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Wargaming Fourth-Generation Warfare (U)

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Summary

Over the past few years, the Wargaming Department (WGD) at the Naval War College (NWC) has observed a trend: its game sponsors have been turning away from traditional force-on-force gaming, toward increased emphasis on exploring issues related to novel command-and-control structures, information operations, irregular warfare, maritime security, and inter-agency coordination. All of these new interests reflect, in one way or another, the emergence of what is termed “Fourth-Generation Warfare” (4GW), a networked, highly informationalized process in which enemies attempt to evade or neutralize the overwhelming conventional military superiority of the United States and its allies through irregular and asymmetric methods.

The NWC asked CNA to work with its staff to develop gaming techniques to address these warfare issues more effectively. We approached this problem along several avenues of research.

Our research into the concepts embodied by the term *Fourth Generation Warfare* showed how important it is to distinguish what is new from what only seems new, and to understand the necessity of merging the two. In game design, the key elements with which the designer must work have always included time, space, forces (or resources), effects, information, and command. Implicit in these elements, which are primarily the “nouns” of the game designer’s lexicon, is the underlying context of the game and the relationship of those nouns to the fundamental “verbs” of game design—the actions the players may take to change the state of the synthetic universe constructed in and by the game.

None of the key characteristics of 4GW allow designers to dispense with these basic game-design concepts. Instead, our analysis of 4GW concepts highlights the need for designers to address more effectively the potential *asymmetries* inherent in how the different sides of any

conflict think about the elements of the real world. Designers of 4GW wargames must think in new ways, but use both new and old tools to capture these asymmetries in game terms and to exploit those game elements to achieve their goals.

These asymmetries lie first of all in an *asymmetry of worldview* and an *asymmetry of purpose*, which lead in turn to *asymmetries of action* and *asymmetries of means*. Only by understanding all these flavors of asymmetry, and by designing a game system that looks at the game universe from the perspectives of all the major players, can a 4GW wargame hope to provide useful insights into the kinds of questions the NWC and its sponsors wish to explore in wargames.

Based on our research into 4GW theory, and on our development, exploration, and analysis of prototype game systems, we conclude that the central design problems for 4GW wargames are to:

- Evoke the competing asymmetric worldviews in the minds of the players
- Instantiate the resulting asymmetric purposes, actions, and means to create a game “universe” that reflects current and potential future realities
- Structure a framework for player actions and Control assessments that enables players to propose new ideas and new effects while keeping those ideas and effects within flexible boundaries that prevent them from “breaking” the game.

As a first cut at a fundamental structure on which to base the design of 4GW games, we identified the currently popular concepts of DIME and PMESII. (DIME represents the elements of national power defined in terms of diplomatic, information, military, and economic instruments, whose actions affect the political, military, economic, social, information, and infrastructure (PMESII) dimensions of a nation or region—or even an organization such as al-Qaeda).

This same structure allows us to provide a framework for the players themselves to introduce new ideas into the game without allowing flights of fancy—whether by those players themselves or by Game Control—that may take the game into unproductive directions.

In addition to the structural foundation, a 4GW game needs a procedural superstructure to facilitate game play. As a first step toward designing 4GW game engines and mechanics, we propose adopting some concepts and techniques derived from commercial board wargames of a type called *card-driven games* (CDGs). CDGs embody many of the resources and options available to players in a set of cards built on a structure tailored to the gaming environment. These cards help define and drive player actions during the game. Through mechanics for acquiring, storing, and sequencing cards, CDGs combine the creation of hidden options for player actions with a concomitant need for the players to plan their actions and combine resources and capabilities in creative ways to achieve the greatest effects possible. This combination is an extremely attractive design tool for building 4GW wargames.

To illustrate our ideas, we present a rough and incomplete conceptual design of an operational-strategic game of 4GW. This conceptual design—something between a thought experiment and a working prototype—is both an example of some of the thought processes involved in designing such a game, as well as a possible stepping stone for future game designs. The basis for our approach derives from the CDG genre, using DIME and PMESII as its structural foundation.

By describing both the process and its output, we illustrate how we could go about producing a workable game of the type we envision. Our work makes us confident that solutions to most (or hopefully all) of the basic problems of wargaming 4GW do exist. We have seen them in available commercial games as well as in recent Naval War College games.

Furthermore, though cast primarily in terms of the design of a manual wargame—in contrast to a computer game—the solutions and ideas we have developed during this project are readily adapted to electronic play—whether asynchronously, using email, or in real-time, using an active internet server. The appendix discusses these concepts in more detail.

Further development of the ideas we present here is a promising line of attack for the Naval War College Wargaming Department to pursue in its future research and development efforts.

Wargaming Fourth-Generation Warfare

The changing face of wargaming

The Naval War College Wargaming Department has been a leader in wargaming for the past 120 years. It continues to be regarded as the nation's premier center of its kind. For this reason, it receives numerous requests for gaming support from throughout the U.S. Navy, the Office of the Secretary of Defense, the homeland security community, and a wide variety of other sponsors.

The Wargaming Department has a long history of gaming conventional military operations. Now it must adapt to the new operational realities of the early 21st century. To assist it in this task, the Wargaming Department asked CNA to help it develop a new approach to wargaming, one that provides structured and disciplined techniques for accommodating 4GW issues.

Specifically, NWC asked CNA to develop manual gaming techniques to address one or more of the following topics:

1. Networked military operations in an opposed network environment
2. Countering irregular operations, including insurgent operations in the littoral, smuggling of weapons of mass destruction via the seas, and the use of ships and boats as improvised attack platforms
3. Strategic effects of tactical operations, including media, deception, and terrorism
4. Organizational processes, including information flow, shifts of power and influence, and the reactions of stakeholders to organizational changes

5. Non-combat operations, including disaster relief, reconstruction, and stabilization operations.

CNA's study team worked closely with the Wargaming Department to explore the foundations of 4GW ideas and to determine how we might address the topics listed above, as well as others, using manual wargaming techniques. By *manual wargames* in this context, we mean wargames that are not driven by automated computer systems. In particular, we mean games in which the adjudication of player actions and effects is managed by a combination of the players themselves and the Game Controllers, or umpires. In manual games, computer tools may be part of the assessment process (indeed, almost certainly will be part of the process for at least some aspects of it) but they do not control the play of the game. Manual wargames are useful in themselves, and can also serve as a prototype and testbed for developing computer-based or online games. We considered the possibilities of directly implementing online play of some types of manual games—particularly those games most similar to commercial-style board wargames—using readily available tools. The appendix summarizes our assessment of what that approach might entail.

Why 4GW is important

As the 50-year-long Cold War ended with a whimper rather than a bang, many in the United States and its allies (which we will call "the West," despite including Japan and other Asian powers under its rubric) celebrated "the end of history"¹ with the triumph of Western ideals of political and economic freedom. But it appeared that the victory was not so complete as we had hoped.

The all-out struggle for survival against Soviet Communism and its threat to bury the West had been won, to be sure; however, instead of an unfettered new world order of peace and prosperity, in the years immediately following the fall of the Berlin Wall, the world saw the rise of new threats to its peace. The first Gulf War witnessed the deployment into a full-scale combat situation of American

1. Francis Fukayama, "The End of History?" *The National Interest*, Summer 1989, pp. 3-18.

military power unprecedented since the Vietnam war. Slowly it dawned on us that without the existential threat from the Soviets we could now see the growing likelihood and importance of conflicts and warfare of types that had been eclipsed or ignored in our study of and preparation for the Big War. The pundits were quick to argue that even before the end of the Cold War we were entering a new era of warfare, unlike what we had experienced before, an era they termed “Fourth-Generation Warfare,” or 4GW for short.

The shockwaves of 9/11 revealed the incipient and deadly threat posed to the people and infrastructure of the United States itself by shadowy groups of international Islamist terrorists. It caused much “I-told-you-so-ing” among the prophets of 4GW. The extent to which those prophets had “got it right” while the rest of the West had “got it wrong” remains a topic for heated debate, but the undeniable fact is that the battle for the Fulda Gap and the threat of Soviet tanks racing from the inter-German border to the Channel coast no longer dominate military thinking, planning, procurement, and training as once they did.

For the Naval War College and its Wargaming Department, this undeniable fact meant that if they were to maintain their long tradition of leading the services in wargaming excellence, they would need to develop new games and new approaches to gaming that would be more directly relevant to this new environment.

What we sought to accomplish

Drawing on our existing expertise in a broad range of wargaming techniques from both the commercial and Department of Defense (DoD) perspectives, we embarked on a focused effort to identify the key aspects of 4GW as they applied to wargaming future operations and capabilities. How did these concepts, stripped of their hype, change the ways and means of war and, therefore, of wargaming? Could we pull together some initial guidelines and longer-term ideas about how to design games better tailored to this new environment? Could we develop prototypes and conceptual designs to serve as the basis for developing future NWC wargames targeted to help the Navy

explore its options in the increasingly dangerous world of the 21st century?

The research and analysis we conducted

We attacked this task on two fronts. First, we conducted a thorough review of the intellectual foundations of the concepts of 4GW to identify the key elements of those concepts and how they might require game designers to address them in ways different from traditional wargaming techniques. Second, we simultaneously attacked from the opposite flank. We put together a rough prototype of a wargame set in an environment whose prominence had grown with the increasing popularity of 4GW: maritime terrorism in the form of state-sponsored or state-condoned piracy, in the context of fundamentalist Islamist transnational organizations.

As we made progress on these two fronts, the NWC staff proposed that we consider an existing game they had developed—a game called *Grab Granite Island*, and its most recent incarnation, *Granite Island Online*—to analyze its design characteristics and experience its play dynamics. The goal of this effort was to seek further insights into the game-design concepts and techniques that might apply to our broader task, and to evaluate *Granite Island* as the basis for a more general system for modeling 4GW.

What we learned

We have distilled the results of our research, analysis, and insights on the conceptual design of 4GW wargames into two research papers. The first is a detailed discussion and assessment of the intellectual foundations of 4GW and their implications for game design.² The second paper, which you are reading now, builds on that analytical foundation to present a framework for thinking about designing games dealing with 4GW topics. That framework comprises three main pillars:

2. CNA Research Memorandum D0014875.A1, *Recent Trends in Thinking about Warfare*, by Albert A. Nofi. Unclassified, September 2006.

- First is an understanding of how the asymmetries of worldview, and the asymmetries of purpose that result from them, form the basis for designing wargames in this environment we describe as 4GW.
- These underlying asymmetries in turn highlight critical asymmetries of actions that any game design must reproduce in the decision-making processes of its players if that game is to illuminate the critical factors of 4GW.
- These asymmetries of actions, in turn, help dictate the asymmetries of means available for the players to use as they carry out those actions so as to achieve their purposes and to validate and advance their disparate worldviews and value systems.

It is these multilayered asymmetries that a 4GW wargame's design must reflect in ways seldom so prominent in the past. Wargame designers have a well-stocked toolbox at their disposal to help them construct workable designs. These tools are based on both well-established techniques and new innovations. From our perspective, the overall design problem consists of finding techniques for evoking the asymmetrically competing worldviews in the minds of the players, and merging the resulting purposes, actions, and means into a unified representation of reality that becomes the synthetic universe of the game.

At the same time, however, it is critically important that we allow the players of a 4GW wargame to have the intellectual freedom and game-playing capability to step beyond the constraints of the game design and propose new ideas and new effects. Balancing this need for freedom from constraint with the ever-present need to maintain the willing suspension of disbelief among all the players—without which any game will collapse irretrievably—is even more important than ever in the doctrinally contentious environment of 4GW.

We conclude this paper by presenting a tentative, and experimental, solution to these challenges. This solution draws on elements of the classic techniques of both *rigid* and *free kriegspiel*.³ We propose a conceptual design that embodies some of these ideas in a form similar to that of a relatively new and popular commercial boardgame tech-

nique, that of the card-driven game (CDG). This marriage of old and new wargaming concepts is a good starting point for developing war-games of 4GW. It is not, by any means, the final word.

3. See Peter P. Perla. *The Art of Wargaming*. (Annapolis: The Naval Institute Press, 1990).

Fourth-generation warfare⁴

Proponents of 4GW view it as the next stage in the history of modern war. The name derives from their assertion that modern war has unfolded in a series of phases, each of which has been rooted in a particular combination of technologies, organizations, tactics, and strategies.⁵ Their starting point is the idea that “modern war”—the way of war that gave the West global dominance—is a little more than 350 years old, having developed as a result of the Peace of Westphalia (1648), which ended the Thirty Years' War. William S. Lind, Director of the Center for Cultural Conservatism at the Free Congress Foundation, the author of several books on military policy, and the man who coined the phrase “Fourth-Generation Warfare,” says that

before the Peace of Westphalia, many different entities waged wars. Families waged wars, as did clans and tribes. Ethnic groups and races waged war. Religions and cultures waged war. So did business enterprises and gangs. These wars were often many sided, not two sided, and alliances shifted constantly.⁶

Lind and his supporters contend that Westphalia gave the state a monopoly on “legitimate” organized violence. They believe that the conduct of war has passed through three phases since the Westphalian dispensation, and is now entering a fourth.

4. This section is largely taken from Nofi, *Recent Trends*.

5. The literature on “4GW” is voluminous. A foundational source is William S. Lind, Keith Nightengale, John F. Schmitt, Joseph W. Sutton, and Gary I. Wilson, “The Changing Face of War: Into the Fourth Generation,” *Marine Corps Gazette*, October 1989, pp. 22-26.

6. William S. Lind, “FMFM 1 A: Fourth Generation War” (henceforth Lind, FMFM), http://www.d-n-i.net/lind/4gw_manual_draft_3_revised_10_june_05.doc, p. 3, emphasis in the original.

What does it mean?

As yet, there is not a consensus as to precisely what 4GW means. The concept is more of a hypothesis than a demonstrable theory. As a result, the various proponents have different definitions. Thus, Thomas X. Hammes, a retired Marine Corps colonel and one of the principal proponents of the idea, writes:

The first generation of modern war was dominated by massed manpower and culminated in the Napoleonic Wars. The second generation, which was quickly adopted by the world's major powers, was dominated by firepower and ended in World War I. In relatively short order, during World War II the Germans introduced third-generation warfare, characterized by maneuver...[fourth-generation warfare is an] evolved form of insurgency [that] uses all available networks—political, economic, social, military—to convince the enemy's decision makers that their strategic goals are either unachievable or too costly for the perceived benefit.⁷

On the other hand, Lind, arguably the person who first outlined the concept and who is among its most prominent proponents, describes these generations in the following terms:⁸

- First Generation: Mid-17th to early 20th century. Characterized by a battlefield of order (i.e., line and column tactics), which created a bureaucratic military culture of order. This began to break down with the development of industrial-age armies, as the military culture of order clashed with the increasingly dis-

7. Thomas X. Hammes, "4th Generation Warfare: Our Enemies Play to Their Strengths," *Armed Forces Journal*, November 2004, p. 40-41. See also, Thomas X. Hammes, *The Sling and the Stone: On War in the 21st Century* (St. Paul, Wisc.: Zenith Press, 2004), pp. 2 and 208; Thomas X. Hammes, "Insurgency: Modern Warfare Evolves into a Fourth Generation," *Strategic Forum*, No. 214, January 2005, <http://www.ndu.edu/inss/strforum/SF214/SF214.pdf>.

