development to Testing, is not intended as an infinite process; otherwise, games would be designed right up until execution. Once the game progresses out of testing and into rehearsal, the feedback loop is complete and the game should not backtrack unless an irreparable event jeopardizes the ability to execute the game.

Game Billets

To accomplish its many responsibilities, the WGD is organized into multiple war game project management teams. Each team is responsible for all aspects of war

game project management. War game project team major roles include game director, game designer, game analyst, game adjudicator, game developer, game logistician, game knowledge manager, and Office of Naval Intelligence (ONI) representative. To facilitate learning among newer faculty, major game role billet holders may be assigned assistants to help manage workload and as an opportunity for on-the-job-training to learn war game roles. A simplified description of position responsibilities follows, with more detailed position descriptions included in the appendices.

- **Game director.** The game director is the project team leader, responsible for organizing, synchronizing, scheduling, and successfully accomplishing all game project tasks. The game director, who is the primary interface with the game sponsor, drives discussions between the game sponsor's representative and the war game project team to discern and articulate mutually understood and agreed-upon war game problem and purpose statements, as well as game objectives. He/she is the WGD chairman's single point of contact to lead the project through to completion.
- **Game designer.** The game designer takes the problem statement, purpose statement, and game objectives approved by the sponsor, and creatively merges them into a design suitable for gaming. All team members support the game designer during the design phase, especially the game analyst and game adjudicator, who provide design inputs from the analysis and adjudication perspectives. The designer's workload is greatest in the initial phases of the game project process.
- **Game analyst.** The game analyst delivers a postgame analytical report that addresses the sponsor's problem, provides a response to the sponsor's stated game purpose, and provides a coherent organization of player insights relevant to game objectives. The analyst develops a data collection and analysis plan (DCAP) that describes what data will be collected, and how the data will be collected, stored, and analyzed. The analyst's workload is greatest in the latter phases of a game.
- **Game adjudicator.** The lead adjudicator serves as the principal game umpire, managing subject matter adjudication and the sharing and coordination of expert responses to promote attainment of game objectives. The lead adjudicator must ensure that the

adjudication plan is addressed in the game design document, to ensure the plan is executable during the game.

- **Game developer.** The game developer is responsible for game playability. To do this, he takes the design, and creates and refines game products required to facilitate effective game play. The primary role of the game developer is to develop game tools needed for game execution.
- **Game logistician.** The game logistician manages all the administrative and support activities related to facilitating player arrival, such as managing player registration and block-reserving hotel rooms. The logistician also works closely with all supporting agencies to ensure that game and player requirements are met during execution. Additionally, the game logistician manages security issues.
- **Game knowledge manager.** The knowledge and information manager is responsible for establishing procedures to move information during a game. He/she also works closely with the game developer to establish a game filing system directory and player accounts, and to ensure data accessibility or exclusion based upon one's assigned player role.
- **ONI representative.** The ONI representative is responsible for leading scenario development, developing adversary products, and liaising with the intelligence community.
- **Enlisted coordinator.** This individual coordinates the enlisted team in support of the game and assists the game logistician in scheduling and producing items needed for game execution (e.g., name tents, badges, player check-in procedures).
- **Technical services.** This support function consists of four subcategories involved in varying degrees depending on the game:
    - ◊ Game tech—Game cell layout and computer hardware and software
    - ◊ Game tech communications—Projection, sound, video teleconference (VTC)
    - ◊ Model and simulations—Multitouch multiuser (MTMU) and communications operating picture (COP) interfaces
    - ◊ Web development—Web tools and player interfaces

Now that the game project management process and key game positions have been introduced, subsequent sections will describe each phase of the

game project management process in more detail, with emphasis on phase-specific inputs, outputs, and key tasks. The next section describes the first of the game project management process's eight phases: the tasking phase.

Tasking Phase

TASKING	**Starting Point:** Game Request Letter Received **Transition:** Game Proposal Approved/Initial Planning Conference	1.5–2 months

The tasking phase is primarily about managing expectations, both of the sponsor (external) and of the department (internal). In addition to being the lead for the entire project, the game director has primary responsibility for the tasking phase. This section describes preliminary game initiation actions that occur in the tasking phase. Receipt of a sponsor request is the primary input in this phase, while internal and external proposal documents form the key outputs of this phase. This tasking phase section describes: initial coordination with the sponsor; identification of the game problem, purpose, and objectives; and creation of a preliminary game project schedule.

Initial Contact with Sponsor

The tasking phase initiates with a request from a prospective game sponsor. Requests may be received through formal or informal means. Formal game request means may consist of a letter to the president or other leaders at the Naval War College, and informal game requests may be via e-mail or telephone. Regardless of format, all game requests should be forwarded to the WGD chair for consideration. If the project is accepted by the WGD chair, a formal written sponsor request from a flag officer or equivalent is sent to the President, Naval War College (PNWC).

After preliminary assessment, the WGD chair typically assigns one WGD faculty member to make contact with the requestor to better understand the nature of the request. One consideration for determining whether to accept a war game request is whether a war gaming technique is an appropriate method to respond to the sponsor's problem. Other considerations to determine WGD's ability to support a sponsor request include available WGD personnel and existing event commitments. The consultative portion of the tasking phase may involve several weeks of iterative e-mails with sponsor staff members to facilitate awareness of the sponsor's needs.

If the WGD chair accepts the war game request, a game director is assigned by the chair. The game director subsequently coordinates with the WGD operations officer to identify game project team members. The game

director drafts an initial game project schedule, establishing and announcing a game project team meeting schedule.

Concept Development Conference

To better understand the nature of the sponsor's need, a concept development conference (CDC) is held as soon as is practical with the sponsor, conducted via VTC, telephone, or face-to-face. The CDC will help solidify the problem definitions, game purpose, initial objectives, and will identify initial assumptions and restraints.

Problem Definition

An essential and challenging task completed in the tasking phase is working with the game sponsor to articulate the problem prompting the request for a game. Problem definition is an important input to game formulation. A problem has been described as the difference between what one sees and what one wants (Gause & Weinberg, 1989). Problem identification is intended to discern the root cause of undesirable symptoms (Sidky, Sud, Bhatia, & Arthur, 2002). Sponsors may be aware of a general problem, but may be initially unable to clearly articulate the real problem due to: their own lack of understanding of the problem, an initial, but misconceived problem, or thinking ahead to possible solutions before carefully exploring the problem (Sidky et al., 2002).

Elements of a problem statement include a description of the problem components, identification of who may be affected by the problem, the impact of the problem on those affected, and identification of benefits to problem solution (Sidky et al., 2002). Interviews are considered an effective tool for problem identification and problem decomposition (Sidky et al., 2002), a technique frequently used by war gaming faculty with prospective sponsors. Face-to-face interviews are initially conducted, followed by iterative e-mail correspondence over several weeks to refine the problem statement.

The importance of properly defining the sponsor's problem cannot be overstated. The game purpose, objectives, and all subsequent game actions should be mapped back to this problem. Defining and working toward the wrong problem neither fills the sponsor's needs nor effectively utilizes the collective time and talents of the department. Due to the complexity and ambiguity of some problems, the sponsor may be initially unable to articulate their real problem, and may sometimes cite symptoms versus causes. An example of a problem statement follows: "The integration of *XXX New*

Concept into maritime operations in a high-combat-intensity, degraded C2 environment, has not been comprehensively explored." Understanding the underlying problem prompting a war game is essential, since a misidentified problem may lead to a game design unsuitable for answering the sponsor's underlying questions. "If I were given one hour to save the planet, I would spend fifty-nine minutes defining the problem and one minute resolving it," Albert Einstein said.

To increase awareness of the existing body of knowledge surrounding a problem, team members review relevant publications and documents to learn what information exists. This is referred to as a literature review. Examples of the types of documents reviewed include military doctrine publications, Service instructions, public pronouncements of senior naval and national leaders, classified materials, and relevant scholarly materials. Existing literature is reviewed to ensure that the game team is aware of what has been previously written on the game topic. Through research, one ". . . must fill in as many gaps as possible in your knowledge as you can" (Dunnigan, 1992, p. 114).

Purpose

Development of a clearly articulated problem statement informs identification of a game's broad purpose. The game purpose statement articulates why a game is being conducted, and is the guiding rationale for the entire game project management process. An example of a game purpose statement follows: "This game will explore implications to the JFMCC's war fighting effectiveness when operating in a degraded C2 environment in order to inform the integration of *XXX capability/concept* into maritime operations." From this example purpose statement, understanding the possible impacts on JFMCC effectiveness after introduction of a new *"XXX capability/concept"* is the main reason for conducting the game. The game purpose statement helps the game team orient, prioritize, and focus team efforts.

Derived from a game's purpose statement, the game team will discern a principal educational or analytic focus, recognizing that most games have parts of both components. For over 100 years at NWC, "(t)he object of the naval war game is to afford a practice field for the acquirement of skill and experience . . . and an experimental and trial ground for testing strategic and tactical plans" (McCarty Little, 1912, pp. 1218–1219). Game design, analysis, and adjudication methods are greatly influenced by the selection of primarily either an educational or analytic purpose.

After a war game's broad educational or analytic purpose has been determined, games further derive more detailed aspects from the broad purpose to focus and refine select areas of particular interest to the sponsor (McHugh, 1966). The game-specific purposes, more recently referred to as objectives, are discrete components of the game's broad purpose.

Objectives

Game objectives describe subordinate, intermediate goals that together result in achievement of the overall game purpose. Formulating game objectives is a critical, difficult, and iterative game project activity. Objectives are written as a statement. Creators of objective statements may be aided by the acronym SMART: specific, measurable, achievable, relevant, and time-bound. An example of a game objective is: "Identify the strengths and weaknesses of *XYZ* command and control structure during an antiaccess, area-denial operation." Social science researchers use terms such as "central question" to describe the purpose, and research questions to describe subordinate questions related to the purpose (Creswell, 2009).

Research Questions

Research questions are derived from the game objectives, and inquire about discrete facets of the broader game objectives. Development of research questions begins after game objectives are determined. Research questions influence data collection and game design, and can be both quantitative and qualitative. Quantitative questions often focus on *what* type questions, while qualitative questions focus on *why* or *how* type questions. An example of a quantitative research question is: "What command and control structure is preferred by players according to *XXX* attributes?" Conversely, an example of a qualitative research question is: "Why do players prefer *ABC* command and control structure over *XYZ* command and control structure?"

Initial WGD Availability Estimate

While working the problem, purpose, objectives, and research questions, the game director, in conjunction with the WGD chair, needs to assess the capacity of the WGD to conduct the game within the agreed upon time frame. In consultation with the game team, the game director makes an initial assessment of the number of game team and game support personnel required for the game, and estimates the number of rooms required. The game director further coordinates with the WGD operations officer and

Warfare Analysis and Research Department Decision Support Center (DSC) manager to assess availability of desired player cells and DSC.