8. William S. Lind, "The Four Generations of Modern War," <http://www.lewrockwell.com/lind/lind26.html>, and Lind, *FMFM*, pp. 35-36.

orderly battlefield, leading to a period of often bloody confusion.

- **Second Generation:** Early to mid-20th century. During World War I, a firepower-and-attrition model of warfare was developed, most notably by the French, which relied on centralized decision-making within a controlling hierarchy, which produced decisive results while preserving the military culture of order.
- **Third Generation:** Mid- to late 20th century. Known as “maneuver warfare” or “blitzkrieg,” like Second-Generation Warfare, this developed out of World War I, but was not fully realized until the early German campaigns of World War II, and was then picked up by other powers. Third-Generation Warfare was characterized by great operational mobility, with decision-making pushed down to the lowest levels, and great operational flexibility. Attrition was less important than rapid, decisive maneuver to encircle enemy forces—an innovation made possible by the development of the internal combustion engine and radio.
- **Fourth Generation:** Mid-20th century to the present. In response to the overwhelming capability of the modern conventional military force, weaker opponents began resorting to alternative ways of waging war, such as insurgency, “terrorism,” and other forms of “asymmetric” conflict.

The argument made by Lind, Hammes, and others is that with the rise of these new Fourth-Generation forms of conflict, the state monopoly on the organized use of force, which has existed since 1648, has been broken. Wars can now be fought by many other entities—sects, political parties, criminal cartels, “super-empowered individuals,” and so forth—and conventional armies, muscle-bound by their culture of order, are helpless to respond.

Although everyone may not agree completely with him, John Robb, a former Air Force officer, journalist, and businessman, and another prominent advocate of 4GW, has a neat summary of what he views as the critical factors favoring this new way of war:⁹

- Global: Modern technologies and economic integration enable global operations by small actors.
- Pervasive: The decline of nation-state warfare has forced all open conflict into the 4GW mold.
- Granularity: The numbers of extremely small yet viable groups, with a broad variety of reasons for conflict, are growing.
- Vulnerability: Open societies and economies offer many vulnerabilities and targets of opportunity, while allowing the free movement of individuals.
- Technology: New technologies—automatic weapons, cell phones, the Internet, GPS, chembio weapons—have dramatically increased the capability of small groups of warriors.
- Media: Global media saturation potentially provides an extraordinary propaganda reach and lends itself to facile manipulation of public opinion.
- Networked: New organizational models made possible by improvements in technology are much better at learning, adapting, surviving, and acting.

All of the proponents of 4GW argue that its principal objective is not the destruction of the enemy's forces, but of his will to continue the fight. As Robb states it:

Victory ... is won in the moral sphere. The aim of 4GW is to destroy the moral bonds that allow the organic whole to exist—cohesion.¹⁰

Proponents of 4GW often argue that the “Clausewitzian Trinity” of warmaking, the ties among government, people, and armed forces, which prevailed during the first three generations, is no longer valid.¹¹ Marginalized during the first three generations of modern

9. John Robb, “4GW-Fourth Generation Warfare,” *Global Guerrillas*, May 8, 2004, http://globalguerrillas.typepad.com/globalguerrillas/2004/05/4gw_fourth_gene.html.

10. Robb, “4GW.”

war, the “non-state actors”—tribes, sects, criminals, corporations, and more—are once again able to engage in war. Thus, to some extent, 4GW is a return to the pre-Westphalian politico-military environment, and, given this “decline of the state,” there “can be no purely military solution to Fourth Generation threats.”¹²

Some critical elements of 4GW are that:¹³

- There is no distinction between “war” and “peace,” or “lawful” and “unlawful” activity in the conduct of conflict.
- Distinctions between “civilian” and “military,” or “combatant” and “non-combatant” have no real meaning.
- The “front” and the “rear” are the same.
- Asymmetric approaches are the default mode of combat.

Making war the 4GW way

It is clear from any review of events over the past 20 years that the practice of war is changing, particularly in regard to certain traditional aspects of warfare. “Conventional” warfare between states is in decline as a practical instrument of policy, partially because of the development of economic globalization. But if conventional warfare is less likely, other forms of conflict, such as information warfare, covert operations, and terrorism, are becoming more prominent. Non-conventional means and modes of violence are more accessible to so-called “non-state actors” than they were in the past, because of technological innovations, and cultural and social change, including

11. Lind, FMFM, p. 41.

12. Lind, FMFM, p. 4. The notion that the “nation-state” is a dying entity is explored in Martin van Creveld’s *The Rise and Decline of the State* (New York: Cambridge University Press, 1999).

13. These are summarized neatly in an article that has been widely circulated and republished often, by Harold A. Gould and Franklin C. Spinney, “Fourth Generation Warfare is Here!” *Center for South Asian Studies Newsletter* (University of Virginia), Fall 2001, www.virginia.edu/soasia/newsletter/Fall01/warfare.html.

that very globalization that has otherwise promoted a surprisingly high degree of international amity. At the same time, there has been a blurring of the boundaries between war and peace that evolved over several centuries.

Based on our research into the writings of the proponents of 4GW, some of the key elements of future warfare include the following:

- **Political motivations:** Ultimately all conflict involves political objectives, whether these are defined in nationalist, economic, religious, racial, or any other terms.
- **Military resources:** While the size and character of the military forces that will be needed may differ from those we have at present, maintaining flexible capabilities across the entire scale of conflict will be necessary for some states—particularly a global power like the United States—and will always remain an important determinant of success or failure in the complex global environment.
- **Cultural understanding:** Sun-Tzu's prescription to “Know the enemy and know thyself” remains a valid underpinning not only for political objectives but also for information operations.
- **“Soft power”:** Money, diplomacy, cultural and social activity, humanitarian actions, and intelligence and information operations are becoming more important.
- **Non-state and transnational enemies:** States may be less likely to be opponents. Non-state actors, transnational entities, and even “super-empowered individuals” will become more noticeable, so that we may face many small enemies, rather than one or two major ones.
- **Failed, fragile, and rogue states:** Imperialism had largely eliminated these from the world stage by the end of the 19th century. They began to re-appear in the mid 20th century, and their proliferation provides breeding grounds and havens for non-state actors, transnational entities, and super-empowered individuals.

- Urbanization and development: These provide additional sources for non-state actors, and crowded “seas” in which they can swim in relative obscurity. They also give these “sharks” more potential targets, while limiting the flexibility of military response.
- Facile communications: Never before has the movement of information or people been so easy, and so difficult to monitor or control. This situation can be leveraged by all actors, but provides particularly important avenues of access to the asymmetric actor, who would not have had such capability in the past.
- Technological access: The increasing availability and importance of technology provides potential enemies with the ability to develop innovative weapons and cause extraordinary numbers of casualties.
- Diffuse populations. The “implantation” of very diverse ethnic, cultural, and religious communities in virtually all developed countries creates potential instability in many of them, even those with histories of ethnic and religious pluralism, while providing potential enemies with possible “nodes” of support within those societies.
- Waning social contract: Traditional and codified cultural limitations on warfare, albeit often honored more in the breach in the past, are far less likely to restrain non-state actors, transnational movements, and super-empowered individuals engaging in asymmetric warfare, which can range from military action to criminal acts, thus imposing a serious handicap on the more culturally constrained combatant.

These factors fall into several broad categories. Some have been the most prominent factors in warmaking throughout history, such as political motivation, military forces, money, diplomacy, and intelligence. Others were once less prominent—or perhaps less “visible”—but became more important recently. These include information operations; cultural, social, and humanitarian actions; non-state and transnational actors; and failed and fragile states. Newer factors, such as urbanization and development, technological access, facile communications, diffuse populations, and a waning social contract are

critical enablers of “non-traditional warfare.” They cause vulnerabilities in conventional powers, which can be exploited by the unconventional warrior, whether state-based or non-state.

4GW and game design

The pundits of 4GW have highlighted important systemic changes in the global environment, particularly those associated with increasingly free access to the territory of nearly any nation, and access to information and communication capabilities beyond the wildest dreams of our forbears. They also may have over-emphasized what has changed in other areas, by characterizing those developments as “new” when, in fact, they are merely a change in emphasis of some traditional elements of conflict, not a fundamental change in the nature of conflict or war itself.

From the game designer’s perspective, this distinction is important because it means that at least some of the fundamental approaches and mechanics we have been using to represent operational-level warfare may still be valid. To bring those old approaches and mechanics up to date, however, we will have to come up with new ways of implementing them, or new ways of connecting them to represent the reordering of the prominence—and perhaps even the relative importance—of some of war’s major elements.

In wargame design, the key elements with which the designer must work have always included time, space, forces (or resources), effects, information, and command.¹⁴ Implicit in these elements—which are primarily the “nouns” of the wargame designer’s lexicon—is the underlying context of the game, and their relationships to the fundamental “verbs” of game design, the actions the players may take to change the state of the synthetic universe constructed in and by the game.

14. See CNA Research Memorandum D0010807.A2/Final. *Transforming Naval Wargaming: A Framework for Operational-Level Wargaming*, by Peter P. Perla et al. Unclassified, September 2004.

None of the key characteristics of 4GW dispenses with these game-design concepts. What the environment of 4GW does do is highlight the potential asymmetries inherent in how the different sides in the conflict think about the elements of the real world. These perspectives must be represented in game terms, and the players must learn to recognize and exploit those game elements to achieve their goals. The next section explores these asymmetries in greater detail to prepare us to understand how they affect wargame design.



Exploring asymmetries

The asymmetries that characterize the comparisons of traditional Western powers with their Fourth-Generation opponents are perhaps the most prominent feature of the ideas proposed by the leading advocates of 4GW. Such asymmetries are clearly of fundamental importance to designing games about conflict in this environment.

Asymmetries of means

As we have seen in the previous section, much of the emphasis in the discussions of the advocates of 4GW thinking centers on what we will call the *asymmetry of means*. The term recalls those famous pictures of Polish cavalry lancers who are (apparently) charging armored and mechanized German tanks with wooden spears during the opening days of WWII. It evokes images of heavily armed and weighed down U.S. soldiers succumbing to the ragged, nearly naked, AK-47-armed Somali—what do we call them? Not soldiers, not civilians. Guerillas? Fighters? Gangsters? We envision those movie scenes of little boys with cell phones calling back to warn the warlords of the departure of American helicopters. We remember the images of Israeli troops attacking through Palestinian towns, which were posted in near-real-time on blogs across the global internet.

These asymmetries of means capture our imagination because they are physically obvious and emotionally striking. But how real are they in practical terms? What fundamental difference is there between the little boy with his cell phone on the hill and a highly trained and expertly camouflaged Special Operations sniper calling back his observations of enemy activity using a satellite radio? The effects are much the same in analogous situations, but the capabilities of those two sources of information are very different, at least in a purely quantitative sense.

What physical means can the Fourth-Generation warrior from a terrorist organization or failed state deploy that a Western power cannot match in kind? Is a difference in effectiveness of similar physical means really an asymmetry? Not from a game-design perspective. In that case, where are the truly fundamental asymmetries?

Asymmetries of purpose and worldview

Far more important from the perspective of game design are the *asymmetries of purpose* among the conflicting parties—asymmetries largely stemming from *asymmetries of worldview*. These asymmetries are key elements in defining the scope of player attitudes about what they want to accomplish and, therefore, about the scope for actions they may want to undertake. Because games are all about decisions, understanding the domains of decisions the players should have available to them, their options, and their implications is of critical importance to game design.

In classical wargames, especially those at the operational level of war, opponents typically had similar purposes—though often at opposite end of the operational see-saw: attack versus defense of territory. Maximizing the ability to apply force to destroy your enemy’s stuff and kill his people, while preventing him from doing the same to you. Forcing your opponent to stop doing whatever it is that got you into this mess in the first place, while maintaining your own freedom of action, either physically, by applying superior force, or morally through weakening his resolve to oppose your desires.

The Big Wars of the 20th century dominate the thinking of many—wargame designers included—as archetypes of “real” war. Such war is a struggle for political suasion through physical occupation. It’s the same old story from Alexander and his phalanx, to Rommel and his panzers: the conquest of land and submission of people through the application of superior might demonstrated by the occupation of the opponent’s home and exploitation of its people and resources for the benefit of the conqueror.

Much of the wargaming done in the United States during the Cold War reflected these same predilections, even when the subject of the

game (the war in Vietnam, for example) was itself more akin to a 4GW situation than to the 1940 Battle of France. With those sorts of prejudices, Cold War games could easily focus on the nice, quantitative, tangible things like the means and modes of destruction and occupation. Other critical elements of real war, even at the global scale, could be considered merely enablers or irritations—minor details such as command, logistics, public opinion, political opposition, and the global media. Though not exactly zero-sum games in the mathematical sense, there was very much a sense of judging my success in terms of how much I was “taking away” from you.

This is not to say that classic gaming techniques ignored all asymmetries of purpose and means. Indeed, what serious wargame of WWII could afford to ignore the conduct and effects of guerilla warfare behind German lines in occupied Europe, or against the Japanese in the Philippines? Or what about Napoleon’s Spanish Ulcer in strategic games of the Napoleonic wars? Such asymmetries of purpose seemed to be represented on the surface, yet the techniques used to represent these asymmetric operations tended to evaluate their nature and their outcomes in the same general ways as more conventional operations—destruction of enemy resources and military power.

This symmetric view of asymmetric operations stemmed in large measure from a symmetry of worldview among the contending parties—at least as reflected in the games. The aggressor—Hitler, Tojo, Napoleon—wanted to take something from the defender that both parties valued. The defender wanted to keep it. Where possible and profitable, both sides used similar resources (in terms of military force and economic mobilization) operating in similar ways. There were surface differences, to be sure; in wargames of the World War III variety, Soviet submarines attacked U.S. reinforcement convoys in the North Atlantic, while NATO air forces and long-range missiles attacked the Soviet follow-on forces in East Germany and Poland. But in the end, the effects were analogous.

When such analogous means were not available, one side might seek to turn its opponents’ conceptual flank and counter their capabilities not by opposing them directly, but rather by finding ways to circumvent them. An interesting example of this real conceptual judo in

action can be seen in the entire style of *blitzkrieg* as practiced by the Germans in Poland and Western Europe in 1939 and 1940. As insightfully analyzed by Professor Paddy Griffith, the *blitzkrieg* was a technique for winning wars by avoiding combat, not by fighting the enemy more efficiently in an attrition battle.¹⁵

What is less obvious in both its workings and its effects is the asymmetry of worldview. This asymmetry extends to the very core of conflict. It is an asymmetry of values, which may well lead to an asymmetry of purposes and means—or it may not! The most obvious asymmetry of worldview permeating the current 4GW environment is the current asymmetry between Islamist extremists and the West. Aside from fundamentally different valuations of concepts such as freedom and democracy, the Islamists, at least for now, place little value on territorial control or physical conquests. Their actions in Iraq, for example, seem to have little to do with the historical goals of an insurgency seeking to establish physical and political control over a geographic region. Instead, they seek to engender chaos, to prevent the United States and the Iraqi government from exerting that sort of physical and political control that we in the West are used to thinking about in terms of established nation-states.

This is the critical point—the center of gravity, as it were—of designing wargames to explore the 4GW environment. Games are about decision-making. Decisions stem ultimately from worldview, from value propositions that each actor on the world stage (or the game room) must assess. In a game, however, most often the players tend to emerge from similar value systems. It's not likely that we can invite Osama bin Laden to play himself in an NWC wargame. Instead, we must somehow find a way to characterize a value system that may be quite foreign to our own, so as to engender decisions consistent with it from players who are the products of a vastly different real-life worldview. How do we do it?

The key is to step away from the philosophical and sometimes intangible asymmetries of worldview, and even of purpose, and give our attention to the more tangible domain of actions—that is, of what

15. See Paddy Griffith. *Forward into Battle*. (Chichester: Antony Bird, 1981)

players actually do in playing the game. For it is through their actions that they manipulate the game environment in their favor, and achieve their goals in playing the game.



How asymmetries drive wargame design

Historically, wargames began with representations of symmetric situations in which the competing players (usually, two sides only) could consider their chances of victory fairly even, with little obvious differences among their resources or goals. Chess and Go, the most ancient games of war still played today, are symmetric games. Within each game, both players field the same playing pieces (maneuver elements), use the same mechanisms for movement or attack (combat capabilities), and strive for the same goals (strategic objectives). But the pair of games reflect contrasting worldviews.

Chess is focused on the enemy leader (the King piece) and uses playing pieces of varying capabilities to capture territory and destroy enemy pieces in stylized combat. Go, on the other hand, uses homogeneous playing pieces (stones), and the players place stones on the board in an effort to create subtle combinations to seize territory and paralyze the opponent, not to destroy him in direct combat. How on earth could you design a game that would integrate the play of both chess and Go simultaneously? In many ways, this is the task we have set ourselves in designing a game dealing with 4GW.

Virtually all “modern” wargames of the classic style stem from concepts developed for boardgames of war, from the 19th-century invention of *Kriegspiel* by B. von Reisswitz through the table games played by H.G. Wells and Fred T. Jane during the turn of the 19th and 20th centuries, through the sophisticated hobby wargames, which grew out of the work of Charles Roberts in the 1950s.¹⁶ These boardgames laid the foundations for most subsequent wargames, including many of the computer wargames that we see today in the commercial marketplace.

16. See Perla, *The Art of Wargaming*, for a discussion of the history of modern board wargames.

The designs of the board wargames of the latter half of the 20th century did not often attempt to explore the asymmetries of worldview and purpose as we described them in the preceding section of this paper. Indeed, at least in the early years of the genre, games focused on recreating historical eras and events, and emphasized the differences between the hard, technical capabilities of the opposing forces. This emphasis on a comparison of similar means caused designers to pour a lot of attention into representing different mixes of unit types and different levels of combat effectiveness. Quantifying these differences, creating mathematical expressions of the relationships between them, and using those expressions to determine probabilistically the results of their interactions became the principal tools that designers used to characterize the differences between opposing sides.

A variety of approaches evolved within this construct. With the emphasis on differentiated forces (or resources), designers derived models of time, space, effects, information, and command to implement and realize the interactions of the different forces. Thus, cavalry and motorized units moved faster (or at least farther) than foot units (time and space effects). Armor and artillery units had greater firepower than infantry units (combat effects). The Prussian General Staff of 1870 performed with greater efficiency than the French Army high command of the same period (information and command effects). Yet, the fundamental worldview of the players remained largely the same. Capture and defense of territory and destruction of the opposing armed forces while preserving one's own were the major *desiderata*.

As the post-World War II era became of more and more interest to the commercial marketplace, however, commercial wargame designers faced new challenges. How could the undeniable validity of some of the fundamental symmetries of war as we understood it be reconciled with the growing recognition of a need for a more careful representation of the asymmetries of action that were becoming more and more important in the wars of the end of the millennium? And how could we represent better the mix of symmetry and asymmetry in our wargame designs?

Card-driven wargames

Partly in response to these challenges, designers of mainstream commercial board wargames developed a number of innovations in techniques as they attempted to break out from the old patterns of thought and design practices. One of the most influential ideas to arise during the past 15 years is the concept now known as card-driven games (CDGs). The progenitor of this game genre was *We the People*, designed by Mark Herman and published by The Avalon Hill Game Company in 1993.¹⁷

Origins and fundamentals

We the People (*WTP*) did not, in fact, introduce the idea of using special-purpose cards to drive the play of a boardgame. Other games, notably Milton-Bradley's *Summit* of the late 1960s, had used cards to drive game play. What *WTP* did do was to show how a creative designer could take advantage of the almost unlimited flexibility of the card-based mechanisms to serve as the core engine of game play in ways not seen before in a "real" wargame.¹⁸ Herman's key insight was that card-driven mechanics can allow players to "break" the "normal" rules of the game for a brief period of time and in a carefully controlled way.

To explain the implications of this technique, we first must consider a bare-bones description of how a card-driven game in the *WTP* family proceeds. CDGs typically use the standard wargame practice of basing play on a map of the geographic region of interest. Players position and act with playing pieces representing their military forces (and sometimes their political influence) upon the map. Instead of using the standard wargaming practice of allowing each side to move all of its pieces during its turn to play, CDGs limit that ability through the use of the cards.

17. Mark Herman. *We the People*. (Baltimore: The Avalon Hill Game Company, 1993).

18. To read some of Mark Herman's thoughts about this game genre, see his C3i article, "My Philosophy Behind Card Driven Game Design," *C3i Magazine*, No. 17, 2005, pp. 6–10.

At the beginning of a *game turn*, each player typically is dealt a hand of five to seven cards. The players then alternate *player turns*, during which they may play one card and act according to the capabilities the card provides. Each player in turn must play one of the cards from his hand and carry out the event or the operations he chooses.

Cards may have multiple functions. Most often in CDGs, the central component of the card is its *event*, a text description of a special situation which prescribes some specific opportunity the player may take advantage of by playing the card. These events have a wide scope: they may simply provide a small benefit in battle, or they may create major changes in the strategic situation. For example, a card could represent the intervention of France in the American Revolution, with profound effects for the subsequent play of the game as French troops and warships arrive to reinforce the embattled colonists. Such cards may allow the introduction of new forces and new leadership, or the removal of some of the opponent's forces to respond to actions in other theaters of war not represented on the map. A card may also provide the operational wherewithal (usually known as operations, or "ops," points) to move forces on the map or to place markers showing one side's increase in political influence.

The power of the cards

A key decision dynamic confronts the player in the use of these cards: of all the various functions of the cards, events, operations points, and possibly others as well, the player must choose only one function to carry out when playing the card. The cards are designed so that, usually, events with the greatest direct effects on play also have the highest ops-point value, making each card play a potentially agonizing decision for the player. As play progresses, the cards become, in a sense, the currency of capability in game terms. If the playing pieces and their characteristics represent the capabilities of the opponent as readily perceived by the other players, so too do the opponent's cards—but in a way mostly hidden from view. Thus, the system introduces a new layer of uncertainty into the game and provides the players with new opportunities for stratagem and bluff.

In a CDG, each card may provide the player with enhanced capabilities within the standard rules of play, or it may give him special capabilities that go beyond what is normally available in the standard rules. Each card may represent a perturbation in the underlying game system. In every case, however, it is self-evident that the capabilities the card provides its player all must lie within the boundaries created by the fundamental structures of the game and the universe of possibilities it provides.

If a card is too powerful, it “breaks” the game, and players quickly point out the flaw and demand its correction. For this reason, prepublication playtesting of CDGs is at once crucial and difficult. The designer must strive hard to ensure that no card becomes a game breaker, and that, under the right circumstances, all cards have a utility beyond their apparent worth. Even more interesting from the player’s perspective, the entire set of cards can provide certain powerful “combinations” of card plays that can have devastating effects if managed adroitly.

DIME and PMESII in the 16th century: *Here I Stand*

One of the most recent CDGs has even more direct connection to the problems of gaming 4GW. In the game *Here I Stand*, published early in 2006 by GMT Games, the designer created an intricate and multi-dimensional representation of Europe in the period 1517 to 1555.¹⁹ This was the Age of Reformation, when Protestantism arose as a major religious and political force in Europe. It was also a period that saw the struggles of the original global superpower, the Hapsburg Empire of Spain and Austria, with up and coming nation states in England and France, and the continuing threat from the Moslem East, the Ottoman Empire.

To represent the rich stew of political, economic, military, social, and religious upheaval, *Here I Stand* introduces some innovative design solutions. Foremost among these, for our purposes, is the way the game models the different worldviews and purposes of the major players (which include the Protestants, the Pope, the Hapsburgs,

19. Ed Beach. *Here I Stand*. (Hanford, CA: GMT Games LLP, 2006).

France, England, and the Ottomans). Each of these “powers” has its own set of disparate objectives in the game. For the Protestants, one principal goal is to convert as much of Europe as possible to their religion. For the Ottomans, conquering the major cities of eastern Europe, particularly Belgrade, Budapest, and Vienna, is high on the list. For the England of Henry VIII, the first preoccupation is the production of a healthy male heir, whether or not this requires repeated marriages and divorces and the resulting chances of excommunication from the Pope. In France, in addition to military and political struggles against the Hapsburgs and possibly the English, the king finds himself committed to a program of social and cultural development symbolized by the building of elegant chateaux throughout the country.

The game succeeds in presenting an incredible range of factors in a coherent, if intricate, setting. Tying together the asymmetric world-views, purposes, actions, and means is a system of *victory points* that rewards the powers for achieving the idiosyncratic goals that each of them seek. By using this common currency, and a carefully constructed reward system, the game allows the players to judge their relative success in achieving their multivariate goals using a simple scalar measure. In a very real sense, *Here I Stand* integrates the diplomatic, informational, military, and economic (DIME) elements of 16th Century power, and shows how their interplay affects the political, military, economic, social (especially religious), informational, and infrastructure (PMESII) dimensions of the major powers of the time.

Here I Stand is an object lesson in the power of innovative wargaming techniques to represent complex situations in manageable and understandable ways. Its popularity in the commercial wargaming hobby rests on its success at combining playable game-system mechanics and historically evocative content into a comprehensive strategic game. The power and flexibility of the CDG genre as illustrated by *Here I Stand* suggests its suitability as the basis for a 4GW gaming system. We will return to that prospect shortly.

Free and rigid *kriegspiel*

Another major theme in the evolution of modern wargames is the variation in methods through which the actions of the players are implemented and adjudicated in the game universe. In its earliest incarnation, this game universe consisted almost entirely of a game board representing physical terrain and a set of playing pieces representing military units, which moved and fought over that terrain. These activities were carried out in accordance with the “rules of the game” and, in the earliest days, moderated by an umpire who enforced those rules and handled unusual or contentious situations.

The original Prussian game of *Kriegspiel* as invented and popularized by B. von Reisswitz used a written set of complex and comprehensive instructions to manage the play of the game. The umpire’s role was to make judgments about what the players might see and know about their enemy, and to resolve interactions by comparing the roll of specialized dice with various tables that dictate the outcomes of fire, close combat, and special circumstances (such as engineers constructing field fortifications or bridges).²⁰

This original approach, later termed *rigid kriegspiel* in the Prussian and German practice, gave way in the later days of the 19th Century to what became known as *free kriegspiel*. In the latter, the detailed rules and charts of the past were replaced by a set of very generalized instructions. An officer-umpire of experience and sagacity (at least in the ideal case!) oversaw and adjudicated the play of the game based on his own experience and judgment. Rather than tables of results indicating the number of troops lost when fired at by a battery of artillery for 15 minutes, the umpire decided the effect of the fire as he saw fit.²¹

20. B. von Reisswitz. *Kriegspiel*. First English edition of 1824 Prussian edition, translated and edited by Bill Leeson. (Hemel Hempstead, UK: Bill Leeson, 1983).

21. See Perla, *The Art of Wargaming*, for more discussion of free and rigid *kriegspiel*.

Both traditions live on today. In the commercial world, the dictates of the marketplace demand a rigid sort of style, in which all the rules of play are embodied as comprehensively as possible in the printed instructions so that competing players can be certain they are playing “by the same rules.” (To be sure, such is not always an easy goal to achieve and disagreements about how to interpret the rules are as pronounced today as they were in von Reisswitz’s time.) In the “professional” world of DoD gaming, on the other hand, the prevalence of seminar-style games and the rapidly changing nature of technology and operational concepts frequently results in more emphasis on a free *kriegspiel* style, in which “Control” may use rules and models as an aid in its “adjudication” of results, but not slavishly. Frequently, Control will modify the raw outcome of a model of, for example, an attack on a Navy aircraft carrier, to help keep the game on track toward achieving its objectives. In other cases, all or many of the players discuss and agree upon the results of moves and interactions. Everything is very polite and professional (well, sometimes at least). Although players and umpires may dispute details of effectiveness and outcomes, this approach is not very likely, on the whole, to create unusual or unexpected outcomes. There is simply too much bureaucratic pressure to keep things centered on the expected-value outcome.

The dangers of such free *kriegspiel* techniques are obvious and frequently reinforced by horror stories of one form or another. The classic such story is set in the gaming undertaken by the Japanese Imperial Navy as it planned the Midway operation of World War II. During this game, Control initially assessed an attack by American B-17 bombers from Midway as a success, damaging or sinking several Japanese carriers. The decision of the umpire was overruled by the senior officer, and the game continued. More than once, this “intervention” by a senior officer is highlighted as an incident of dishonesty designed to avoid an embarrassing loss in a wargame. The truth is more complicated than that. The fact is that the subsequent loss of Japanese carriers at Midway had nothing to do with attacks by B-17s, which proved horribly ineffective at damaging ships at sea. The Japanese did miss an important insight from the Midway game, but vulnerability to B-17s was not it. Rather, it was the almost unnoticed

danger posed to the Japanese fleet by an American carrier force operating to the northeast of Midway.²²

Of course, rigid umpiring techniques are no more free from dangers of poor or biased modeling or assumption. In the case of a rigid game, with predefined rules, it is the judgment of the game designers that is hidden from the players by the layers of input data and models. And seldom is it possible, at least in DoD games, for the players to challenge the designers of these models directly when their outcomes disagree violently with the players' expectations—and sometimes the players' superior expertise.