Project Schedule

After reviewing availability and capacity of the WGD to conduct the event, the game director and sponsor coordinate game length and dates. With game dates determined, the game director then develops a comprehensive game project schedule, including pregame preparatory events, such as testing and rehearsals, and postgame analysis and report preparation.

Proposal

Following the CDC, the generation of the game proposal document will occupy the majority of the tasking phase. If the tasking phase is about managing expectations, this document is the vehicle in which to do it. It is broken into external and internal sections. The external portion is focused on the sponsor and contains game specifics, while the internal portion is focused on the department and contains timing and resource allocation requirements. The internal portion is neither required nor desired to be released to the sponsor. Items of concern to both the sponsor and the department are to be included in the external proposal.

External proposal. The external proposal is intended to be a document for the sponsor and WGD to agree upon the overall concept of the war game. Sponsors are not required to actually sign the proposal but it is expected to be binding enough to forward the progress of the game. Items to be addressed (with some examples) in the external proposal are:

- Problem statement
- Game purpose and objectives—these will be derived from the refined problem statement agreed upon at the CDC
- Focus of the game
    - ◊ Strategic
    - ◊ High-operational
    - ◊ Low-operational
- Size
    - ◊ Small <50
    - ◊ Medium 51–149
    - ◊ Large >150
- Location
- Date

- Classification
- Year that the game will be played (how far in the future?)
- Constraints and restraints
- Approach—description of the game overview
    - ◊ Inductive vs. Deductive
    - ◊ Vignette-Based vs. Scenario-Driven
    - ◊ Analytic vs. Experiential
    - ◊ Single vs. Multisided
- High level plan of action and milestones (POAM)
- Responsibilities of sponsor and WGD
    - ◊ Funding
    - ◊ Invitations
    - ◊ Player recruitment
    - ◊ Game report
    - ◊ Article
    - ◊ Executive brief
- Game request letter
- NWC response to the game request letter

Internal proposal. The internal proposal is intended to supplement the external proposal and to address timing, manpower, and resources within the department. Situations will arise in which some of the required portions of the proposal are not known or will change as the process progresses. Any items that cannot be properly identified at this point in the game process are to be noted with deadlines for an update to the chairman. Items to be addressed in the internal proposal are:

- Game team assignments—wiring diagram for the game team and where they fit into the war game process. This relationship may be different for each game. Examples include the placement of the knowledge manager as a direct link to the director vice as a subordinate to another member, or the determination of who is the developer.
    - ◊ Desired team—quantity and personnel (if desired by specific individual)
    - ◊ Minimum required to accomplish the game (if manpower limited)
    - ◊ Conflicts—by individual personnel or critical capability
- Game process time line—identify time allotted to the phases of the game process

- Initial resource expectations—based on size, scope, and type of game
    - ◊ McCarty Little Hall (MLH) rooms required
    - ◊ Technology requirements
    - ◊ Conflicts or potential friction points, such as back-to-back games
- Phase transition criteria—only if required to be different from those identified in this guide and why
- Game execution manpower plan—this should at least address the quantity of personnel required to execute the game. If specific individuals have been identified, they should be included.
    - ◊ Facilitators
    - ◊ Technographers
    - ◊ Data collectors
    - ◊ MTMU operators
    - ◊ Briefers
    - ◊ Spider operators (video display in Joint Command Center (JCC))
    - ◊ Room guards

Initial Planning Conference

The game director likely has had extensive contact with the game sponsor's representative iteratively throughout the tasking phase, so most or all items reflected in the game proposal document would likely have been discussed and previously agreed upon. To ensure complete mutual understanding between the sponsor and game team, they meet to discuss the game project, often within sixty days after the initial sponsor query. The initial planning conference (IPC) meeting may be held face-to-face, or via VTC or telephone. At the IPC, the game proposal document is reviewed, discussed, and possibly debated and edited as required. Annex F has an example of an external game proposal document.

In conclusion, the tasking phase initiates the game project management process. In the tasking phase, initial contact is made with the sponsor; the game problem, purpose, and objectives are identified; WGD facility availability is determined to permit creation of a game project schedule; and codification of these actions is recorded in a game proposal document and discussed at the IPC. The next section will outline the design phase.

Since it happens to be the first transition, this point in the guide is as good as any to address the blurring of lines that occurs at transition points. It is unreasonable to believe that a game designer could be assigned to a project while idly sitting through the tasking phase without, at least internally, brainstorming a game design. The transition from phase to phase will almost never be a single event but it is important to ensure that the process moves forward. Languishing in a state that encompasses any and all phases is an easy position to fall into because the transition points are hard to define, but that defeats the purpose of instituting this process. Transition from phase to phase must be declared for the project to move forward.

Design Phase

DESIGN	**Starting Point:** Game Proposal Approved/Initial Planning Conference **Transition:** Game Design Document with Draft DCAP, Adjudication Concept	2.5–3 months

Overview

The design phase begins with game objectives and ends with a game design document—the blueprint of how the game will be organized and run. The design phase, led by the game designer, provides the backbone of the war game. The primary focus driving the design phase is creation of a game design document. All games are required to produce a game document, which serves as a guide for the intended game and as a reference for future game designers.

Design Considerations

Initial design concepts are explored following the establishment of a problem statement and initial discussion with the sponsor on game objectives. While at the beginning of the design phase the ultimate design outline may remain murky, the game analyst and adjudicator mutually collaborate with the game designer in design deliberations. This is to ensure that a prospective design accommodates data collection and analysis needs, and permits adjudication of the planned player activity outputs. Hence, design, analysis, and adjudication are related, overlapping, and integrated project tracks. Consulting previous game designs during literature review may spur insights relevant to the game envisioned.

Keeping the game design simple and straightforward facilitates participant comprehension, and increases the likelihood of task performance during circumstances of stress, confusion, or task complexity (Joint Operations, 2011). Simplicity in design may help one work through unanticipated problems during execution, while a complex design gone awry may be impossible to complete as envisioned.

> It is very difficult to keep a game-design project simple. Once you get going, there are tremendous temptations to add this and that. A game design is a very dynamic activity. It soon acquires a life of its own, asking questions and providing parts of answers. The game designer is sorely tempted to go deeper and deeper. Without some years of experience and a high degree of professional discipline, it is extremely difficult to do an unsimple game that is not a truly incomprehensible one. For a game is, in addition to being a source of information, also a form of communication. If the information cannot be communicated, the game does not work. You've got to keep it simple. (Dunnigan, 1992, p. 114)

Level of War

Design is also influenced by the selection of a strategic, operational, or tactical focus, previously characterized as "general divisions of the game" (McCarty Little, 1912, p. 1220). The key is to ensure the level of war played in the game addresses the stated objectives. While multiple-level games may be played, they are more complex, and do not use all players' time equally. While tactical-level players are busy completing assigned activities, operational- and strategic-level players may be left without constructive activities while waiting for tactical-level player inputs.

Number of Sides

While traditional war games have two opposing groups, characterized as sides in war gaming jargon, war games may involve just one-player groups or multiple-player groups, depending on the purpose and objectives of the game.

> The available players are divided into two camps, to one of which is assigned the blue, and to the other red—the two colors usually used in the game to denote sides. A certain number, however, must be reserved for umpire staff—consisting usually of an umpire, the recorder, and an assistant umpire for each side, and, if desired, such other assistants as may prove convenient. (McCarty Little, 1912, p. 1221)

One-sided games have no active player adversary, such as in the case of a sustainment game with the purpose of approximating replenishment rates. Another type of one-sided game is one in which a control cell represents aspects of an opponent's actions but with no intent to try to win. Such a design is used mainly to promote participant learning (McHugh, 1966).

Scenario

A game scenario is the scenic backdrop for a game, selected to serve the game's purpose and facilitate attainment of game objectives. A scenario

should provide a plausible set of conditions and circumstances that contribute to a minimum level of believable acceptance of their role-playing responsibilities. For example, an educational, one-sided game intended to explore disaster response coordination between federal and state agencies could use a hurricane or flood scenario to provide a plausible backdrop to facilitate player interaction toward game objectives. Scenarios should include only the required degree of detail and complexity necessary to achieve game objectives. "We should deplore the tendency to introduce the trappings and ornaments in simulation to gain the 'appearance' of reality, when it is the 'essence' which we need" (Thomas & Deemer, 1957).

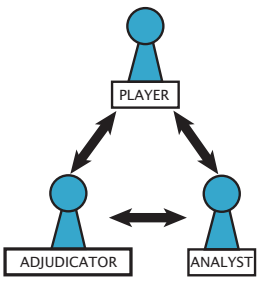
Another scenario, known as "front-end scenario," considers whether a specific scenario is required to meet sponsor needs. In this instance, the game design is required to accommodate the prescribed scenario. Alternatively, if the sponsor's problem is not scenario dependent, game design considerations take precedence over scenario selection. This latter example is referred to as a "back-end scenario."

Level of Information Sharing

For multisided games, depending on game objectives, each side may be given different levels of information. For example, all players would receive general types of information, such as geography, or the year that the game occurs, while other information, such as special capabilities, may be provided to one side only (McCarty Little, 1912). Additionally, there may be some information deliberately withheld from all players and known only to the umpires, such as weather conditions, or international responses to player actions (McCarty Little, 1912). Games where player information is reduced to only that which they would realistically receive is known as a closed game. However, in open games, all players possess equal access to all information (McHugh, 1966).

In-Cell Player Activities

One of the first steps is for the designer to consider the participant triangle (player, adjudicator, and analyst) and determine the dominant figure based on the objectives. The design should be geared toward that figure. The designer should be aware that the other two figures are still important. Neglecting either, or both, of the remaining participants can negatively



Player activities may include physically placing game pieces on a large map display to facilitate awareness of space, time, and forces considerations, as used in the 2012 Rehearsal of Capability game.

affect the outcome of the game by impacting the quality of the data captured or inadequately evaluating the interaction of the players. Conversely, overemphasizing a subordinate participant can inadvertently skew the game toward that participant and away from the objectives.

Activities are designed to efficiently and effectively capture player insights related to game objectives. Players are assigned roles, presented with an initial set of information for context, and given a problem to solve. The players often deliberate and are asked to submit a product based on group decisions made after deliberations. For example, players may be required to assess, plan, coordinate, respond, react, decide, or implement actions in response to various circumstances, depending upon game objectives.

> "The problem being delivered to the players, each side must make a careful study of the situation, and must disentangle from the details of the statement the exact task that has been assigned . . . ." (McCarty Little, 1912, p. 1222)

Players are often asked to summarize decisions and accompanying rationale in a game-specific web-based document or database known as a move tool, used in adjudication and by analysts. Game design also considers the information flow between game entities, as is depicted in Figure 2.