In the end, neither rigid nor free *kriegspiel* is the “correct” technique. Such a universal right answer simply does not exist. Techniques of adjudication are merely that—techniques. They are tools that the controllers or designers of a game use to make tangible in the game universe the outcomes and implications of the decisions players make and the actions players take. Both techniques have strengths and weaknesses. The real issue for the designer is how best to handle the situation in a specific game environment. Our own attempts at developing a 4GW wargame, and our experiences with the NWC game of *Granite Island Online*, revealed some issues that are important to consider when trying to build any 4GW wargame.

Pirates of the Fourth Generation and Granite Island Online

During our research for this project, we saw an unexpected coming together of the two ideas discussed above: card-driven games and free-versus-rigid *kriegspiel*. Our exploration of CDGs took place in the context of developing a way to use wargaming to explore directly some maritime aspects of 4GW. To this end, we built a prototype CDG, the *Pirates of the Fourth Generation*, to get some first-hand experience at the issues associated with designing such games. In addition, we analyzed, played in, and critiqued a game designed at and used by the NWC. This game, *Granite Island Online*, is an internet- and email-

22. See Perla, *The Art of Wargaming*, for more discussion of frequently misunderstood incident.

based game which evolved out of an earlier version titled *Grab Granite Island*. The design of the original game is firmly rooted in boardgame principles, though it is not played in the standard boardgame style. The updated version of the game as we played it introduced many elements of free *kriegspiel* into the rigid-*kriegspiel* foundation of its predecessor.

The *Pirates* game shows how a classic boardgame designer (steeped in the traditions and tools of a form of rigid *kriegspiel*) approached the task of designing a 4GW wargame. *Granite Island* illustrates the difficulties inherent in modifying what is essentially a 3GW game into a 4GW game. In this case, the approach used ultimately took the form of applying a free *kriegspiel* mentality to let the game's controllers introduce and emphasize the aspects of 4GW that were of most interest. Both attempts produced what we assessed as flawed models of 4GW. But our experience with both games taught us much that we will use when we propose an approach to a conceptual design of a true 4GW wargame in the final section of the paper.

Pirates of the Fourth Generation

To explore the task of designing a game to represent 4GW, one of our first efforts was to design a two-sided manual wargame we called *Pirates of the Fourth Generation (Pirates)*. *Pirates* is an ambitious attempt to apply the CNA study team's evolving concepts of multi-level system display and asymmetrical game mechanics to a current operational scenario. This game focuses on maritime piracy in the Global War on Terrorism (GWOT). One side ("Blue") represents a Coalition combatant command in a multinational area of operations. The other side ("Red") represents groups of clan-based warlords in the fictional land of Erythia.

Setting

International shipping in coastal waters off Erythia is under attack from clan-based criminal gangs that flourish in the chaos of a failed state plagued by famine, natural disasters, and tribal violence. Using armed speedboats, supported by mother-ships (converted fishing trawlers), criminal gangs board commercial vessels and hold their crews and cargoes for ransom.

Initiating the design process

To begin designing the game, we listed some of the characteristics of the GWOT that we wanted the game to capture:

- Clashing networks of systems, including news media, non-governmental and international organizations, and the global economy.
- Complex, “messy” environments: cities, mountains, and deserts with pervasive humanitarian crises.
- Breakdown of distinctions between combatants and noncombatants.
- Tribes, clans, criminal gangs, and religious sects as adversaries. (While this suggests an inherently multi-sided conflict, we decided to design *Pirates* as a two-player game. It is much easier to test a two-sided game than a multi-sided one, and you can always add complexity after playtesting has confirmed the validity of basic game systems.)

One of the first questions every wargame designer must answer is, “What roles are the players playing?” At the strategic level, players typically represent national command authorities, whether individual (Alexander the Great, Jenghiz Khan, Stalin) or collective (the Roman Senate, the Prussian General Staff, the military-industrial complex). At the operational level, players represent senior flag officers (combatant commanders). At the tactical level, they represent officers in tactical command, down to operators of individual combat platforms.

For a 4GW wargaming system the answer to this question of player roles is not so straightforward. If warfare is viewed as a multi-dimensional clash of systems on systems, the players represent collectivities of decision-making subsystems—something close to Rousseau's (1762) concept of “the general will.”²³ This imposes a heavy burden on the player, who must manage simultaneous mental constructs of

23. Jean Jacques Rousseau. *The Social Contract or Principles of Political Right*. (1762) Translated by G. D. H. Cole, available online at <http://www.constitution.org/jjr/socon.htm>

multiple points of view—for example, diplomatic, informational, military, and economic.

Design features

We wanted to integrate into the game some specific features of contemporary global conflict, neglected by most “conventional” war-games:

- Hostage-taking and hostage rescue
- Collateral damage and its effects on political and diplomatic situations
- Staging and media-management of atrocities
- Humanitarian response to natural disasters in the midst of conflict.

Based on our previous research into theoretical conceptions of 4GW,²⁴ we implemented a model based on the concept of *Will points*—an abstract metric of each side's “will to continue the fight” as the game's critical variable. A quotation from Clausewitz neatly captures this principle:

If you want to overcome your enemy, you must match your effort against his power of resistance, which can be expressed as the product of two inseparable factors, the total means at his disposal and the strength of his will.²⁵

We decided to represent this concept of will by using a standard approach. Each side begins the game with a store of Will points. Arbitrarily, we assigned 50 points to Red and 55 to Blue. (In due course, after a period of playtesting, we could modify these initial numbers to balance the game). Players have to “spend” Will points like currency in order to conduct operations, and their store of points increases as a result of successes, or decreases in response to failures. If either side's Will points reach zero, that side “gives up the fight” and the other player wins the game. In effect, this means either that Blue

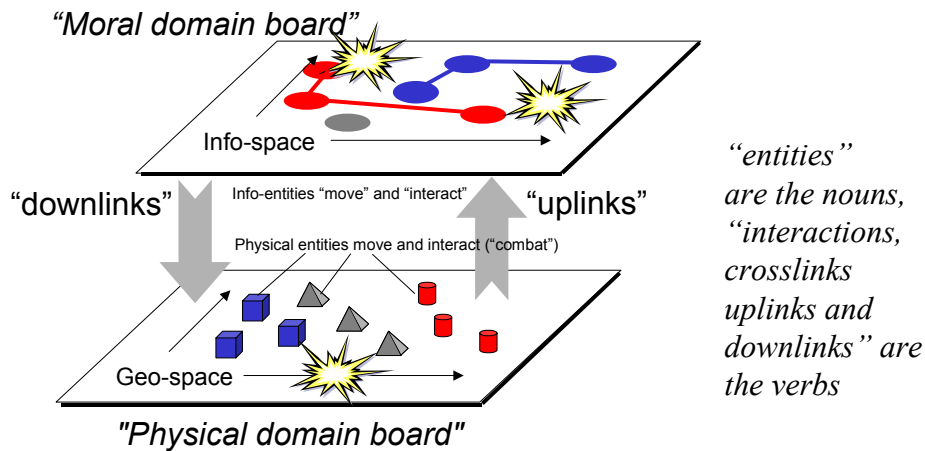
24. Nofi, *Recent Trends*.

25. Carl von Clausewitz, *On War*, translated by Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976).

national leadership decides to withdraw from anti-piracy operations in the area represented in the game, or that Red's clan elders and religious authorities decide (at least for the time being) to stop preying on neutral offshore traffic.

Drawing on John Warden's concept of "the enemy as a system,"²⁶ and our own earlier work on the representation of networks and information effects in wargames,²⁷ we decided to represent the game's battlespace on two levels: a physical layer (the map) and an information layer (a network diagram). This is shown in figure 1.

Figure 1. *Pirates of the Fourth Generation*: The two-layer concept



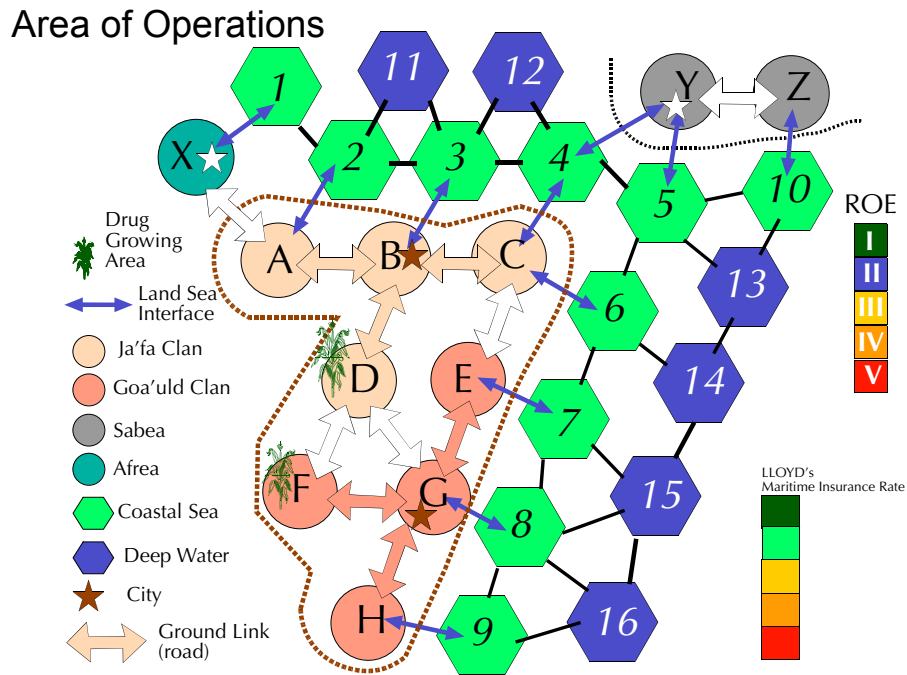
Entities that move and interact on the physical layer include conventional and unconventional military forces, economic infrastructure, and the geophysical environment. Entities that "move" and interact on the information layer include leadership, morale, media perceptions, and motivations (for example, revenge, anger, solidarity, religious faith). Most game counters, representing forces and targets, exist, move, fight, and die on the physical layer. Will points (embodied as poker chips) and information entities exist and affect the information layer, which "floats above" the physical world.

26. John A. Warden, III. *The Air Campaign: Planning for Combat (Future Warfare Series, Vol 3)*. (London: Brassey's, 1989).

27. Perla et al., *Transforming Naval Wargaming*.

As figure 2 shows, we represent the physical layer or game map as a network of zones and links. Our idea is that land and sea zones will hold playing pieces (known as *counters* in gamespeak) representing forces and assets, while players use a variety of markers to indicate the state of the links between zones (for example, markers may be labeled interdiction, mined road, ambush, or beach under surveillance).

Figure 2. *Pirates of the Fourth Generation: Physical layer*



The population of Erythia (shown by the brown, dotted outline in figure 2) is approximately equally divided between the rival Ja'fa and Goa'uld clans. Both speak the same language and practice the same faith (which is also the case for the X clan of neighboring Afrea). The Government of Erythia collapsed in 1996. Since then, clan-based warlord armies have struggled for control of the social and economic wreckage, and for the lucrative drug trade. Narcotic plants grow in the inland sub-clan territories of D and F. The cities of Bistar (in the B sub-clan territory) and Geestar (G sub-clan territory) are power centers for the traditional merchant class, and contain important shrines under control of the powerful clergy. Depletion of offshore fisheries has left the coastal population dependent on smuggling, ille-

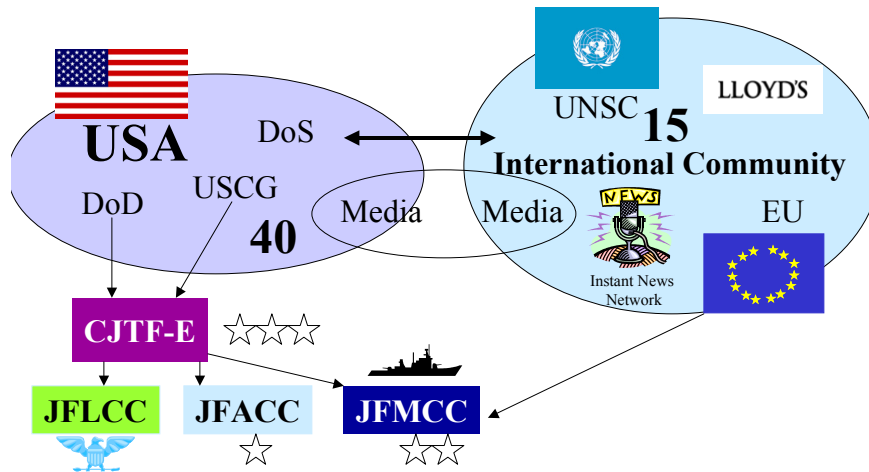
gal migration to neighboring Sabea, and more recently, piracy (armed robbery at sea).

Our conception of the two-layer playing field was that the physical layer and the information layer would be tightly integrated by a series of explicit “uplinks” and “downlinks.” For example, if the stock of Will chips in the “European Union” box of the Coalition network dropped below a critical threshold, EU forces on the physical display might be withdrawn (this would be a downlink). Or if Coalition forces on the physical layer successfully rescued hostages held by the Red player, this might cause a gain in Coalition will and a loss of will to the defeated warlord clan on the network layer (these would be uplinks).

A severe shortcoming of classic board wargames is the “God's eye view” they provide to players. Unlike real commanders, each player typically has instantaneous perfect knowledge of the location and state of all entities: terrain, resources, friendly forces, and enemy forces. Our initial concept was that both players would see the same physical-layer map, but each player's network diagram would be concealed from the other player. This complicates the game, but seems to be a workable compromise to provide “limited intelligence.”

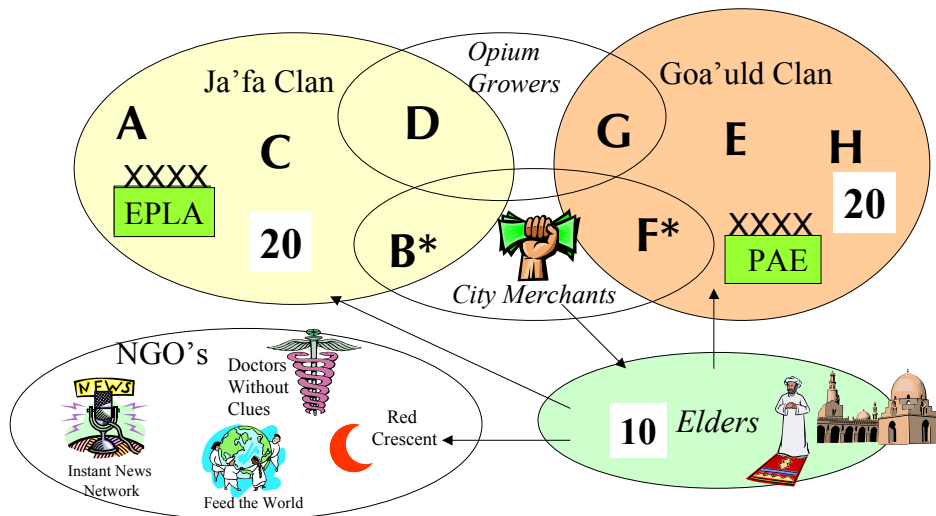
The Blue network diagram, shown in figure 3, includes the Coalition joint task force organization chart, and “clouds” representing power centers for the United States and the “International Community.” We never fully developed the precise mechanics by which Will points and other entities would move on this display, but basically anything not visible to Red would normally reside on this display.