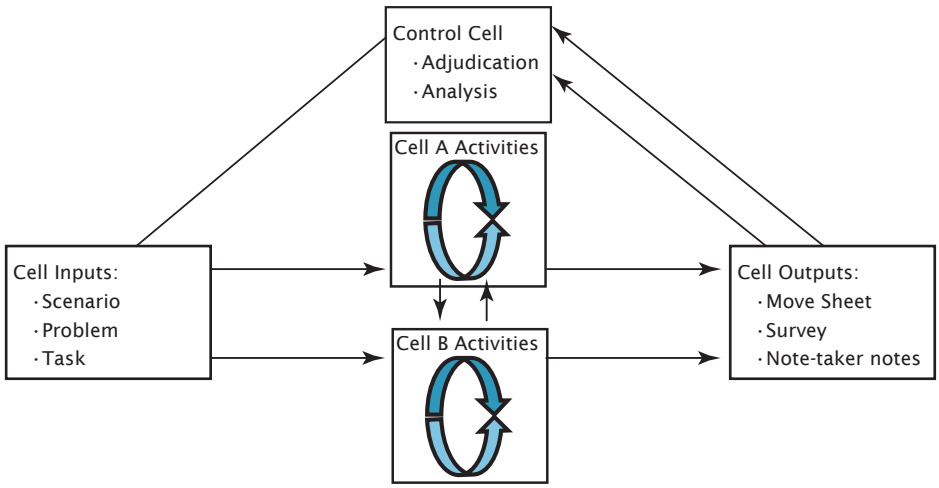


Figure 2. Game Information Process Flow, adapted from Martin (2012).

Design includes a description of the game information exchange requirements and cell layout to facilitate information exchange.

Players

Player activities are structured to facilitate decision making related to informing game objectives. Based on the game's purpose and objectives, special expertise is often required to perform player roles. Game design provides the initial concept for the numbers, types, and years of experience for each player role, but this initial idea is confirmed or modified during the development phase. Some player roles may be added or reduced based on testing results.

Cell Leader

Additionally, one player is designated as the cell leader, often the player performing the primary cell leadership role. The cell leader plays a key role in successful attainment of game objectives. Due to the extra workload of comprehending the game processes and performing a cell leadership role, some game teams personally brief game cell leaders in advance of the game to provide an overview of the game, explain game processes, and review cell leader responsibilities. During game execution, game project members, called facilitators, are in the game cells supporting the game cell leader, helping to keep the cell on schedule, and working through technical matters.

Time in a War Game

The characterization of time is a critical war game design consideration, due to the need to promote player understanding of time protocols that may impact game play during player activity periods. Time representation is broken into two parts. First, from a game time-management perspective, planning game time is needed to ensure adequate time for attainment of game objectives (Perla, 1990). To promote cell effectiveness, the game design must also anticipate the time needed for in-cell discussion, planning, move preparation, and decision vetting. Game designs will often include a suggested in-cell activity rhythm, evaluated during pregame tests, as a suggested in-cell time-management approach. Second, the game design must address game clock or time representation. Selection of continuous time or move-step game-timing methods impacts adjudication and game play.

Move-step. A frequently used method for the design of game time is to select predetermined periods of time for each move, after which players submit moves. Move-step designs permit time jumps to focus on specific aspects of an unfolding scenario related to game objectives. For example, a game with an objective focused on major combat operations could use a move-step design to "fast forward" the game through a routine month-long forces flow, to more efficiently use player decision-making time. Move-step games proceed according to prescribed, predetermined time intervals, following which players are required to report some action, or report taking no action (McHugh, 1966). Move-step design considerations include the duration of each move and determining the time interval between moves, often with time jumps between moves. Design considerations include making constructive use of players' idle time pending adjudication results and

ensuring a robust, trained adjudication cell to produce a coherent, integrated response to keep the game on track for the subsequent time-step.

Running time. As contrasted with a move-step design, running time eliminates deliberate time-block-phased gaming sequences in favor of continuous player actions followed by continuous player feedback. A running-time design consideration is selection of the ratio between real clock time and game clock time. For example, a running-time design could include a time ratio of thirty minutes of real clock time corresponding to one day of game time. In this example, every sixty minutes equals two days, every two hours equals four days, etc.

Advantages of running-time designs include the ability to collect more player inputs on a continuous basis, thus providing a more competitive approach to the game. However, disadvantages of running time include the possibility of cells producing outputs at different rates than one another, complicating the task of adjudicators to keep the overall game scenario coherent and synchronized. Therefore, running-time designs may require periodic game pauses to synchronize adjudication activities.

Adjudication

Adjudicators, also called umpires, monitor and evaluate player actions and provide feedback results to each player cell (McHugh, 1966). Design considerations related to adjudication include selection of free, rigid, or semirigid (McHugh, 1966) adjudication methods. Additionally, adjudication may be open or closed.

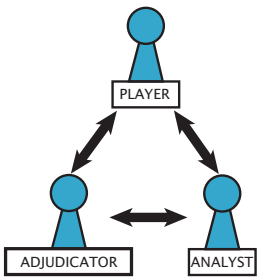
Rigid adjudication is patterned after an early Prussian war gaming method that used strict adherence to predetermined procedures, while free adjudication reflected a later Prussian war gaming innovation that placed greater reliance on the professional judgment of the adjudicator (Sabin, 2012). For example, the board game chess uses rigid adjudication with a strictly interpreted set of rules to determine the results of moves, while judging works in an art show is more analogous to free adjudication, with no prescriptive rules, relying solely on the professional discernment of the judge.

Semirigid adjudication is a method that uses a blend of predetermined rules with adjudicator judgment (McHugh, 1966). Advantages of rigid adjudication include reduced adjudicator bias in results determination, but may limit flexibility, while, conversely, free adjudication is less complex and provides flexibility during game execution (Sabin, 2012).

Free adjudication was often used before World War II. "In the vast majority of pre-World War II games, the players, acting as military commanders and staffs, made decisions as they would in the real world" (McHugh, 1966, p. 18). Free adjudication is a method frequently used in the WGD, since operational and strategic games are more dependent on SMEs to exercise professional judgment, as opposed to strictly following prescriptive rule sets.

Open and closed are other ways of categorizing adjudication. Closed adjudication is a traditional method with the results of player action players determined by the adjudication team without player involvement in determining outcomes. Open adjudication, on the other hand, is done in the presence of both player cells and resembles a facilitated discussion between the cells, with adjudication results determined by the players.

Game Design Document



After consideration of the above noted items, the designer organizes these ideas into a game design document. The game design document serves as the blueprint for the remainder of the game creation process. Since planning for analysis and adjudication are part of game design, the game design document will include a DCAP, written by the game analyst, and an initial adjudication plan, written by the game adjudicator. This document is intended to catalog the participant actions and interactions with an explanation as to how the objectives will be met. Designers should note that not every game will be focused specifically on the players. In an analytical game such as the Chief of Naval Operations Title X war game series, called Global, the players are required to produce the necessary information to analyze, but the game is not designed or executed for them. However, the design must be understandable so the players do not become confused.

Alpha Test (Game Design Prototype)

The alpha test is the initial playing of the game to determine the validity of the design to achieve game objectives, before expending major effort on game development. "(I)n the early stages, you are merely testing the mechanics of a game" (Dunnigan, 1992, p. 128). The alpha test is designed to determine if the game does what it is expected to do. The complete player interfaces, technology, and communication requirements are not required at

this point of the game process. After initial design prototype testing during the alpha test, the designer may identify refinements to player-needed information inputs, procedures, and player products. The alpha test is conducted mostly by members of the game project team, since they are most familiar with the design and objectives. "(D)esigners themselves are by far the most important playtesters" (Sabin, 2012, p. 129). After an initial test of the game design, the game team meets with the sponsor to provide a game progress update.

Mid-Planning Conference

With a refined game design plan documented in the game design document, the sponsor and game project team meet again to review and discuss the game design document, including estimates for the number of participants needed to conduct the game as designed. The game sponsor is often responsible for locating and inviting game participants, so sponsor approval of design and scope, as reflected in numbers of personnel required for participation, is a key mid-planning conference (MPC) point of discussion. The game design document is what sets the direction for the realm of the possible for the proposed event. Its assumptions and considerations must be realistic in terms of time, money, and personnel. Agreement on game design, as reflected in a game design document, is the major output of the design phase and the key input of the development phase.

Development Phase

DEVELOPMENT	**Starting Point:** Game Design Document/Draft DCAP **Transition:** Game Products and Interfaces Complete and Functional	2.5 months

Game Development

Development is about playability. The goal of the developer is to mold the designer's ideas into a refined process for the participants to be able to play the game. The role of developer is determined by the game director, and should be identified in the game team assignments section of the internal proposal. No one on the game team is restricted from being the developer; however, making the designer the developer can have negative aspects since the designer has a preconceived notion of how the game will be played. The game director is responsible for ensuring that the individual game products created during the development phase have the appropriate level of management tools to ensure all game development requirements are accomplished. For example, a straightforward ten-person, single-sided game does not need a written development plan, while more complex games with multiple game products may benefit from a more detailed development description.

Game development is bringing the game concept to life, through a process of design refinement. With a game blueprint in the form of the game design document, the game project team acquires, builds, and tests game products. Development is the creation of actual game products, such as templates and web tools, and refinement of game processes that will be used in the game. Individual game products are developed during this phase and tested once the individual product or process seems ready for testing according to the game developer.

As contrasted with the testing phase, which comprehensively integrates testing of all game processes, products, facilities, training, and technology, the development phase is more narrowly, discretely focused on development of specific products and processes. Development is analogous to an orchestra's percussion section or woodwind section building its instruments and practicing in small, separate groups before the collective all-orchestra integrated preperformance testing.

In war gaming jargon, the term "development" derived from commercial board game creators, and refers to iterative game testing and process refinements. "(G)ame development seeks to ensure that the game design is complete, as realistic as possible or desirable, and that it is playable and capable of meeting the objectives specified for it" (Perla, 1990, p. 231). Within the development phase, game products, processes, and technology are created and tested. While a person other than the designer is designated as the developer during this phase, ". . . considerations of time, resources and individual assessment require that designers assume a more pivotal role throughout" (Sabin, 2012, p. 129). The rationale for having someone other than a designer develop game products is to provide another set of unbiased quality checks to ensure game playability and ability to attain game objectives.

Process Development

Game development includes creating the inputs provided to players, organizing the sequence of player activities, creating formats and templates for player outputs, and creating communication methods among players, between players and adjudicators, between players and data collectors, and between adjudicators and data collectors.