Figure 3. *Pirates of the Fourth Generation*: Blue network diagram



The Red network diagram, shown in figure 4, is somewhat more functional because it need not correspond to any particular reality. There are large “clouds” for the two functionally equal clans we envisioned for the game, each containing spaces for clan territory and militias. These overlap or link to clouds for other important entities, such as opium growers, city merchants, religious authorities, and international aid organizations.

Figure 4. *Pirates of the Fourth Generation*: Red network diagram



Two factors that seem to be particularly important drivers of the response to piracy are maritime insurance rates (“Lloyds of London”) and the Coalition’s naval Rules of Engagement. We threw these into

the game as “steam gauges” that might rise or fall (over a range of five levels), depending on events in the physical and information domains. If insurance rates go too high, for example, shippers will re-route traffic to avoid the area of operations (even if this increases fuel costs). So the pirate player, if he wants to continue harvesting the eggs, is discouraged from killing the goose.²⁸

We represent the quasi-random nature of near-shore and distant off-shore traffic by two physical containers—a green cup for “green water” and a blue cup for “blue water.” Counters representing potential piracy target vessels are mixed up in each container. A pirate raid consists of a random pick (with replacement) from the appropriate container. The Clan conducting the raid receives political Will points equal to the ransom value of the ship, cargo, and crew (a fixed amount plus a variable die roll).

Initially, the Rules of Engagement (ROE) prohibit Blue from taking any preventive or punitive action against pirates; he is limited to patrolling. The ROE level can shift up or down over the course of the game. ROE levels may increase in response to successful Red attacks on shipping, hostage taking, UN sanctions, and other events. ROE levels may decrease in response to Coalition military losses, threshold political Will changes, and other game events. We defined the ROE levels as follows:

- I Observe and report, fire only in self-defense.
- II Engage to protect vessels under attack in blue water.
- III Engage to protect vessels under attack anywhere.
- IV Engage confirmed enemy forces, land or sea.
- V Destroy confirmed enemy forces and bases anywhere.

28. Our understanding of the dynamics of 21st century piracy was shaped by William Langewiesche. *The Outlaw Sea: A World of Freedom, Chaos, and Crime*. (New York: North Point Press, 2004); and by the unpublished research of, and our discussions with, CNA colleagues Peter Swartz and Robert Benbow.

Under these rules, the Blue player normally cannot send forces ashore to attack pirate base areas until the ROE level reaches IV or higher.

Finally, we decided to provide each player with a deck of 24 cards, representing a variety of opportunities and constraints that shape the flow of the game and influence command decisions. At the start of play, each player randomly draws five cards to form his initial hand.

Red's card deck includes: Operations cards, which must be played to initiate coastal raids (cost, 1 Will point) or deepwater raids (cost, 2 Will points); Reaction cards, which can be played to attempt to disrupt Blue operations (Explosive Boat, Ram Enemy Vessel, Attempt to Capture Boarding Party); and cards to represent various special events.

Blue's card deck includes the following cards: Increase ROE Level, Deploy Carrier Strike Group, Deploy Expeditionary Strike Group, Deploy Coast Guard Cutters, Deploy Coalition Task Force, Approval for Air Strikes, Launch Hostage or POW Rescue, Sympathetic Media Coverage, and a variety of intelligence tips.

The sequence of play is extremely simple, with players alternating actions. An action can be any one of the following:

- Drawing a card
- Playing a card
- Moving a force in physical space (which may also include combat)
- Searching a zone (which may also include combat; note that Red does not need to search, since all Blue forces are revealed on the map.)
- Adding a planning chit to a force (mission preparation).

Subsystems of the game include routines to adjudicate the results of searches by both sides. In general, Blue forces are always visible to Red and Red forces are usually concealed from Blue, unless Blue conducts successful intelligence, reconnaissance, surveillance, or track-

ing actions. Balancing these capabilities to be both realistic and useful for game purposes is one of the challenges that can only be resolved by testing the game during play. If we make searches too easy, the pirates will quickly be crushed. If we make it too difficult, Blue players will be frustrated (bad game design) and the representation of fourth-generation conflict will be unrealistically depressing (bad analysis).

Planning is an important task in any sort of operation, and we designed a way of representing the effects of planning into the system. Each side faces a tradeoff between immediate execution of missions and investment in planning. Each Planning chit added to a mission (up to some limit) increases the odds of success. Certain kinds of missions, like hostage rescue, make this tradeoff even more challenging because each turn of delay imposes a cost in Will points.

The combat system is radically asymmetrical. Under specified conditions, usually requiring the play of an appropriate card, either side may attack enemy units they have already detected. The number and combat capability of the units involved allow one or both players to roll a number of standard six-sided dice. The outcomes of the dice roll determine the effects of the combat. Blue has pretty much overwhelming combat power; when Red forces engage Blue forces directly and Red suffers combat losses, Red removes units—Militia, arms caches, clan chiefs—from play. When Blue forces suffer combat losses, the hit points that result from Red's combat dice rolls reflect smaller physical levels of damage and casualties than those inflicted by Blue, but that damage translates directly into a loss of Blue Will points. Such considerations of relative capabilities and relative effects in different dimensions is an element of gaming 4GW that we have seldom seen in past games.

Insights for 4GW wargaming

Our design work on *Pirates* got as far as an initial playtest before we were forced to discontinue the work in order to play and analyze *Granite Island Online*, as described next. But we certainly learned some useful lessons in the process.

Because of our long experience with designing games of the classic two-player, boardgame variety, we gravitated to that format as the starting point for *Pirates*. Such games have much to recommend them, especially for purposes of creating “rapid prototypes.” But they also have limitations. We ran into such limitations right away.

Even though we had created an environment in which there existed multiple groups of opponents for Blue, we forced ourselves to amalgamate them into a single Red player. With no Control entity or umpire, all actions of the players were largely forced to be open. Even though we had included provisions for planning to improve the performance of certain missions, there was really little strategic surprise. In 4GW, the likelihood that one side or another will suffer significant surprise at one or all levels from tactical to strategic is almost a defining characteristic. Creating such a potential in a game of the type we chose to design requires that the options for action available to the players be wide and varied both in nature and effects.

To give the players numerous options for action that would also remain within the limits of the rigidly defined system we had designed to resolve them, we created dozens of cards. It wasn’t enough. In a wide-open situation such as the one we were trying to represent, just thinking up good ideas for actions that both sides could take proved both way too easy and way too hard.

One problem was that we had developed no framework for what the cards should be like, other than a basic notion that those cards that provide high potential value should also come with some high attendant risk—of failure, of blowback (unexpected negative consequences of success), or of both. Unlike the cards used in most of the commercially available CDGs, we had little structure in terms of rating each card for operations points the players could use to conduct missions, or in terms of classes of activities that events might affect. It was easy, therefore, to come up with an idea for a card, because there were few constraints. For example, one card in the initial set was titled “Seize Relief Food Convoy.” Its effect was that Red would gain +5 Will points by playing the card. Figure 5 shows some other cards available to the Red player.

Figure 5. *Pirates of the Fourth Generation*: Sample Red cards



But that very freedom from the constraints of a framework for the cards caused us trouble in deciding how to define a complete set of cards to give the players to draw from during the game. It also made it difficult to see how to balance the capabilities and effects of different card plays so as to keep the game on track.

Most critically, by the we time finished our efforts on *Pirates*, we realized that we had fallen into one of the most insidious of all wargame-design traps. We had designed the game from the perspective of only one of the players, Blue. Yes, we had included lots of asymmetric touches that we hoped would provide a full-flavored Red opponent, but we had not considered how a game to cover the same subject matter from the Red perspective might look very different from the one we designed.

What sort of goals had we given to Red? Driving Blue’s Will points to zero? Hardly a real-world objective. Even though achieving such a goal meant that Red would have to “accomplish” actions of value to him, why should Red’s ultimate success be dictated by the effect that Red’s actions have on Blue and not on the effect Red’s actions have

on Red? Or why should Blue's success be dictated only by driving Red's Will points to zero? Was that really what we wanted this game to be all about? Or was there something deeper here, something we needed to probe more thoroughly if we were to understand how to design a game to explore asymmetries related to 4GW? Where were the 4GW asymmetries, and did they really matter? This was one of the questions we pondered as we turned our attention to *Granite Island Online*.

Granite Island Online

Background

Granite Island Online is designed to help the Naval War College faculty teach students concepts related to the integration of the elements of national power, defined in terms of DIME (diplomatic, information, military, and economic). Teams of players represent five regional powers in a struggle for local supremacy. The online game that we studied and played was derived from an earlier version called *Grab Granite Island*, which was designed primarily to support in-person play in a seminar format using player cells located in different rooms in McCarty Little Hall at the NWC.

Specific objectives for the game are described in the game rules in the following terms:

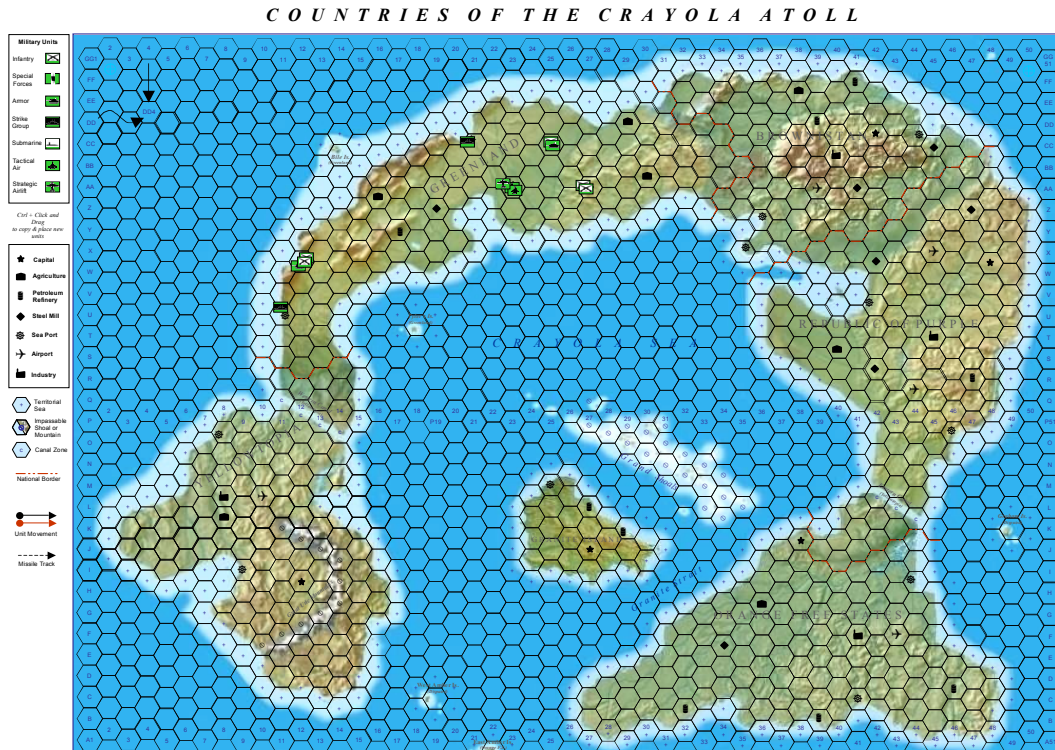
The objective of this game is to use diplomacy, information, military force, and economics to achieve your unique objectives. Each country has two primary objectives and two secondary objectives and/or modifiers. Players are unaware of the objectives of their opponents. After a set number of turns, usually no more than ten, countries are scored based on the degree to which they met their objectives. Primary objectives are worth six points if fully met, three points if partially met. Secondary objectives are worth two points if fully met, one point if partially met. In all cases, countries must maintain control of their own nations and their grip on power as assessed at the end of the last move.

Setting

Not surprisingly, the focus on DIME dictated that the system provide mechanisms for exploring all four elements of power. The context

created for the game is an atoll (the Crayola Atoll) on which are located five traditional industrial and military powers: Yellow, Green, Brown, Purple, and Orange. These powers are arranged in a rough semi-circle around an inland sea. Granite Island itself is located in this sea, as shown in figure 6.

Figure 6. *Granite Island Online: The Crayola Atoll*



Each of the major nations is fleshed out with a cursory background story, which defines in general terms its political system, its natural resources, its physical infrastructure, and its military capabilities. An international economic system is in place, allowing the buying and selling of commodities (grain, oil, and steel) among the nations of the atoll, as well as with the rest of a global economy, presumed to exist much as it is in the “real world” today. As described in the rules for the game, “These natural resources are used to build, maintain, and operate armies and war-fighting equipment as well as have an impact on the conditions of domestic life and subsequently public support of the government and taxation levels.”

Game mechanisms

Additional machinery includes a United Nations-like construct comprising a Pastel Assembly (modeled loosely on the UN General Assembly) and a Primary Color Council (with Security-Council-like functions). The workings of these bodies are managed and recorded in a series of web pages, which allow for discussion and debate, the introduction of and voting on resolutions, and the management of an international loan fund. On the economic side, players may get access to information about the market for commodities and supporting financial markets to help manage their trade.

Each country has its own set of information pages. Some pages focus on the development of military technology and the acquisition of military forces. Others help players manage their military operations, show the latest intelligence information, and keep track of strategic objectives and guidance. Each country is usually played by a team, so that each player focuses on only one or two aspects of DIME, while team members work together to integrate all the elements of power.

Granite Island itself is a potential battleground and reward for the major powers. The game rules provide the following background to set the stage for play:

Recently the ruling dictator of Granite Island died from a rare liver disease leaving the island in chaos. Several corrupt factions have risen up to battle for control of the island during the civil unrest. As the leader of Yellow, Green, Brown, Purple, or Orange, you must decide how to manipulate opportunities presented by the collapse of Granite Island to meet your own national game objectives.

Controlling play

To manage the play of this ambitious game, the NWC developed a mix of automated and manual control techniques. In the version of the game we played, players could input their orders and actions asynchronously, using email and online pages, over the course of about a week per move. Certain deadlines had to be met, but other than that, players could devote as much or as little time to the game as they desired.