Process development helps refine estimates of the time required for players to perform assigned game tasks. Since the game project team is immersed in the details and rationale for each game detail, tests by game project team personnel intended to confirm activity timing sometimes underestimate the actual time required by players unfamiliar with the game processes. In addition to estimating the length of time required to perform player tasks, game development also considers a notional timing and sequence structure provided as a recommended schedule to ensure that players have adequate time to deliberate and create assigned cell products.

Player Development

Information to be presented to players is created, refined, and tested during this phase. To facilitate player orientation, players are provided information on the game purpose, schedule, process, assigned roles and context, and expected outcomes. Game teams make available game orientation materials in advance of the game, either by posting on a game web site, or by sending via e-mail. Also during the development phase, initial consideration for the time required for players to become acquainted with game processes and for

technical familiarization is factored into the evolving game time management plan.

Game Team Augmentees' Development

In addition to the core game project management team, expertise is needed to perform and accomplish a myriad of game tasks. Games include a cell facilitator, assistant facilitator, technology assistant, data collectors, adjudication assistants, and MTMU display operators. Game project team augmentees, noted above, may be unfamiliar with game details and expected duties. During the development phase, these team augment members receive training to ensure awareness and comprehension of expected duties. Involving game augmentees in game development provides an additional source of suggested game process improvements.

Adjudication Development

The adjudication process initially outlined in the game design document is refined during the development phase. Just as cell processes and products are developed, adjudication processes and products are also developed. Adjudication development includes determining the number and types of subject matter expertise required, and determining the number and types of game project team adjudication facilitators required. Adjudication information management process development includes evaluating the usefulness, adequacy, and detail, from an adjudication perspective, of player move templates and data. In addition to providing adjudication feedback to players, adjudication information needs to be shared and coordinated within the adjudication cell. For complex games, WGD members are assigned to help manage and facilitate processing adjudication results from SMEs.

Analysis Development

Similar to adjudication development, the analysis plan initially outlined in the DCAP portion of the game design document is further refined during the development phase. The game project team lead analyst develops a plan that incorporates continuing literature review related to the game problem, purpose, and objectives; develops research questions derived from objectives; and ensures that player activities and products facilitate collection and analysis. The analyst considers each source of data collected, as well as analytical methods and tools for each data source, and, as an active participant in the development process, may suggest player activity modifications

to facilitate meaningful data collection. In addition to providing input to player activities and products, the game analyst also develops initial analytical products, such as survey questionnaires, cell-specific periodic discussion topics, or the creation of a final plenary bank of player interview topics and questions.

Product Development

Developers build and test the tools needed to perform the game process outlined in the design phase. Examples include web tools, player planning references, in-cell deliberation aids such as wall charts and whiteboards, and an adjudication information wall display plan.

Technology Development

Identification, planning, articulating, communicating, and coordinating game technical requirements to technologists also occurs in this phase. The knowledge manager coordinates technical requirements including web development, network configuration, and decision support center configuration needs, under the overall development guidance of the developer. Each of these facets is described in more detail below.

Web development. There are two types of web sites often developed for a game—a web site covering administrative details, and another developed for use during game play.

1. Game administrative web site development. Game teams often create a game web site to facilitate information with participants before game arrival. A game home page provides prospective game participants with administrative and logistic details, such as length of game, nearby airports, lodging, dining, attire, and game check-in procedures. The publicly accessible game web site may refer players to other limited-access sites, with more detailed game information. The administrative web site development is managed by the game logistics representative.

2. Game-play web site development. As contrasted with the pregame administrative web site, games often also have a web site for use by players during game play. Game web sites are used as a reference repository and tool for documenting player decisions, which are used by adjudicators and analysts. Development of the game web site is determined by the game director, in consultation with the developer and knowledge manager. Additionally, as key "consumers" of the game site information, the adjudicator and analyst

are also closely involved in web site development to ensure player data is presented in a format usable for adjudicators and analysts.

Network configuration development. During development, game information sharing requirements are further refined, accompanied by the supporting technology. Network configuration development includes consideration of the level and type of information provided to each cell. The information available to a cell may differ from one to another, based upon game objectives. The knowledge manager, in close concert with the Gaming Tech Branch, determines the number of computer work stations required by players, adjudicators, and analysts as part of network development.

Multitouch multiuser display development. MTMU displays provide an ability to visually and electronically sketch a graphic depiction of a game move. Identifying and incorporating relevant electronic charts and game-related data into MTMUs occurs during the development phase. MTMUs may be used in player cells to provide a situational awareness by providing a common operating picture, and in adjudication to visually depict adjudication results. Planning the intended use, configuration, and placement of MTMUs occurs during the development phase. Determining MTMU functionality, effectiveness, and enhancement to game play occurs during the testing phase.

LCDR Reynolds, USN, and LCDR Savio Cavalcanti, Brazilian Navy, Inter-American War Game 2013 control group members, plot player force positioning using an MTMU display.

Players gather in the Decision Support Center after game play to discuss significant game observations.

Decision Support Center planning development. The DSC is often used for final plenary player gatherings. During development, final technical requirements may surface, and are coordinated with the Warfare and Analysis Department, managers of the DSC.

Visual Communications Development

The method in which information will be visually presented to the participants must be considered. This section is specifically focused on the systems rather than on the content, which was previously addressed in the player development section. Projectors, TVs, and desktops are universally available in all game cells as options for the ultimate end-user consumption. The key to successfully conveying the desired information is source management and system familiarity. Source management is the input to visual communication. Consideration should be made as to whether a single-source or multiple source approach is optimal. Single-source approaches only require one input to be patched to the display media but require a well-thought-out transition sequence. Multiple sources require more resources, and potentially remove player interfaces as they are being utilized for information display. System familiarity refers to the setup of the game cells to display the desired

information. Audiovisual system upgrades to game cells occur on an as-available basis and therefore may not be known to game teams or departmental personnel as they transition from one game to another. How to patch the source(s) to the display must be understood, especially as the complexity increases.

The media wall in the JCC presents an added level of planning that game teams must complete. Source information to this wall is routed through the video processor, which requires an operator, set-up, and practice. Media wall operations are highly customizable and seamless if given the proper development time. Custom functions can be built, but are one-off operations and require communication between the operator and developer to create and refine.

Media wall in the Joint Command Center/adjudication cell is capable of displaying multiple images to support adjudicator cell and control cell game situational awareness.

Telephone and video teleconferencing planning and development. Game teams need to periodically coordinate with the game sponsor. For unclassified games, a group telephone conference call is adequate for group coordination. However, in games with classified subject matter, secure telephone conference calls are inadequate, since secure phones have no speaker capability to facilitate a group conference. Therefore, coordination between a sponsor group and a WGD game project team is best done via secure video

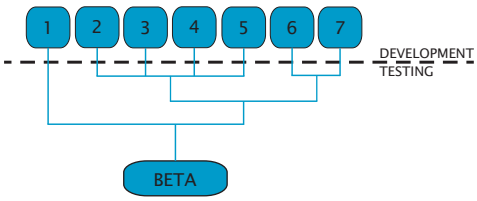
teleconference. Video teleconferencing is available at multiple classification levels, throughout MLH rooms.

Transition

The completion of the development phase will be marked as the point in which all the game products and interfaces are complete and function individually. This point marks another time in which the transition is not a clean break. There will be some testing required to ensure that each element of the game works properly. The game director, advised by the developer, must make the determination to end the development phase when the game is ready for integrated testing.

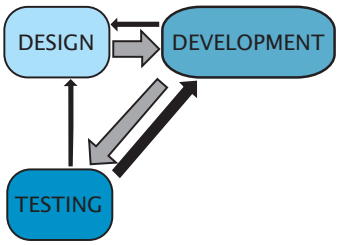
Testing Phase

TESTING	**Starting Point:** Game Products and Interfaces Complete and Functional **Transition:** Successful Beta Test and Finalized Documents	1 month



The testing phase is about integration. At the end of the development phase, all of the individual pieces of the game have been identified, created, refined, and initially tested for functionality. The testing phase brings all of these pieces together. The game director determines how much and what level of testing is required during the testing phase.

Feedback



Design-Development-Testing encompasses the feedback loop. The intention is to establish a method for the game process to advance while leaving the ability to alter the game based on something learned by a later phase.

Beta Test

The beta test is the first full integration of the game in its entirety, including people, process, and technology. Communication paths and data flow are a key focus. Properly conducting a beta test requires significant prior planning on the part of the game team. All systems and room setups should be intact as planned for the game. With the multitude of events that occur in McCarty Little Hall, setting up spaces and hardware with over a month until game execution will be difficult. Unsuccessful beta tests require retesting and will be named by the number of retest (beta#—starting with 2).

During the testing phase, the time required for players to become acquainted with cell game processes and technology is checked. For example, using non-game-team members in the game test may uncover unanticipated deficiencies with: the explanation and actual use of game web tools, planning resources, suggested in-cell deliberation and decision-making

processes, adequacy of time provided to players to accomplish assigned tasks, and move submission procedures.

The game test also provides an opportunity to test and practice adjudication procedures, such as receipt of moves, conduct of adjudication, coordination of individual adjudication decisions with the lead adjudicator, and review of the process for providing adjudicated feedback to the players. Adjudication testing also provides initial estimates of the time required for adjudication and the impact on overall game progress.

Additionally, the analysis plan is also tested during a game test. Refined survey questions and plenary topics initially tested during the development phase are checked again during the testing phase. Further, mock player data gathered during the test is used to check data collection and analysis procedures, and as a training opportunity for the analysis team.

Final Planning Conference

At the conclusion of the testing phase, game project team members and sponsor representatives meet to discuss results of the game development and testing. Sometimes a need for additional subject matter expertise is identified during the development and testing phases and shared with the sponsor. At the final planning conference, the names and registration status of participants are confirmed, and pending logistics actions are discussed.

Transition

With a successful beta test, the transition to the rehearsal phase marks the exit of the feedback loop and the associated phase. Design, development, DCAP, adjudication, communication, and testing are finalized and the facilitator and player guides are drafted prior to starting rehearsal.

Rehearsal Phase

REHEARSAL	**Starting Point:** Successful Beta Test **Transition:** Game Start	1 month

The rehearsal phase contains practice sessions for the game. Rehearsals are a final opportunity to mentally prepare for one's duties in a game, hopefully improving individual performance during execution. Individual practice is the focus of the rehearsal and should only produce minor tweaks to in-cell timing and flow. The game director is the lead for this phase.

During rehearsal, introductory briefers practice the delivery and sequence of briefings. Also, facilitators, guided by a facilitator guide, practice welcoming players to a cell, including computer log-in procedures, accessing the game web site, and locating references, such as charts, documents, and move templates. As with other game products, the initial facilitator guide version was created during the development phase by the game designer. During rehearsal, the facilitator updates and finalizes the facilitator guide. In the course of rehearsing, facilitators may be able to anticipate possible player questions. Similarly, the adjudication team rehearses adjudication procedures, as does the analyst team.

At the conclusion of each rehearsal day, participants gather for a constructive self-critique. Feedback is explicitly sought from proxy participants to discern clarity of cell processes, intuitiveness of web-accessed tools, and sufficiency of time allocated to perform assigned tasks. The rehearsal is focused on ensuring integration of all war game project components to provide a positive player game experience and improve game data collected. At the conclusion of the rehearsal, the game director provides a summary to the department chair, highlighting areas of risk to successful game execution, and suggestions for risk mitigation.

Transition

Game execution.

Execution Phase

Starting Point: Game Start

Transition: Game End

Game execution commences when the first participant arrives for a game, and concludes when the last participant departs. Game execution closely resembles the final rehearsal if pregame tests and rehearsals were conducted flawlessly, and game execution unfolds exactly as expected and rehearsed. Sometimes, unanticipated technical and schedule problems arise, but if a thorough rehearsal was conducted, problems are the exception, and are manageable.

The game execution phase includes all activities previously described in the rehearsal phase. The key difference between the final rehearsal and game execution is the presence of actual game participants, versus department-internal proxies. During the execution phase, the lead analyst assumes a gradually increasing game leadership role. If additional data are needed for a game research question, the analyst may advocate for process modifications to ensure needed data are captured. Only those tasks not previously described in the rehearsal phase are explained below.

The game director is often located in the adjudication cell but roves among player cells as well. The game director is especially concerned with ensuring coordination between player cells and adjudication, and anticipating possible adjustments to game time, based on game circumstances.

Adjudication

At the end of each day, the adjudication cell meets to discuss how the game scenario is progressing and whether the game is progressing toward attainment of game objectives from their perspective. Most games provide a morning update briefing to players simulating an intelligence briefing to summarize the results of the previous game day in context of the upcoming game day. The adjudication team often prepares input for the following day's morning update.

Data Collection

Data are collected per the game's data collection plan. Sources of data collected include summaries of player discussions, survey questionnaires,

player-submitted game products, such as move sheets, and transcripts of final plenary discussions. Additionally, in-cell data collectors record, summarize, and characterize significant player deliberations relevant to game objectives. Further, survey questionnaires provided to players may solicit demographic data, and player views on the cell's success or lack of success attaining cell objectives.

Analysis

As data are collected in the course of a game, the lead analyst assembles the data to get an initial sense of whether data streams collected will adequately support answering game research questions and objectives. Additionally, the lead analyst often schedules an end-of-day analysis team meeting with in-cell notetakers to get a progressive and continuous sense of insights gained during monitoring cell deliberations.

Daily Coordination Meetings

The game director conducts daily coordination meetings as required.

Midday meeting. The game director often holds a brief midday meeting among all game project team members to identify game progress or problem areas. These approximately-15-minute meetings are held after players go to lunch and focus on obtaining feedback from the cell facilitators on the adequacy of time allotted for activities, clarity of task instructions and expectations, and feedback on the adjudication information provided to the players.

End-of-day meeting. WGD personnel, game augmentees, and sponsor representatives gather at the end of each day to recap game progress. Often, cell facilitators will brief game progress from their perspective, noting any friction points needing resolution. Similarly, the adjudication and analyst leads provide updates from their perspectives, highlighting any areas where they need help accomplishing their game duties. The game director summarizes game progress.

Social Activity

To facilitate participant socialization among game colleagues and game staff members, and also to provide a welcoming environment, games often organize optional social activities after game play. The game logistician manages these activities.

Transition

Game end.

Analysis and Archive Phase

ANALYSIS
ARCHIVE

Starting Point: Game End

Transition: Analysis; Report; Briefing; Archive

2 months

Introduction

After game completion, the sponsor receives a report summarizing what was learned in the game relative to game objectives. In order to provide meaningful results to the game sponsor, player data must be reviewed in a systematic manner. Analysis is the process of organizing, reviewing, distilling, and presenting player data in a useful format. Further, analyzed game data needs to be recorded, so that other sponsors with related problems or other war gamers may benefit from what was learned in a particular game. By recording how games are designed, analyzed, and what is learned in games, we contribute to war gaming scholarship.

Analysis Overview

Game analysis links player actions to game objectives, summarizing and presenting results and implications in a manner most relevant to the game sponsor.

"(R)esearchers write for audiences that will accept their research" (Creswell, 2009, p. 19). In other words, game reports are written from the perspective of providing value and relevance to the sponsor.

Planning for analysis begins in the initial tasking phase when the game problem, purpose, objectives, and research questions are initially discussed. Analysis planning and refinement continues throughout the entire game project process. With greater design firmness after agreement on game design, the analyst then refines and codifies the draft analysis plan. This section may summarize analysis considerations.

The DCAP is the analyst's blueprint for how to gather, organize, and interpret data into meaningful game findings. Concept development games may use inductive game approaches, while games about more mature concepts may use deductive approaches.

Analysis Planning

The game analysis plan is the guiding North Star of game analysis. The lead analyst has planning, leadership, and analysis responsibilities. Planning for

analysis begins during the tasking phase, requiring detailed coordination with the game sponsor, game director, and game designer throughout the game project process. The game problem statement and purpose statements provide overarching guidance, providing direction for all game project efforts including analysis, since they reflect the sponsor's main concern and inform design, analysis, and reporting.

Game objectives are derived from the game problem and purpose statements. After the sponsor agrees to written game objectives, game team members, including the analyst, review relevant literature, such as policy and strategy documents, studies, books, or conducting interviews with SMEs. After review of the relevant literature, research questions are formulated informing the analysis plan.

Throughout the game project management process, the game analyst continuously monitors and ensures that planned player game activities:

- Produce data relevant to the game objectives, and
- Provide a process to gather relevant player data streams.

The analyst and designer negotiate design modifications to ensure that collection processes result in analyzable data sets. All player activities in an analytic game should be geared toward the collection of data relevant to game objectives and research questions. The analyst may identify player activities that may be interesting, but if they are not linked to research questions, collection, or analysis, these activities may be irrelevant and should be removed from the game design. With a design agreed to by the sponsor, designer, and analyst, and codified in a game design document, the analyst refines the draft data collection and DCAP. DCAPs describe what and how data will be collected during a game, and also how the collected data will be analyzed.

Analysis Team

The analysis team is the key to capturing and recording player data in a manner of greatest value to the sponsor. Great player decisions with poor data capture or poor data analysis do not help the sponsor. The game lead analyst is responsible for assembling and training the analysis team. Some analysis team duties include:

- **Lead analyst.** The lead analyst leads, organizes, trains, and schedules the activities of the analysis team. The lead analyst writes the DCAP and leads postgame analysis.

- **Data collectors.** Data collectors observe and record cell activities, summarizing important points of discussion relative to game objectives. Data collectors provide another source of data in addition to player-generated data. Unlike court stenographers, who record every word verbatim, data collectors capture the essence and context of the main points raised by players, ideally providing personal observations on the significance of items noted. Data collectors provide valuable insights during postgame analysis, since they are closest and most familiar with player statements and attitudes. Two data collectors are common per cell to strengthen postgame analysis, helpful as a cross-check of points noted as significant, or to possibly provide an alternative perception of an in-cell discussion. Data collectors provide an additional data source of the context to player-provided data.

Data Collection Products

Planning for data collection includes envisioning players' activities and the products needed to record player data in formats useful for analysis. The lead analyst is a key participant in game decisions throughout the game project process—especially during the tasking, design, and development phases—and influences the format and content of game product inputs to analysis. Several types of products are collected for use in analysis.

- **Move sheets.** Cells document their actions, rationale for actions, and intended outcomes in a document called a move sheet. The exact format of move sheets varies from game to game, but they commonly include a visual depiction of actions taken accompanied by a written explanation of the actions. The designer, developer, and analyst collaboratively plan move sheet composition.
- **Data collector notes.** Data collector notes provide insights into deliberations influencing player decisions. The data collector notes format is prescribed by the lead analyst, reviewed during data collector training sessions led by the lead analyst. Notes are often presented in a hierarchical format, with player discussion points described, summarized by the data collector noting the relevance and significance of what players said and decided, relative to the game objectives. The professional expertise of the data collector influences the value of data collector notes. A data collector versed in the player topics

discussed will produce better data collector notes than one unfamiliar with the subjects covered in a game.

- **Demographic survey.** The views of respected experts in a given field carry more weight with sponsors than the views of players with less game subject matter familiarity. Demographic surveys show the expertise of players and adjudicators. Participant demographic surveys are gathered to report relevant player background information, such as relevant subject matter expertise and years of experience in a field, gathered via online survey questionnaire or after game arrival.
- **Plenary discussion data capture.** Plenary discussions may be conducted periodically during a game, and nearly always at the end of every game. These facilitated discussions are composed of players from all cells. Facilitated plenary gatherings include select questions created by the analyst to gather player responses needed to answer game research questions and further explore unexpected insights observed during game play. Plenary data are recorded by individual player responses in a structured blog-like format, using decision support software to record and organize player-written responses to questions posed. To complement the player-typed data, data collectors are also used to capture player discussion points.

Postgame Analysis

The department standard for delivery of postgame analytic reports to the game sponsor is within two months after game completion. Additionally, to complement the extensive analytical report, an executive briefing is prepared, often a 10–20-slide presentation summarizing findings and implications to the senior decision-making game sponsor. To meet the two-month delivery time line, intermediate analysis milestones are established. These include data organization, categorization, analysis, and presentation (Billups, 2012). Qualitative analysis has more initial steps than quantitative analysis, since qualitative data must first be assembled and categorized before analysis commences, while quantitative data, collected in a categorized and organized manner, is more ready for immediate analysis after game completion. Some of the highlights of game analysis are described below, distinguished between quantitative and qualitative game analysis.

Data management. The first step of qualitative analysis is to read and make sense of the data collected during the game (Billups, 2012). This requires reading the data. With large amounts of data to read, the lead analyst

may assign data subsets to members of the analysis team, such as by individual cell, final plenary, or survey data. Working in parallel rather than in a series may result in faster data management.

Data categorization. After reading and getting familiar with all the data collected, data are then collapsed into grouping categories, known as codes. Some codes are developed before a game based on a review of relevant literature, known as a priori or selective codes, while other codes are developed after the analysis team begins working with the data, known as emergent codes (Billups, 2012). Initially, there may be dozens of code categories identified, but these are usually pared down to four to seven categories (Billups, 2012). The analysis team may use qualitative analytic software to help electronically associate codes with data passages and facilitate grouping data into categories. Coded data are then assembled into code groups, known as clusters, with clusters further collapsed into themes relevant to the game research questions (Billups, 2012).