Based on discussions with the game controller, the process that consumed most of his time during assessment was “crunching” the military moves. In our game, the process was as follows:

- Players submit their military activities by moving icons representing their military units on a PowerPoint image of the game board.
- Players upload their moves.
- The umpire then executes a multistep process to compare the newest move with the previous positions, to enforce the rules on movement, and then combines all five country moves into a single master “ground truth” display.
- While creating the master display, the umpire also records any interactions that take place among the units.
- The umpire then resolves the interactions, following the combat rules and using his own judgment when necessary, and updates the master to reflect the outcomes.
- The umpire then makes customized copies of the master display for each country, revealing only what that country’s information capabilities would allow it to know.
- These situation updates are then uploaded to the country pages along with other assessment information, such as an updated economic spreadsheet reflecting the resources consumed in manufacturing, deploying, maintaining, and fighting with military forces; new resources produced or purchased; changes in the cash on hand; and other data.
- These raw data also affect the overall stability of the country and the degree of popular support for the government. The umpire calculates these using simple mathematical models for unemployment, inflation rates, poverty, domestic energy prices, the national debt, and other elements.

Of course, the description above greatly oversimplifies the complex and challenging task of managing and adjudicating the play of such a game. Again, according to the game controller, assessment is time consuming and requires more than a dozen separate steps to handle

all of the activities of play: counting votes in the various bodies, recording economic activity, posting various situation updates and combat summaries, updating and uploading maps, creating imagery, and other related tasks. As of the summer of 2006 (the time at which we participated), the umpire enjoyed very little in the way of automated support for most of these tasks. The fact that the game could be played at all was a tribute to the dedication and ingenuity of the controller and whatever support he got from the staff.

Analysis and critique

Our primary goal in participating in a full-up game of *Granite Island Online* was to assess its suitability for adaptation into a 4GW gaming environment. After playing the game for more than six weeks (at one move per week), we concluded that its potential in that area was limited. But playing the game also provided us with some important insights about how a 4GW gaming environment might best be created, and what to include and avoid in designing a 4GW gaming system.

The world of *Granite Island* is very different from the real world in which it is presumed to exist. Rather than merely a fictitious environment, it is a highly *condensed* environment. The laws of physics, the economics, the history, and the other dynamics by which the world as we know it operates, do not always apply to the world of *Granite Island*.

In the real world, real nations have their own historical “back story.” This history creates a texture that affects a nation’s actions. It comprises a nation’s cultural, economic, historical, political, and ethnic characteristics along with many other elements that make a nation what it is. Its internal politics flow more or less naturally from these characteristics, as do many elements of its international relations, such as its standing alliances, any tensions with neighbors, and its longstanding trade relationships. In *Granite Island*, the game, these critical back stories are barely hinted at. Players begin with pretty much a clean slate. In some ways this is good; players can interact with one another without a lot of baggage. In other ways, it is not so good.

In the real world, nations generally have a pretty accurate understanding of the long-term objectives of other countries, unless those

countries are controlled by irrational or revolutionary actors. In the world of *Granite Island*, there is not much basis for understanding the likely behavior of neighboring nations when that behavior is driven overwhelmingly by the idiosyncrasies of competing players new to one another, the game, or both.

In the real world there is a sort of “invisible hand” that rewards or punishes “players” for their actions; games come to an end, but reality goes on forever, and what you do to “win” today may come back to haunt you later. So while stabbing your allies in the back, incurring outrageous debts, and similar actions may get you a short-term benefit in both the game and in the real world, in the real world they will have overwhelming negative consequences in the long run.

A couple of specific examples will suffice to illustrate our concerns. In the game, the cost of building military capabilities is not well grounded in anything resembling reality, in terms of either money or time. For example, in the real world it takes U.S. industry about eight years, and it costs the U.S. Government about \$10B to build and fit out a single aircraft carrier strike group (CSG). Similarly, the equipment for an armored division can be built in a year and costs between \$1B and \$2B. In contrast, *Granite Island Online (GI)* puts the relative cost of the tank division at 50 percent *more* than that of the CSG, while the time to deliver both units is the same! And both require only one “ton” of steel to build. Even if one grants the abstraction that the quantities of money and resources in *GI* are not the same as those of the real world, the relative costs of such units is grossly distorted.

Even more distorted is the relationship between space and time, and its effects on the movement and action of military forces. Based on internal evidence confirmed by Control during our game, each hexagon on the *GI* map is about 18 km across. According to the movement rules, however, a fleet can only move 6 such hexes, or 108 km, a turn. This distance is the same as that covered by an armored division in that same time period, while an air unit can fly only 8 hexes, or 144 km, in that same time period! These time-space relationships bear no resemblance to any reality, whether the time span of a turn is a “day” or a “year” or anything in between.

As with most aspects of reality, game designers must be willing to accept a high degree of abstraction in their representations of time and space in order to enable the meaningful coexistence of joint forces in one battlespace. The problem is that air units function on planning and operational time scales measured in hours, naval units on time scales of days, and ground units on time scales of weeks to months. (Tactically, everything pretty much happens in terms of minutes, but this is a grand-strategic-level game). So if you try to represent air operations “accurately,” naval forces become annoyingly slow, and ground forces become immobile terrain features. Most games, whether commercial or DoD, resolve this problem in one way or another.

GI's solution to the problem of incommensurate time-distance scales across force types falls into a common trap: by overly simplifying the mechanics of the game to “relieve” players of some of the “burdens” of real-world considerations, the game system disconnects the essential real-world experiences and intuitions of the players from the representation of the world in the game. As a result, players may discover—too late, as we did—that what they “know” in the real world simply isn’t so in the world of Granite Island. The result is not only poor or inappropriate decisions by the players, but also an immediate loss of that willing suspension of disbelief so critical to effective play of any wargame. Once a player “raises the BS flag,” it is hard to bring him back into the tent of the game. (We were told by the NWC staff that the designers of *GI* accepted this risk in an attempt to dissuade military players from “dropping down into the weeds” to dispute minor details of military operations so that they could focus more effort on the D, I, and E of DIME. This did not work for us, but we are not the target audience of the game.)

Our assessment of Granite Island Online as a potential foundation for a 4GW wargame rests partly on the sorts of detailed concerns expressed above, but also on concerns about the very foundations of the game environment, not merely its systems. The game is actually set in a classic Third-Generation environment. The real struggle is between five regional

nations, peer competitors all, using all the means so characteristic of 3GW. Yes, there are some elements of 4GW layered over the top of this fundamental 3GW engine: special forces are available to conduct unconventional operations (but so too are nuclear weapons and the missiles to deliver them). Yes, the “trigger-ing” event of the collapse of the Government of Granite Island itself has some of the hallmarks of 4GW. But the real asymmetries simply are not there. As with most other attempts to game 4GW, *Granite Island Online* suffers from the symptoms inherent in forcing a square 3GW peg into a round 4GW hole.

An essential element of making that process as successful as it is lies in the role of the Control team, which monitors and directs the play of the game. It is here that we see the introduction of principles of free *kriegspiel* in an attempt to represent 4GW elements that do not fit naturally or cleanly into the basic system. Our game’s controller described his basic function to us in the following terms: “As this is a free-form role-playing game, Control takes any given player action, sums it with all other activity and gently pushes the story along.”

As a result, the game relies very heavily on Control. This creates some problems: first, a Control who is short on time or imagination would seriously handicap play; second, Control has such an enormous number of things to do that the number of player actions could easily overwhelm him; third, because the play of the game relies so much on Control, the other players—in a sense, the true players of the game—learn that playing to Control is often more important than playing against the competing players themselves. In short, Granite Island Online, as we experienced it, seemed far too Control-centered to allow effective exploration of the key elements of 4GW during the play of the game.

Insights for 4GW wargaming

Our experience of playing Granite Island Online highlighted several key points for our consideration in designing games to deal with 4GW.

First, not surprisingly, the roles or positions of the players are fundamental to gaming any 4GW situation. If the players are cast as the leaders of industrial nations states fighting peer competitors, the reasons for the struggle are unlikely to convert what is essentially a 3GW game into a 4GW game. The symmetries of worldview and means of such leaders are too pronounced, despite any incidental asymmetries of purpose, to really highlight the asymmetries of 4GW. It is the asymmetries of worldview and purpose that lead to or exploit essential asymmetries of means and action in a 4GW environment. Because of this symmetrical orientation of *Granite Island Online* we have trouble envisioning it as a vehicle for exploring 4GW issues. A true 4GW war-game must include as active players leaders with fundamentally different worldviews.

Second, the underlying game model must be firmly rooted in real-world phenomena—physical, historical, social, and psychological. Artificially condensed worlds are difficult for real people to live and act within because players will have little chance to learn about their quirks. Our experience has been that a game designer who breaks the laws of physics (or economics) to simplify play so that players can focus on “what’s really important” is about as likely to succeed as a driver who ignores speed limits to make his way around the Washington Beltway more quickly. It might work for a time, but the chances are that it will eventually lead to a horrible, disfiguring accident.

Third, and most important, one of the things that the free kriegspiel approach used in our game of GI did extremely well was to encourage players to come up with creative ideas. By this we mean not only creative solutions to problems posed by the game or by Control within its context, but also creative ways to make the lives of their opponents miserable. As an example, one of our opponents created so-called “refugees” in our border areas as a pretext for military movements and a cover for invasion. There were no rules for how to create or handle such refugees, but the player proposed the idea out of his fertile imagination and Control made up some effects—and we were left scratching our heads about how to respond.

Because 4GW is quintessentially an environment of asymmetric behaviors and nonconventional means, any game that pretends to explore its nature must find ways to encourage players to be creative in their actions. They must think outside the box and come up with actions that are at once believable and effective. This is a key element to deriving valuable insights from the game's experience. To respond to this sort of creativity consistently and coherently, Control must be knowledgeable, but also it must be flexible and adaptable.

On the other hand, giving Control complete freedom to allow and adjudicate any actions that spring from the minds of the players—regardless of their consistency with the fundamental model, engine, and mechanics of the game—can divert the players' attention to focus on playing Control more than on playing the game. To the extent that player creativity depends on Control for free-form adjudication, this tendency toward diversion is heightened. Finding the right balance between freedom and constraint is one essential task and challenge of the game designer.



Designing a 4GW wargame

We make no claims to have met the challenge posed above. What we will do in this concluding section of the paper is to summarize what we learned from the project as a whole, by embodying that learning in a conceptual design for a 4GW game at the operational level. This design attempts to lay a foundation for a game system that can represent at least some of the activities currently underway in the Middle East, as well as possible near-term evolutions of that situation. As requested by the NWC, our approach takes the form of a manual game—in particular a game heavily influenced by boardgame mechanics. In the appendix, we make suggestions about how the approach we take here might be implemented using tools for building electronic versions of boardgames to deliver an interim capability for web-based play.

A new beginning

Our research, our experience with *Pirates* and *Granite Island*, and the discussions and debates we had about the subject of game design in a 4GW environment led us to propose a new approach for tackling that problem, rather than continuing to develop *Pirates* or building on the foundation of *Granite Island*. The essence of this new start was to build a firm foundation for the game by concentrating on three main pillars in the design process:

- First is an understanding of how the asymmetries of worldview and the asymmetries of purpose that result from them form the basis for designing wargames in this environment we describe as 4GW.
- These underlying asymmetries, in turn, illuminate critical asymmetries of actions that any game design must reproduce in the decision-making processes of its players if it is to illuminate the critical factors of 4GW.

- These asymmetries of actions, in turn, help dictate the asymmetries of means available for the players to use to carry out those actions so as to achieve their purposes and validate and advance their disparate worldviews and value systems.

The central design problem is to evoke the fundamental, asymmetrically competing worldviews in the minds of the players and to instantiate the resulting asymmetric purposes, actions, and means to create a game “universe” that reflects current and potential future realities.

At the same time, however, *Granite Island* highlighted the advantages of allowing the players of a 4GW wargame to step beyond the constraints of a classically rigid game design, enabling them to propose new ideas and new effects, but within some flexible boundaries that keep their ideas from “breaking” the game.

Our approach takes as its fixed point in the swirl of design possibilities a game engine based on the concept of card-driven games. As Mark Herman has described them, a CDG is “a game that uses cards to create strategy and maneuver from hidden combinatorial options.”

²⁹ This combination of hidden options and the need to combine resources, in terms of cards, to achieve the greatest effects is an extremely attractive characteristic for 4GW wargames. So, with that CDG engine in mind, we construct a conceptual design, something between a thought experiment and a working prototype. By describing both the process and its output, we hope to illustrate how we could go about producing a workable game of the type we envisage.

The setting of the game

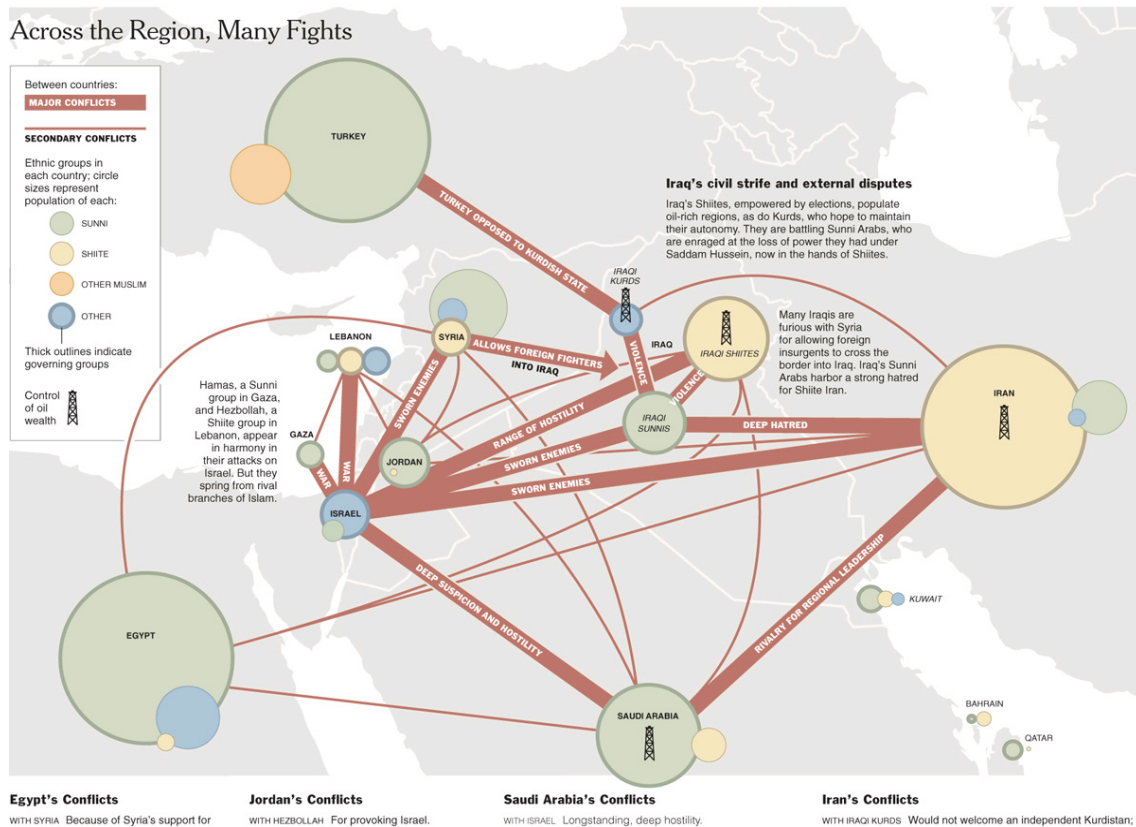
All games have objectives, and those objectives must play a driving role in both the design and execution of the game. In this case, however, we are not trying to design a specific game with a specific purpose. Instead, we are considering a conceptual design of a game system or game approach intended to be the basis for designing specific games in the future. This requires us to be a bit general and

29. Herman, “My Philosophy,” p. 9.

vague at times, but we are only trying to illustrate ways to think about the issues.