Data interpretation. Data interpretation is about figuring out what the player data means to the sponsor. Data from games are often presented by thematic analysis. With thematic analysis, analysts discern patterns and connections among codes relevant to research questions. While data interpretation is noted here as a discrete step, interpretation most likely began much earlier in the analysis, as analyst team members perceive code groupings and linkages. Thematic analysis is a method often used to interpret game results.

> Observation precedes understanding. Recognizing an important moment (seeing) precedes encoding it (seeing it as something), which in turn precedes interpretation. Thematic analysis moves you through the three phases of inquiry. (Boyatzis, 1998, p. 1)

Data description. Finally, game findings may be presented in a variety of formats useful to the game sponsor. The game project team provides a comprehensive game report to the sponsoring organization, accompanied by an executive briefing of major findings. The WGD chair participates in periodic progress reviews of game report formulation, as well as formulation of the executive briefing. If briefing Pentagon officials, it is customary to offer a presentation of the executive briefing to the CNWS dean, provost, and PNWC. The game director presents all briefings, often accompanied by the game designer, game analyst, and WGD chair.

Archiving Report

Final game reports are stored on a departmental computer, provided to the NWC library, and may be provided to the Defense Technical Information Center as a subsequent research source. Faculty and other interested parties may use the game report's data, findings, results, and recommendations for further research.

Location. Archived data will reside in two locations on the T-drive:

- T:\War Gaming\GAMES EVENTS\War Game Name—this folder is for use by the game team and future inquiries about specific games in their entirety. An archive folder should be created for all finalized products
- T:\War Gaming\PRODUCTS—This folder is for use by the kIM Team and includes game products by type. The folder structure is such that inquiries will result in documents of a specific nature (design documents or 5000s) across multiple games. It also allows for a repository of "customer ready" documents that are easily accessible by anyone in the department. Ownership by the kIM Team is a version control measure. Times will arise when a postgame product is required to be revised, if this is the case the new version should be forwarded to a kIM Team member for replacement in the proper folder.

Products. The game process may have produced any or all of the following documents/plans to archive:

- Proposal
- Design document
- DCAP
- Facilitator guide
- Player guide
- NAVWARCOLNOTE 5000
- Game report
- Postgame products from the proposal

References

Billups, F. (2012). Qualitative data analysis: An overview for beginning qualitative researchers. *The NERA Researcher, (50)1* March 2012, pp. 8–10.

Boyatzis, R. (1998). *Transforming qualitative information: Thematic analysis and code development.* Thousand Oaks, CA: Sage.

Burns, S. (2008). *Game Design Document for the Navy-Wide Standard Task Force Construct War Game.* Unclassified game planning document stored on US NWC T-drive at: T/War Gaming/Games Events/2009 PACFLT TF C2 II.

Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches (3rd ed.).* Thousand Oaks, CA: Sage.

DellaVolpe, D. (2012). Whiteboard sketch of war game project management process discussed during NWC WGD faculty class facilitated by WGD Chair DellaVolpe.

Dunnigan, J. (1992). *The complete war games handbook.* New York, NY: William Morrow Company.

Frascati manual: Proposed standard practice for surveys on research and experimental development (6th ed.). Accessed 30 April 2013 at: www.oecd.org/sti/frascatimanual.

Gause, D. & Weinberg, G. (1990). *Are your lights on? How to figure out what the problem really is.* New York, NY: Dorset House.

Gladwell, M. (2002). *The tipping point: How little things can make a big difference.* New York, NY: Back Bay Books/Little, Brown & Company.

Glaser, B. & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Aldine de Gruyter: Hawthorne, NY.

Herman, M., Frost, M., & Kurz, R. (2009). *Wargaming for leaders.* New York, NY: McGraw Hill.

Huck, S. (2012). *Reading statistics and research.* Boston, MA: Allyn & Bacon.

Joint Publication 3-0, Joint Operations (2011). Washington, DC: U.S. Government Printing Office. www.dtic.mil/doctrine/new_pubs/jp3_0.pdf, accessed November 23, 2012.

Logel, J. (2012). PowerPoint® depiction of game project management process adapted from DellaVolpe (2012) whiteboard sketch for professional development class on analysis planning.

Martin, D. (2012). Figure 3 based on sketch by author. U.S. Naval War College.

McCarty Little, W. (1912). The strategic naval war game or chart maneuver. *Proceedings 38(4),* 144. Annapolis, MD: U.S. Naval Institute.

McHugh, F. (1966). *Fundamentals of war gaming* (3rd ed.). Washington, DC: U.S. Government Printing Office.

Miller, N. (2013). Game project management process graphic depiction.

Oxford Advanced Learner's Dictionary. Oxford University Press. oald8.oxfordlearnersdictionaries.com/privacy.html, accessed 30 April 2013.

Patton, M. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Perla, P. (1990). *The art of wargaming: A guide for professionals and hobbyists.* Annapolis, MD: U.S. Naval Institute.

Rubel, R. (2006). Epistemology of war gaming. *Naval War College Review, 59*(2), 108–128. Newport, RI: Naval War College Press.

Sabin, P. (2012). *Simulating war: Studying conflict through simulation games.* Continuum International Publishing Group: London, UK.

Schelling, T. (1987). The role of war games and exercises. In A. Carter, J. Steinbruner, & Zraket, C. (Eds.), *Managing nuclear operations* (pp. 426–444). Washington, DC: The Brookings Institution.

Schwartz, P. (1991). *The art of the long view: Planning for the future in an uncertain world.* New York, NY: Doubleday.

Shubik, M. (Jan., 1972). On the scope of gaming. *Management Science 18*(5), *Theory Series, Part 2, Game Theory and Gaming,* 20–36.

Sidky, A. S., Sud, R. R., Bhatia, S., & Arthur, J. D. (July, 2002). Problem identification and decomposition within the requirements generation process. In *6th World Multiconference on Systemics, Cybernetics and Informatics,* Orlando, FL, July 14–18, 2002, published in conference proceedings, Vol. III, pp. 333–338.

Thomas, C. & Deemer, W. (1957). The role of operational gaming in operations research. *Operations Research,* February 1957, pp. 1–27.

Wade, N. (2010). *The naval operations & planning smartbook.* Lakeland, FL: The Lightning Press.

ANNEX A

Glossary of War Gaming Terms

War gaming uses its own terminology. Definitions are provided below. These and other terms should be included in the glossary of the game book as needed. Each war game is unique and may or may not include all of these terms.

Adjudication
This term is used by the WGD to describe the procedure to impartially resolve the outcome of interactions between sides in a game. A game controller or umpire acts as the impartial judge.

- **Free adjudication**
  The results of interactions are determined by the adjudicators in accordance with their professional judgment and experience (McHugh, 1966).
- **Semirigid adjudication**
  Interactions are evaluated by the rigid method, but the outcomes can be modified or overruled by the lead adjudicator (McHugh, 1966).
- **Rigid adjudication**
  The results of interactions are determined according to predetermined rules, data, and procedures (McHugh, 1966).

Aggregated Force
A single symbol, model, or force which represents a real-world force composed of two or more units.

Alpha Test
The proof of concept event that tests the validity of the game design against the objectives prior to expending significant effort to refine the design before development. This occurs during design phase.

Analysis
A qualitative or quantitative examination of the data derived from a game. We use analysis on data collected from a game to determine lessons, insights, and themes.

Analytical Game
A game conducted for the purpose of deriving information that may be used to assist the sponsor in reaching decisions.

Applied Research
Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily toward a specific practical aim or objective (OECD Frascati Manual, 2002). For war gaming, it is research directly tied to the sponsor's or senior officer's problem.

Archiving
The process that formally completes the game project by digitally filing the game team products created throughout the life cycle of the game.

Assessment
To determine the importance, size, or value of a problem (Merriam-Webster, 2013). To make a judgment about the nature or quality of somebody/something (Oxford Advanced Learner's Dictionary, 2013). Determination of the effect of operations as they relate to overall mission accomplishment (The Naval Operations and Planning Smartbook, 2010).

Assistant Facilitator
Assists the facilitator in the player cells with keeping the players on track. Coordinates with the white cell during game play, as needed.

Assumptions
Caveats that keep the game focused on game objectives, ideally to prevent a game from becoming distracted by tangential issues. For example, a game assumption could be that Country Green remains neutral during a conflict between County Orange and Country Yellow.

Basic Research
Experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view (OECD Frascati Manual, sixth edition, 2002, para. 64, page 30). War games are a form of applied research, as contrasted with basic research.

Battle Damage Assessment
The estimate of damage resulting from the application of lethal or nonlethal military force. Battle damage assessment is composed of physical damage assessment, functional damage assessment, and target system assessment (JP 1-02).

Beta Test
The first full integration of the developed game in its entirety, including game people, processes, and technology. The beta test occurs at the end of the testing phase.

Briefs
Several types of briefs are presented throughout the course of a war game.

- **Admin/security brief**
  The brief presents important administrative details of the game. The topics in an admin brief include: overall game schedule; a facilities map showing the player cell locations, admin and security offices, restrooms and evacuation procedures, exit routes and evacuation muster points, and parking locations and regulations; physical and information security policies; policies on personal electronic devices (e.g., cameras, cell phones, PDAs, memory sticks, laptops etc.) public affairs; policies on attribution/nonattribution; social events; Internet access; emergency contact procedures; and personal message handling.

- **Cell update brief**
  Briefs given to the players on a specific side or in a specific cell. It contains the information representing the specific viewpoint and situation of that cell and the specific functions and tasks of that cell. Given at the beginning of a move or when circumstances dictate.

- **Design brief**
  The brief on the objectives, structure, organization, schedule, and procedures of the game. This brief is normally given at the end of the information briefs.

- **Executive brief**
  A game summary, often fifteen pages of PowerPoint slides, presented to a game sponsor flag officer or senior government executive, presenting results of the game relative to the game objectives.

- **Information brief**
  Briefs to the game participants containing information needed for game play.

- **Scenario brief**
  The brief on the situation at game start given to all players. It contains the "Road to War," scene-setters, and scenarios as required to set the initial conditions for game play. Given at the end of the game brief but before the players break into their individual cells.

- **Outbriefs**
  The briefs created and presented by the players at the end of a move or end of game play.

Cell

1. A group of game participants organized to accomplish an assigned purpose.
2. The space to which the participants are assigned.

Cell Identification

Opposing sides and their allies in a game are normally assigned specific colors to reduce confusion, or limit inadvertent disclosure of classified reference to the sides played. Red and Blue are the two basic opposing sides in a two-sided game. Green usually represents a neutral third party or an ally of Blue. Orange is normally an ally of Red. Other primary colors may be assigned as necessary. White is usually reserved for the adjudicator, higher headquarters, subordinate units, and other players, such as SMEs.

Cell Leader

The senior player or a player specifically picked to lead the cell. The cell leader is responsible for ensuring that the cell completes the required tasks on time.

Cell Scribe
A designated player who prepares the required outputs. Preferably a "Power-Point warrior."

Control Cell
The person or group of persons designated to monitor and direct game execution to meet the game objectives. The control cell is directly responsible to the game director. The control cell is led by the game director and includes the sponsor, moderators, facilitators, lead analyst, and lead adjudicator.

Data Collection and Analysis Plan (DCAP)
The plan describing the process by which the desired data from the game is identified, captured, assessed, and published. The DCAP is created by the lead analyst.

Data Collection and Analysis Team (DCAT)
The team executing the DCAP, led by the lead analyst.

Data Collector
A member of the data collection and analysis plan team assigned to collect data during game execution in a player cell. Data collectors report to the lead analyst.

Facilitator
Control team member in a player cell who keeps the players on task and assists coordinating the necessary administrative and technical support for the cell.

Game Board
An array of squares, hexagons, or tessellating shapes used to represent an area of operations, or employed as an overlay to a map or chart which depicts the area of operations.

Game Designer
The person responsible for designing the game, i.e., creating a method for player actions to produce an output that informs the purpose and objectives of the game. The game designer produces a game design document.

Game Developer
The person responsible for game playability. This person molds the game designer's ideas into a refined process for the participants to be able to play the game.

Game Director
The war gamer assigned overall responsibility to lead a war game project.

Game Layout
A diagram or map showing the game facilities and physical location of the game cells, computers, and organizations. One layout is a depiction of game cell rooms within McCarty Little Hall for use in a game. A more detailed game layout depicts the confirmation with game cells, such as positioning of tables, computers, and audiovisual equipment.

Game Objectives
A short list of specified tasks, approved by the sponsor, that the game is expected to and designed to accomplish.

Game Project Management Process
A WGD front-loaded process intended to produce games that advance through a robust, regimented set of steps that result in focused activities and interactions that have been streamlined toward the desired output. The process steps are: tasking, design, development, testing, rehearsal, execution, and analysis and archive.

Game Report
The game report summarizes key information about a game, such as game purpose, objectives, design plan, analysis plan, player expertise, player roles, and most importantly, the analysis of game play and implications of insights derived from game play.

Game Schedule
A day-by-day or hour-by-hour schedule of game events.

Ground Truth
The actual status of units played in a game. In an open game all players are given the ground truth. In a closed game the white cell maintains ground truth and communicates a limited and possibly distorted view of ground truth to the different sides playing in the game.

Knowledge Manager (KM)
Game team member responsible for the game's information management and flow.

Kriegspeil
A German word for war play or war game (McHugh, 1966).

Lead Analyst
The action officer, responsible to the game director, who is assigned to draft the DCAP, supervise the DCAT, conduct the postgame analysis, and produce the final game report.

Level(s) of War
There are three levels of conflict: strategic, operational, and tactical. The strategic level deals with issues of importance to national authorities. The operational level covers theater-level operations, and the tactical covers local operations. Some games cover more than one level. The level depends on the concept being gamed. Normally the focus of the game is at one level of war, but consideration of the other levels of war may be required when creating a game.

Model
A representation of an object or structure, or an explanation or description of a system, a process, or series of related events (McHugh, 1966).

Monte Carlo Technique
The use of a chance device to determine the outcomes of chance events, or to approximate the probability distribution that is difficult or impossible to compute (McHugh, 1966).

Move-Step
A design consideration where predetermined time periods are selected for game play, following which game time is advanced to another predetermined time period. Move-steps permit time jumps to focus on specific aspects of an unfolding scenario related to game objectives.

Objectives
The stated goals that the game design and game execution must achieve in order to answer the sponsor's problem statement.

Order of Battle (OOB)
A listing of the forces and equipment needed for game play. Typically there are separate Red, Blue, and Green OOBs. The type of operation and the level of war determine the forces and equipment needed to play the game. This also includes the size of the smallest maneuver unit being played or the degree of detail of the orders of battle and tables of equipment. For example, in a strategic-level game, the basic maneuver elements could be fleets. In operational-level games, maneuver elements could be task forces within a maritime component. Finally, in tactical-level games, the basic maneuver elements could be individual ships, aircraft, or submarines. The degree of detail used in describing the forces and equipment is the basic tool that the game designer uses to keep the game at the appropriate level.

Parameter
A value, such as a hit probability, a detection range, an ammunition allowance, etc., that remains constant for the play of the game, but that may be varied over game iterations.

Participant
Anyone who is attending a game (e.g., player, controller, SME).

Player
A participant in a war game who is not a member of the control group.

Player Requirements
The rank, knowledge, service, or country expertise required of the players and other game participants. Player requirements are determined by the type of game, level of war, and degree of role-playing.

Purpose
The overarching reason for which the game is planned, played, and designed to answer the sponsor's problem statement.

Rehearsal
The final practice and check of the game mechanics, materials, and player and control cell actions to ensure consistency, playability, and game preparedness.

Role Playing
Players are assigned the duties of a specific game billet; e.g., president, chief of staff. This is contrasted with player role performance based upon one's experience and knowledge.

Running Time
Consists of continuous player actions followed by continuous feedback, eliminating deliberate time-block-phased game moves.

Scenario
Addresses geographic conditions and initial types of forces.

Simulation
An operating representation of events and processes (McHugh, 1966).

Sponsor
The senior officer or official of the command/organization who has requested the game. Normally, the sponsor is the approval authority on major game purpose, objectives, research questions, and design.

Sponsor's Representative
The action officer representing the sponsor in discussion with the WGD game team. Able to approve routine decisions concerning game objectives, design, development, and execution.

Subject Matter Expert (SME)
Participant who is an expert on a subject related to the game (e.g., ASW, cyber, space).

Time and Move Convention
How time is handled in the game, and which conventions and procedures are followed in each move. Time is handled by running time, move-step, phases, or key events.

Trusted Agents
Players who have privileged information that is necessary to advance game play and objectives.

Umpire
A member of the control group who performs one or more of the following actions: monitors player actions, enforces the rules and procedures, and judges the outcomes of combat. Another name for adjudicator.

War Game: A war game is a model or simulation of war conducted without maneuvering actual forces, and with a sequence of events that affects and is affected by decisions of the players (Perla, 1990).

- **Board game**
  A manual naval war game employing a game board to represent the area of operations.

- **Closed game**
  A game in which players receive the amounts and kinds of information and intelligence of friendly and enemy forces that they would normally receive in a similar real-world situation. Most war games are closed games (McHugh, 1966). The player's knowledge is limited by the "fog of war."

- **Computer-assisted game**
  A manual game utilizing computer assistance for bookkeeping, data visualization, automated player input (e.g., move tool), and communications.

- **Deductive Game**
  Deductive games begin with a general game idea to be tested, followed by observations collected during the game to support or refute the initial game hypothesis. This type of gaming is used later in the development process, after the concept or plan is more fully developed.

- **Educational Game**
  A game conducted to help students achieve predetermined learning objectives.

- **Experiential Game**
  A game conducted to provide players with decision-making experience and familiarity with operations and associated potential problems.

- **Hybrid Game**
  A game that has both open and closed components.

- **Inductive Game**
  Inductive games are used mainly during concept generation and are characterized by exploratory and brainstorming methods to determine where a concept is going. With inductive games, the concept is discerned after analyzing game data for patterns. This type of gaming is used early in the concept development process.

- **Manual Game**
  A game in which the forces are represented by models, pins, pieces, or symbols, and the participants move them around by hand on a chart, map, board, or terrain model, which represents the area of operations (McHugh, 1966).

- **Multisided or N-Sided Game**
  A game in which there are more than two players or player teams involved in a conflict situation (McHugh, 1966).

- **One-Sided Game**
  A game in which the opposition is furnished by the control group or by nature (McHugh, 1966).

- **Open Game**
  A game in which all the players receive or have access to all information and intelligence of the actions of all friendly and enemy forces (McHugh, 1966).

- **Two-Sided Game**
  A game in which there are two opposing players or teams of players (McHugh, 1966).

ANNEX B

Game Project Team Assignment Duties

All Team Members

- Attend and participate in team meetings
- Participate in discussions with sponsor to determine suitability for war gaming
- Participate in creating game problem and purpose statements, and articulating game objectives
- Attend CDC, IPC, MPC, final planning conference (FPC) with sponsor
- Participate in literature review
- Participate in game design
- Participate in game development
- Participate in game testing
- When required, participate in game analysis

Appendix A

Game Director

- Coordinate with sponsor and department chair to determine suitability for gaming
- Brief, obtain chair guidance resulting from sponsor consultations
- Coordinate game project team member recruitment, assignment
- Develop game team meeting schedule
- Create, coordinate game project schedule with sponsor
- Coordinate with sponsor to discern game problem, purpose, objectives
- Write, discuss, gain sponsor concurrence with game proposal document
- Identify items needed from sponsor (e.g., personnel, products)
- Coordinate, lead CDC, IPC, MPC, FPC conferences with sponsor
- Ensure team augment training (facilitators, technologists, data collectors, adjudication facilitators, MTMU operators, analysts)
- Manage game rehearsal
- Manage game execution and public affairs
- Provide analysis in-progress updates, with analyst, to chair; brief NWC leadership
- Deliver game report and executive briefing to sponsor

Appendix B

Game Designer

- Review previous game designs for applicability
- Participate in formulation of game proposal document
- Identify items needed from sponsor (e.g., personnel, products)
- Identify items needed from game analyst to support postgame analysis
- Lead game design process
- Write game design document
- Participate in game development
- Write initial draft of facilitator guide

Appendix C

Game Analyst

- Participate in formulation of game proposal document
- Develop research questions
- Identify items needed from sponsor (e.g., personnel, products)
- Provide input to game design to ensure relevant data collection
- Lead game analysis planning process
- Identify data streams to be collected during game
- Create survey questions
- Identify data collection process of game products
- Write DCAP
- Participate in game development
- Train analysis team members (in-cell data collectors, postgame data analysts)
- Lead game analysis process, to include production of game report and briefing

Appendix D

Game Developer

- Identify items needed from sponsor (e.g., personnel, products)
- Attend CDC, IPC, MPC, FPC conferences with sponsor
- Lead identification, development, and testing of game player products, after the game designer completes the game design document
- Coordinate obtaining or creating a game friendly order of battle
- Coordinate with web developers the development of gaming technology and web-based move tools, RFI tool
- Provide requirements for computer networks and computer stations to knowledge manager
- Lead game-testing processes, and participate in adjudication testing