To give some firm grounding in reality, we will make some fundamental decisions about the game system. First is that our game is set in the Middle East. But that is a very big place, with lots of potential actors and stages. A serendipitous event helped us to get a better handle on exactly what we want to emphasize. An extraordinary example of an analytical graphic appeared in the *New York Times* and focused precisely on our target area. (See figure 7.) It is designed to illustrate some of the tensions in the region, but it also highlights the primary regional actors, and some aspects of their relations.

Figure 7. New York Times graphic of Middle East tensions^a



a. *The New York Times* online, Week in Review, July 23, 2006, http://www.nytimes.com/imagepages/2006/07/23/weekinreview/20060723_MIDEAST_GRAPHIC.html

Looking at this graphic, we clearly see several potential player entities. Iran, Iraq, Saudi Arabia, Syria, and Israel seem like critical players

from several dimensions: density of tensions, population, and religious differences. Turkey and Egypt, though large, appear more on the periphery of the action. Jordan, Lebanon, and Gaza seem like bit players and probably do not require active participation. Into the mix, of course, we throw the United States and possibly its coalition allies, whether as a single entity or multiple players is not quite clear. What about Afghanistan? It isn't on the map here, but given the operations of the United States in that country, and their links to operations in other parts of the region, must we include Afghanistan? Finally, the global terrorist entity of al-Qaeda seems a *sine qua non* for playing such a game.

That all seems very reasonable, but is it, perhaps, too Third Generation, too nation-focused? What if we think of the players in terms of the distinct political and philosophical alignments that dominate the region? For example, could we not define players in terms of Sunnis and Shi'ites, and whether they are moderate (read as "having some toleration for secularism and globalization") or hostile? What if we had a five-player construct, with the United States and its coalition partners as one player and the others consisting of the Moderate Sunnis, Hostile Sunnis, Moderate Shi'ites, and Hostile Shi'ites? It certainly appears as if both these definitions of player roles (as well as other possibilities) might have validity, depending on what issues we want to study. In any case, however, there is a definite interaction between nations and alignments, and the game must certainly reflect that connection regardless of which group is designated as the players.

Structure and dimensionality

Using DIME and PMESII as our basic dimensions

Our earlier analysis highlighted the need to begin the design process by identifying the critical asymmetries of worldview, purpose, actions, and means. To give some order to this process, we impose the structure of PMESII (political, military, economic, social, infrastructure, and information) as the dimensions we will use to characterize worldviews and purposes. We also will use DIME (diplomatic, informational, military, and economic) as the dimensions for characterizing actions and means. Thus, for example, one element of a nation's

worldview will consist of how it views its political system in relation to those of the other actors. And its set of purposes will include those related to its economic power and performance, both regionally and globally.

Using these two currently popular constructs of DIME and PMESII helps us organize our design concepts. Rather than just a random assemblage of ideas about an entity's worldview, for example, we can arrange them according to the PMESII model. As an example, although a necessarily incomplete one, we present below an assessment of a possible Iran player's characteristics in game terms.

Example: an Iran player³⁰

Here we define a very rough cut on a sample definition of the worldview, purposes, actions, and means of an Iran player in our hypothetical game. In designing an actual game, we would conduct thorough research to justify each of our assessments. For this example, we will play a bit fast and loose, making things up as we need to.

Figure 8 presents a map of Iran, to which you can refer during our discussion.

Worldview

Political: The fundamental political philosophy of the Iranian Islamic Republic is that the only valid form of government is a theocratic state. The government employs a parliamentary system, but it is under tight clerical control. The closest Western historical examples are Geneva under Calvin and the Massachusetts Bay Colony under the Puritans. There is no separation of church and state.

On the international scene, Iran perceives itself as completely (and deliberately) encircled by enemies: U.S.-occupied Iraq, U.S.-occupied Afghanistan, Russian-dominated Central Asia (formerly part of many previous Persian empires), U.S.-allied Gulf states, Turkey (a member of the U.S.-dominated NATO) and U.S.-allied Pakistan. (Is

30. Much of this information is derived from the *MILNET Brief on Iran*, <http://www.milnet.com/pentagon/centcom/iran/index.html>

there a pattern here?) It sees its rightful position as the dominant regional power thwarted by this encirclement. Its government is currently pushing an aggressive and militant policy toward the state of Israel and the United States.

Figure 8. Map of Iran^a



a. From MILNET, <http://www.milnet.com/iran-map.jpg>

Military: The Iranian military has a split functional structure, analogous to that of the *Wehrmacht/Waffen SS* in the Third Reich. The regular army, navy, and air force are basically a jobs program. They are equipped largely with obsolete, formerly U.S. equipment dating from the days of the Shah. On the other hand, the Islamic Revolutionary Guard Corps (IRGC, or *Pasdarān*) is an elite, politically and religiously reliable force dedicated to regime protection, and equipped with new Chinese, North Korea, and Russian gear, ships, aircraft, and

missiles. The *Basij* militia (think *Volkssturm* in the context of the Third Reich again) is also under IRGC control.

Economic: The Shi'ite clergy is rooted in rural villages and the traditional merchant class (*Bazaaris*) is deeply suspicious of a rising urban middle class. The former upper-class citizens (“the rich”) were tainted by association with the Shah; they are now mostly dead or in exile. The basic economic structure is an inefficient form of state-run capitalism. Oil money is distributed through a complex web of foundations, government-owned enterprises, and religious charities.

Social: An Iranian demographic bulge (baby boom) has resulted in the creation of a large group of “twenty-somethings.” A successful government-sponsored family-planning effort has reduced the destabilizing threat posed by an exploding population. Ethnic minorities make up some 40 percent of the population. In addition, there is a growing polarization of reformists and hardliners in the application of Islamic law and resistance to Western-style “progress.”

Information: The mass media is state-controlled, and the government has implemented a very sophisticated filtering of internet access. Restrictions on the ownership of home satellite-TV dishes limit the access of the population to outside sources of information.

External intelligence capabilities comprise the typical third-world tangle of inefficient, redundant, and competing security and intelligence agencies, which spend much of their time keeping an eye on one another. Embassies are key overseas intelligence-collection facilities. Technically, Iranian intelligence services depend on third-party (Russian, and probably also Chinese) satellites and electronic-intelligence gear.

Infrastructure: Iranian infrastructure has little excess capacity in any dimension. Communications, whether internal or external, are not a strong suit. Oil is the primary engine of the Iranian system and Iran's dominating position on the Strait of Hormuz is a primary source of leverage over the world's economy. The relatively poor internal rail and road systems are an impediment to serious invasion, but also restrict the ability of the Iranian military to defend the country from multidirectional threats.

Purpose

Table 1 characterizes our preliminary assessment of Iran’s purposes for our game. (Note these are entirely speculative and for game purposes only.) The specific purposes in the leftmost column are linked to the PMESII elements by Xs in the rightmost columns. (Note that we include only one I, which relates to Information, and ignore Infrastructure.)

Table 1. Speculative examples of Iran’s purposes in the game

Purpose	P	M	E	S	I
Drive the United States, and more broadly all Western influence, out of the Persian Gulf region (initially) and ultimately the entire Islamic world.	X	X	—	—	—
Export the ideology of Islamic revolution to bring about the collapse of collaborationist regimes (like the Government of Iraq, Karzai in Afghanistan, Jordan, Egypt, Pakistan) and the establishment of the Shi'ite version of shariah law.	X	X	—	X	X
Maximize regime protection. (The current power elites recognize that a substantial fraction of urban young people in Iran are alienated from the Islamic revolution and drawn to corrupt Western culture. They are willing to break heads to retain power.)	X	X	—	X	—
Obtain nuclear weapons at all costs. (Without nukes, nobody takes you seriously in this world. You are not a major player. Israel's nuclear deterrent is the only thing that keeps the Jews from being thrown into the sea.)	X	X	X	—	—
Liberate Jerusalem and bring about the return of the 12th Imam. The road to Jerusalem runs through Baghdad. (VERY long term goal!)	X	X	—	—	—
Keep oil prices high, but not so high that the West develops short-term alternative energy sources. (Contrast this with al-Qaeda’s desire to crash the global economy.)	—	—	X	—	—
Maintain good relations—for the time being—with Russia and China as sources of arms and other technology (even though they oppress their own Muslim minorities).	X	X	X	—	—

Actions

Similarly, we organize our speculative set of Iran’s actions in table 2. In this case, we cross the action with the instruments of national

power as defined by DIME: diplomatic, information, military, economic.

Table 2. Speculative examples of Iranian actions in the game

Action	D	I	M	E
Win friends through providing humanitarian aid.	X	—	—	X
Attack soft targets using proxy terrorists.	—	—	X	—
Assassinate key opposition leaders, again using proxy terrorists.	—	X	—	—
Build, maintain, and expand efficient forces for regime protection from internal and external threats.	—	X	X	—
Build up modern conventional forces.	—	—	X	X
Develop nuclear weapons and ballistic missiles.	X	—	X	X
Blockade the Strait of Hormuz.	X	—	X	—

Means

Finally, we briefly sketch some possible means by which an Iranian player could carry out actions. These means are of two broad types. As we envision it, Iran’s principal means of action will be through proxies; they can provide resources of various types to proxies of various stripes.

The resources include:

- Funds (E)
- Weapons (M)
- Training (M, I)
- Refuge and support (D)
- Intelligence (I)

Potential proxy agents include:

- Lebanese Hizbullah
- Palestinian Hizbullah
- Other Hizbullah

- Sadr Militia in Iraq (the so-called Mahdi Army)
- The Supreme Council for the Islamic Revolution in Iraq (SCIRI)
- Warlord factions in Afghanistan (not the Taliban; Iran appears to be an opponent of al Qaeda)

In addition, the Iranian government can act directly to infiltrate and subvert opponents, particularly those in contiguous regions (M and I, as well as D when conducted under diplomatic cover). It is also likely to employ the concept of *taqiyya* (I), justification for dissimulation about your religious beliefs when you fear for your life and the lives of your family members. This is a practice specifically allowed by Shi'a religious doctrine.

Designing from the player's perspective

With the players of the game identified, their fundamental DIME and PMESII characteristics fully plotted, their resultant worldviews and purposes laid out, and their range of actions and means defined, the next step is to design the functioning of the game so that each of the different players can see the game as a valid model for exploring their own purposes, actions, and means in the context of all the rest. How do you do that, exactly? Well, it depends. We will again try to illustrate possibilities rather than answer that tough question directly and completely. And again we will use Iran as our example.

We will focus our discussion on how we might represent the application of actions and means to achieve one specific purpose, that described in table 1 as: "Export the ideology of Islamic revolution, to bring about the collapse of collaborationist regimes (like the Government of Iraq, Karzai in Afghanistan, Jordan, Egypt, Pakistan) and the establishment of the Shi'ite version of shariah law."

Examine table 2 to identify some actions that might apply to achieving this purpose. Clearly, two actions stand out: "Attack soft targets using proxy terrorists," and "Assassinate key opposition leaders, again using proxy terrorists." If the player can succeed in removing a collab-

orationist regime using these actions, then the game should reward him somehow.

Typically, rewards are embodied in one of two ways. Either they give the player an advantage, which he can employ to enhance his immediate or longer-term operations, or they advance the player on the long road toward ultimate victory. The nature of the former advantage varies from game to game and system to system, as well as with the type of action performed. The latter, however, is usually embodied in terms of something called “victory points.”

The most productive way to think about victory points is in terms of a common measure applied to all players to indicate the relative extent to which they are achieving their purposes when measured against their opponents. By collapsing what is inherently a multidimensional variable into a single scalar measure, victory points allow easy comparisons of performance and indicators of impending disaster—or triumph.

So, as the Iran player, I expect to gain some number of victory points for successfully exporting the Islamic revolution and removing a collaborator. I can attack soft targets using proxies, or I can assassinate someone using proxies. Therefore, the game must provide me with targets, the means of attacking them, the means of determining success, and the rewards for success (and, incidentally, punishments for failure).

One prospective area of action is Afghanistan, governed by a collaborationist regime. To model my purposes and actions and means to attack it, the stability of the regime must be subject to my actions. The easiest such action to understand and represent is the possibility of assassinating key officials. Another possibility is to undermine efforts of the Afghan government and its supporters from the international community to secularize (from my perspective) the Afghan people.

As defined above, the means I have available to me include warlord factions in Afghanistan. I must have a means of activating such a faction to carry out my wishes. The game design must therefore provide, at a minimum, provisions for me to:

- Expend resources to acquire the services of an Afghan warlord and to enhance his ability to attack successfully.
- Identify potential targets for attack.
- Create opportunities for the attack to take place.
- Activate the warlord to attack the target of choice.
- Resolve the immediate effects of the attack.

The design must also:

- Characterize and implement any long-term effects of the attack, whether successful or not, on Afghanistan, Iran, and the entire state of the game.
- Reward Iran for success and punish it for failure.

To borrow a popular military construct, these are “specified tasks” for the game system, which carry along with them some “implied tasks.” The implied tasks include at a minimum the means and opportunity for the opponents of Iran to counter its actions at every step of the way, from paying off warlords to prevent Iran from gaining influence over them, to directly protecting the potential targets of attack, to attempting to punish Iran by taking direct or indirect action against it.

Contrast the discussion of the game from Iran’s perspective with the more usual view of such a game from the Blue, or U.S., perspective. We won’t attempt to do the same sort of detailed analysis of the U.S. worldview, purposes, actions, and means that we have done with Iran because these will be better known to most readers of this paper. Simple contrasts are obvious, however.

The U.S. player has at his command vastly more resources of certain types than does the Iranian. Primary among these, of course, is the U.S. military establishment. U.S. actions thus will include far more military options than are available to Iran, and many of those will be of a scale of conventional military action that Iran is incapable of matching. These are the most obvious asymmetries that we find in 4GW.