Appendix E

Game Logistics Manager

- Identify billeting (hotel)
- Coordinate with knowledge manager to create game administrative web site to share game administrative details
- Track participant RSVPs via game registration site
- Manage player arrival process (clearance, parking, badges)
- Manage welcoming social event
- Manage player departure process
- Provide updates to game director (everything okay, or problems)

Appendix F

Game Knowledge Manager

- Build game folder and filing directory structure
- Coordinate with WGD web developers for required game web sites
- Coordinate with gaming technology to establish player and adjudicator Gamenet accounts and log-ins, including for pregame events, such as rehearsals
- Coordinate with enlisted coordinator and gaming technology to ensure game and adjudication cells are configured (furniture, computers, audiovisual) per design
- Coordinate with web developers to create game web site and move tool
- Coordinate with gaming technology–communication reps to coordinate VTC execution and room projection requirements
- Coordinate with and support the lead analyst in developing and accessing data collector templates

Appendix G

Office of Naval Intelligence Detachment Game Member

- Integrate onto the WGD team for game conceptualization, design, development, and testing in order to represent intelligence and Red Cell considerations
- Address issues concerning foreign military and adversary capabilities and intentions, and the strategic/operational environment
- Develop, coordinate, and/or present the scenario, road-to-crisis, Red order of battle, and other intelligence and Red Cell–related game support materials
- Support game design and development in areas concerning the structure and manning of the Red Cell and intelligence-related elements of other game cells
- Coordinate intelligence community (IC) support to game preparations and execution
- During game execution, fill key roles in facilitation, assessment, and adjudication of intelligence and Red Cell–related game play
- Support postgame analytic efforts regarding intelligence and Red Cell issues as appropriate

Appendix H

Game Adjudicator

- Lead adjudication planning, adjudication team training, and adjudication process during game execution
- Develop adjudication plan, including that within the game design document
- Identify adjudication expertise needed based upon game design
- Provide input to developer for creation of adjudication tools
- Lead adjudication testing under guidance of the game developer and director
- Ensure training of adjudication team members for all testing events, including MTMU operators
- Lead adjudication process during game execution
- Participate in postgame analysis

ANNEX C

Game Support Team Duties

Appendix A

Cell Facilitator

- Serve as the primary game team and player interface for game cell execution
- Participate in beta tests
- Participate in pregame rehearsal
- Personally tailor facilitator guide created by game designer to ensure smooth flow of player activities, in support of data capture
- Attend all player introductory briefings, often in auditorium
- Escort players from auditorium to cell
- Lead player introductions
- Provide players a safety overview (e.g., egress procedures), cell etiquette (one person speak at a time, head-calls), planned daily work schedule, break times, lunch times
- Ensure player log-in and ability to access game web site
- Provide players with overview of the cell's initial task, resources available, and time available to complete the tasking
- Attend midday status update meeting with game team
- Attend end-of-day meeting, providing update of player morale and cell's ability to accomplish assignments

Appendix B

Assistant Cell Facilitator

- Support game facilitator, such as assisting players, offering points of clarification when needed, and sometimes alternating cell management duties if cell facilitator leader needs to leave a cell for face-to-face coordination with the game director to discuss a game-critical problem
- Periodically personally update adjudication on cell activities and additionally obtain update on adjudication management progress or problems (such as computer problems, or novice adjudicator workload management problems)
- Participate in pregame cell-process tests
- Participate in pregame rehearsal
- Attend all player introductory briefings, often in auditorium
- With facilitator, escort players from auditorium to cell
- Assist players with log-in procedures and ability to access game web site
- Review; outline player initial task, resources available, and time available
- Attend midday meeting with game team
- Attend end-of-day meeting, providing update of player morale and cell's ability to accomplish assignments

Appendix C

Technographer

- Support cell facilitator efforts to assist cell members with task completion
- Assist players submitting move assignments, such as formatting a COA graphic and posting in the appropriate location per game protocols
- Lead player log-in process and ensure ability of players to access game web site
- Assist players accessing in-cell survey questionnaires
- Attend midday game status update with game project staff
- Attend end-of-day meeting, providing update of player morale and cell's ability to accomplish assignments

Appendix D

Data Collector

- Member of DCAT, in support of lead analyst
- Collect data for use in postgame analysis
- Provide daily update to lead analyst
- Submit daily written summaries to lead analyst in format prescribed by lead analyst
- Participate in pregame cell-process tests, pending data collector availability
- Participate in pregame rehearsal, pending data collector availability
- Attend DCAT training as prescribed by lead analyst

Appendix E

Enlisted Coordinator

- Responsible to game director for managing all enlisted support to the game and pregame events, such as rehearsals
- Serve as WGD primary interface with other WGD enlisted members, providing direction in support of game tasks
- Coordinate with the game logistics manager for specific game tasking
- Configure game cells per game 5000 document (e.g., easels, whiteboards, admin supplies, etc.)
- Prepare name tents, door signs, badges, and video wall
- When directed, provide personnel to support game participant check-in
- Coordinate with game knowledge manager to manage support for PowerPoint presentations in MLH auditorium

ANNEX D

Professional Development Curriculum: Ongoing

Tasking

- Game project management process
- Concept development considerations

Design

- Game design considerations
- Adjudication considerations
- Cyber-gaming considerations
- Special security considerations
- Operational art

Development

- Game development considerations
- Google portal overview, procedures
- MTMU displays
- ONI support
- Decision support software planning considerations
- USNR support procedures
- Department of State overview

Testing

- Game technical (audiovisual, computer, web) testing considerations
- Game product testing considerations
- Game process testing considerations

Rehearsal

- Rehearsal planning consideration

Execution

- Game execution considerations
- Cell and decision support center facilitation
- Administration and logistics

Analysis

- Game analysis planning considerations
- Game report and executive briefing development

ANNEX E

New-Faculty Professional Development Orientation Curriculum

Chair welcome

Professional development program overview

Game project schedule

Departmental administrative matters

Knowledge and information management

Office of Naval Intelligence support to war gaming

Technology in gaming

Logistic and administrative planning

Game analysis

Game design

Senior Enlisted Academy war game

ANNEX F

Game Proposal Document Example

The following is an example of an external game proposal document written by the WGD to summarize and document initial understanding and mutual responsibilities between the game sponsor and the WGD. This resembles a contract when verbal discussion and expectations are documented.

1 Nov 20XX

2013 Information Dominance War Game
Game Proposal Document

Purpose of This Document

To promote mutual understanding and expectations between OPNAV N2/N6 (game sponsor) and U.S. Naval War College (NWC) War Gaming Department (WGD) in order to facilitate coordinated game project development for 2013 Information Dominance War Game.

Game Problem Statement

The integration of information dominance into maritime operations in a high-intensity, degraded C2, combat environment, has not been comprehensively explored.

Game Purpose Statement

The 2013 Information Dominance War Game will explore the impact on a maritime commander's warfighting offensive and defensive effectiveness when operating in a C2-degraded environment.

Game Objectives

1. Explore assessment challenges when operating in a C2-challenged environment.
2. Explore offensive and defensive planning implications when operating in a C2-challenged environment.
3. Explore offensive and defensive limitations to effective plan execution when operating in a C2-challenged environment.

2013 Information Dominance War Game Draft Schedule

5 Nov 2012	Concept development conference, secure video teleconference (SVTC) Problem statement refinement
13 Nov	Initial planning conference (SVTC) Game purpose, objectives, present v.1.0 design, initial manning
3–7 Dec	Design prototype test (NWC internal)
11 Dec	Game progress update (SVTC)
27 Jan 2013	Game progress update (SVTC)
11–15 Feb	Rehearsal 1 NWC-Internal: test game processes
19 Feb	Midplanning Conference (SVTC) Confirm design, sponsor update on game billet sourcing, names
18–22 Mar	Rehearsal 2 NWC + some external participants: test process, products, tech, people
26 Mar	Final planning conference (SVTC) Review manning holes (non-RSVPs), impact, flag presence
29 Apr–3 May	Game Execution
3 Jul	Game report to sponsor
9 Jul	NWC deliver briefing on 2013 game; get guidance on 2014 game

2013 Information Dominance Initial Design Concept

Game classification level: *(classification level)*

Design concept:

Cells: 2

Player #'s/cell: 20 (40 players + possibly 20 adjudication SMEs = 60 SMEs)

Skill sets: URL planners and ID planners

Scenario: Global 12–like scenario

Player Activities:

1. Presented with an off-the-shelf, prehostilities through hostilities plan, players will consider how the plan presented to them can and should be modified to consider information dominance–related considerations.
2. Players will consider activities that can and should be implemented in anticipation of potential hostilities.

Player Deliverables:

1. Explain whether and how would you change the prehostilities portion of the plan.
2. Explain what prehostilities actions you would take before actual hostilities, but before initiation of kinetic actions.
3. Explain how XXXX capabilities can contribute to enhanced warfighting effectiveness during execution (e.g., targeting, fires, assessment).

Analysis Concept:

1. Capture subject matter community-specific and URL SMEs post-discussion insights.
2. Collect responses with move response sheets, survey questionnaires, web IQ.

Game products. The following products will be collaboratively developed and refined by sponsor and NWC WGD:

COP, communications annex, OOB

Roles and Responsibilities Agreement between Sponsor and WGD

To ensure and harmonize mutual understanding of expectations between our organizations, the items noted below specify the macro-level actions, responsibilities, and deliverables needed for successful completion of our war game. This document is in draft form until we discuss it at the IPC, after which we shall consider it agreed to by our organizations.

1. NWC WGD will provide (to game sponsor flag officer, via point of contact (POC) commander XXXX):
    - Facilitated discussion to ensure mutual understanding of game purpose and objectives
    - Provide draft game purpose and objectives; seek approval by sponsor NLT IPC
    - If significant purpose/objectives revisions after IPC, NWC will provide estimated schedule impact
    - Provide draft game design plan; seek sponsor's approval of design; codify final design into a game design document
    - Tailor game design, if required, to accommodate sponsor resource (participants) limitations
    - Create a DCAP, describing the process of how player data will be collected and refined into analyzed information
    - Deliver a postgame analytic report and executive briefing to game sponsor
2. Game sponsor OPNAV N2/N6 will:
    - Invite game participants (players and adjudicators) to attend game
    - Articulate the problem that the game is intended to address
    - Articulate the purpose of the game (why doing the game?)
    - Work with NWC WGD to craft war-gameable objectives
    - Prioritize war gaming objectives
    - Provide support in developing game materials (e.g., OOB)
    - Participate in game project development planning conferences

WAR GAMING

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