Other important asymmetries are obvious among the worldviews and purposes of these two powers. The U.S. worldview embodies liberal capitalism and democracy, and champions individual religious, political, and economic freedoms of choice for all people. This contrasts strongly with the theocratic worldview of Iran. One view of U.S. purposes sees U.S. policies and actions as focused on expanding the processes of globalization of economies and polities.³¹ With such a focus, and such a vast array of available actions and means, any game that includes the United States as an active player must, of necessity, account for its abilities to conduct more operations across wider geographic expanses and with a broader span of means than any other player in the game. At the same time, however, the internal and external political constraints on U.S. actions are far more pronounced than those of many of its potential adversaries. How does the designer figure in such constraints when designing the game from the U.S. perspective?

As you can see, designing a 4GW wargame from each player's viewpoint involves complex research and analysis. We have just touched the tip of that iceberg here. The most important insight we derive from this simple thought experiment, however, has nothing to do with scope or complexity. It has to do with perspective. To create a balanced representation of the 4GW environment, the designer must deal with the motivations, actions, and means of all the various players equally. Only in this way can fundamental asymmetries make their way into the fabric of the game.

A card-driven game needs cards

So, what do they look like?

The basic structure of the cards in commercial CDGs includes two principal components: an event and an operations point (ops point) value. The sample cards in figure 9 show the ops point value in the

31. Tom Barnett is a leading spokesman for this view, as he describes it in his book, *The Pentagon's New Map*. (New York: Putnam Adult, 2004).

shield at the upper left. The event is described by the text that makes up most of the card's real estate.

Figure 9. Sample cards from *Here I Stand*^a



a. From the game, *Here I Stand*, designed by Ed Beach (Hanford, CA: GMT Games LLP, 2006). Image extracted from <http://www.gmtgames.com/nhhis/cards.html>

Other CDGs use cards with additional component elements. Figure 10 shows sample cards from the game *Paths of Glory*, a strategic exploration of the First World War. Here, we see some of the most complex cards found in the genre. The large number at upper left is, once again, the ops point value, used to activate forces for normal movement and combat. The smaller number to the right of the slash indicates that the same value may be used instead to conduct strategic redeployment of forces across greater distances than possible with normal movement. The text in the bar at the top indicates a phase of

war in which the card becomes available: mobilization, limited war, or total war.

Figure 10. Sample cards from *Paths of Glory*^a



a. From the game *Paths of Glory*, designed by Ted Raicer. (Hanford, CA: GMT Games LLP,1999). Image extracted from http://www.gmtgames.com/nnp/pog_cards.html

The major text on the card is the event description when playing the card as an event, just as before. Notice, however, that some of this text is printed in red, which indicates certain restrictions that apply to the play of that event. At the bottom of the card is a notation that shows how many replacement points are available for various nations should the player choose to use the card for this purpose rather than for operations, strategic movement, or the event. These cards show just how broad a range of possibilities is available to a designer when using cards in this fashion.

For our purposes, we will begin by considering only the basic type of cards, with ops points and events. There are at least two fundamental considerations in designing cards of this type. The first is the distribution of ops points values. The second, and much more complex, consideration is the nature of the events and the mechanisms through which they affect and drive play.

Ops points

Ops points are the currency of play. Players use ops points to activate forces and capabilities (means) to carry out operations (actions) that help them achieve their objectives (purposes) in order to win the game (triumph—or at least advancement—of their worldview). In a 4GW game, we consider ops points as the resources available for carrying out actions of different types.

In our construct, we classify actions according to the DIME construct. In fact, we considered the possibility of providing four different ops points values for each card, one value applying to each of the four DIME elements. To start, however, it seemed more sensible to use a single ops point value but allow the player to expend those points in actions of any type.

This approach is also employed in *Here I Stand*, where ops points allow the players to conduct a range of actions, some of which are restricted to only a subset of the players. Even more interestingly, different players in that game pay different ops point costs to carry out similar actions. Figure 11 shows an example of this, extracted from one of the player charts of the game. The sections of the chart shown in figure 11 gives the ops point costs for different types of movement (the top section) and “New World” functions for four of the players in the game, as shown at the top. Note that the costs for “colonizing” are different for the Hapsburgs and the English and French, while the Ottomans are prohibited from participating in this type of operation.

Figure 11. Portion of player reference card from *Here I Stand*^a

ACTION SUMMARY	Ottoman	Hapsburg	England	France
Move formation in clear	1	1	1	1
Move formation over pass	2	2	2	2
Naval move	1	1	1	1
Explore	-	2	2	2
Colonize	-	2	3	3

a. From the game *Here I Stand* by GMT Games LLP. Extracted from <http://www.gmtgames.com/nnhis/HISReferenceCard10.jpg>. Unfortunately, the image is too large to incorporate here in total.

In our conceptual design, we envision a similar structure. The DIME actions available to all players are rated for costs in ops points, and those ratings are tailored to each of the players eligible to carry them out. For example, the cost to move a Carrier Strike Group may be 2 ops points, but only the United States may use that military function.

On the other hand, the cost to establish a terror cell may be only 1 ops point, but this option is available only to al-Qaeda.

Events

Events are the second major component of the cards and are perhaps the most challenging element to create for an individual card. In our concept, we must deal with an added consideration commercial designers do not face (or at least not to the same extent). So that the players may apply their creativity and expertise, our design allows them to design their own cards, either before or during play. To provide guidelines and constraints for such card designs, we need to define a framework within which the players must operate. This framework must also apply to the design of the initial set of cards we create during the original design of the game itself.

The same DIME and PMESII constructs we used as a basis for defining worldview, purposes, actions, and means provide a natural framework for the design of the cards. Card events can affect the game in two broad ways. First, the events themselves can reach in and touch the PMESII elements of any or all players directly. Second, the cards can provide opportunities for the players to carry out DIME actions with special characteristics or special effects.

For example, the U.S. player may receive a card whose event reads: “National Security Council convinces President to increase the tempo of operations in the Gulf Regions. Freely deploy one CSG and one ESG to the region and conduct one operation with each.” Such a card, an example of a military capability, allows the U.S. player not only to introduce new forces into the game, but also to execute operations with them.

The initial set of cards will also include what we might call “random events”—events that affect the environment or specific players in special ways. One example of such cards is the “Bad Weather” card in another of Mark Herman’s CDGs, *Empire of the Sun*.³² This card pro-

32. Mark Herman. *Empire of the Sun*. (Hanford, CA: GMT Games LLP, 2005).

vides the Japanese player with the capability to negate an Allied player's operation after the Allies player plays his card. Such cards tend to be very powerful when used at the right time. However, we do not want to allow players to design cards of such power on the basis of nothing other than random effects over which they themselves have no influence.

Instead, we must add in a sub-framework for player-designed cards (which also exists, of course, as a substructure for the design's original card set). Such cards are limited to events of three types: plan, build, or execute. That is, the events represent the acts and outcomes of a player's abilities to plan operations, build forces or capabilities, or execute special actions.

Other considerations in designing cards

The card-based mechanics of CDGs require the designer to address more than the characteristics of the cards themselves. In addition, we must consider how players acquire, retain, and recycle cards, as well as how to balance the various costs and effects of the cards. The complexities of this subject are too technical—and speculative—for us to discuss in detail here. Nevertheless, we wish to give you a sense of at least some important factors the designers must consider.

First is the question of how players acquire, store, and recycle cards. Our basic conceit is that each player will draw and retain some number of cards readily available for them to play, to conduct actions (their hand). The number of such cards available is a function of a player's resource base—a budget, as it were.

Most commercial CDGs define a player's hand in terms of the number of cards that player may use in a single game "turn," which represents some fixed span of time, say a month, or a quarter. Think of this as the level of resources a country, for example, dedicates to the theater of operations, or global campaign, during that span of time. These resources can be of any type, depending on the ops points and events in the cards. The relative number of cards in the hands of different players is a measure of their relative capabilities. For example, a U.S. player might have a hand of 10 cards to begin a month-long game turn, while an Iraqi player may have only 4.

The next issue is how players sequence the play of their cards. For example, most games cycle through the players, allowing each player to play only one card before the next has a chance to do so. In a 4GW game, however, asymmetric situations can clearly arise that would allow a single player the opportunity to play several cards before other players can react. How to implement such variations in card play is another design challenge. It can be a basic rule of play affecting the entire game, or a special effect induced by the play of specific cards.

The real issue that can help determine the best approach in this matter is how we define the tradeoff in playing or keeping cards. For example, as a player, I may want to keep a card rather than play it, in order to keep my opponent worried about what is in my hand. Also, some cards may be used only once and then must be removed from play. (This is often necessary with particularly powerful or highly specialized cards like many electronic warfare technologies, which are effective only until the enemy develops a countermeasure.) If a card is such a single-use sort of card, then I may not want to use it too soon.

In addition to the action of playing individual cards, the designer must also consider the potential for a player's use of a sequence of cards to achieve powerful effects. In the real world, what might affect a decision-maker's ability to coordinate such actions? In some cases, we can easily envision resource or physical constraints: there is only sufficient funding this month to pay for two terror operations, or there are only sufficient forces to conduct a single hostage-rescue mission. In other cases, it may represent the necessary expenditure of time and effort to get an action underway at all. Frequently, in the real world, the biggest constraint on taking action is the need to build a consensus to do so among the key stakeholders. Consider, for example, the run-up to the 2003 Operation Iraqi Freedom.

Another important element of real-world operations that the card-based engine can help address is the importance of planning. Commercial games, in particular, are often remiss in their representation of the requirements for planning, particularly for large-scale military operations or complex terrorist attacks. CDGs by their nature allow a better representation of these real-world elements, through the sequencing of card-plays to carry out a complex plan.

We can implement an even more explicit representation of planning by allowing players to “play cards to the table.” By this we mean that instead of using their normal opportunity to play a card and conduct an event or operation, they can play the card without revealing it, storing it in a holding area to represent an ongoing planning effort. This is an especially attractive method to model the slow development of complex terror activities (such as the plot to collect liquid explosives in carry-on luggage and destroy multiple aircraft in-flight). It also gives opposing players a chance to employ information operations to investigate and possibly discover such plots.

Conclusion: applying CDG concepts to 4GW games

To sum up, our key ideas for designing an operational—or, perhaps more accurately, an operational-strategic—wargame of 4GW in the near future begin with using a card-driven system for the fundamental game engine. With such a system in mind, we define our player set to be those actors on the world stage of most interest for the research or educational purposes of the game. For our example, we chose the obvious, the Persian Gulf region.

Our process of design then begins with identifying each player’s worldviews and purposes. This leads to an assessment of the actions and means at their disposal, along with any constraints that may apply. This is perhaps the most difficult element of the design process to explain or envision. The designers must overcome the challenge of designing, in effect, multiple games, and then tying them together into a single coherent system.

We chose the currently popular mental models of DIME and PMESII as the structural underpinnings for our assessments, as well as for many of the fundamental game-design parameters. Key among these parameters is the structure of the basic cards that drive the game’s play. Use of a well-defined structure helps keep the design of the basic cards focused on critical elements, and helps us knit together the cards into a coherent fabric of play. What’s more, this structural framework for the cards allows us to specify a process through which the players of the game might themselves define cards according to

their own creativity and insights into the processes that the game proposes to investigate.

Such a design benefits from the strengths of a rigid-*kriegspiel* system, in which careful research underlies most assessments of actions and outcomes. At the same time, it opens the game to free-*kriegspiel*-style flexibility by allowing the players (and Control, for that matter) to create and invoke new ideas, but within a strong but flexible framework of game mechanics. The game we envision is largely player-driven and action-centric, unlike games whose tendencies toward a Control-centric approach are, at times, regrettable.

The game process that we envision centers, of course, on the play of cards to drive actions in the game universe. Those cards provide players with the resources to conduct actions and operations of various types (largely DIME) and achieve effects on their own systems or those of their adversaries (largely defined by the PMESII variables). Other cards may introduce direct effects on the variables of the system through the occurrence of important events of one type or another.

The number of cards available for a player to choose from reflects their ability to harness the powers of their states or organizations to initiate and coordinate activities across the region or the globe. Planning capabilities allow players to collect and reserve cards for play at a later date, but intelligence-gathering and other information-warfare capabilities may allow their opponents to discover or even eliminate some of these reserved capabilities. By sequencing the play of cards and coordinating the actions and means the cards allow, players develop and implement strategies to achieve their disparate purposes and advance their respective worldviews.

Many of the techniques we have sampled or envisioned are similar to or adapted from techniques employed by commercial boardgame designers of card-driven wargames. As a result, we are confident that the approach we espouse can achieve many, if not all, the goals we set for it. What is most important at this early stage is that we know, in fact, that solutions to most—and hopefully all—the basic problems of wargaming 4GW exist. We have seen them in commercial games and in Naval War College games.

The investigations we have conducted and the ideas we have proposed have only started the ball rolling. All it will take for future game designers to develop effective new techniques—grounded in proven methods—to wargame Fourth-Generation Warfare much more successfully than in the past is thorough research, careful design, and expert execution. Piece of cake.

Appendix: Online play of a CDG

We supplement our exploration of 4GW wargaming with a few words about online play of wargames—in particular, the sort of card-driven game we described above. There are at least two approaches to implementing such games for online play, and we will touch lightly on both.

Online play of CDGs is a proven technique. Several applications exist that enable this kind of play, including VASSAL and TUNGUSKA.³³ These systems allow real-time synchronous game play, and VASSAL (at least) also allows for asynchronous play based on email. (Several other systems are also applicable to an email playing environment, including the Automated Card Tracking System or ACTS,³⁴ created specifically to facilitate play of card-based wargames. These systems are limited to performing essentially bookkeeping functions and cannot really manage the complete play of the game.) In general, any online application that can simultaneously display and manipulate multiple database forms should be able to support card play, since a card deck is basically nothing more than a database with text fields, numeric fields, and graphics for each record.

Systems like VASSAL or ACTS are really game-facilitation software. They enable players to engage online and in real time, but the players must, themselves, manage game play according to the rules of the system; the software does not “enforce the rules.” It is possible to program an umpire “player” into the system to oversee such Control functions, but, typically, commercial games are managed by the play-

33. To explore these systems, try <http://www.vassalengine.org/community/index.php> and <http://www.f2fgaming.com/Home/tabid/123/Default.aspx>

34. See the Warhorse Simulations web site <http://acts.warhorsesim.com/index.asp>

ers themselves. The TUNGUSKA approach actually incorporates a game-system monitor that enforces the rules of the game. Not only does it prevent players from breaking the rules, but also it reminds players of the sequence of actions open to them. As you would suspect, the latter approach is more complex and specialized, and requires programming skills of a high order to create packages for specific games. VASSAL and like systems are less sophisticated and may easily be used by most potential players to implement existing paper games electronically.

Granite Island Online falls into a slightly different class of games. It uses an online system, but primarily for communicating information and updating displays. The bulk of game play and all of its assessment is actually managed directly by a Control Team. To be sure, that Control Team uses several computerized assessment tools to calculate the results of player moves (the economic model, for one). Players communicate with their fellows and with Control through email or bulletin-board-like postings, and submit their “moves” to Control, who carries them out and adjudicates the results.

The beauty of the CDG is that it provides a means through which many of these management and adjudication functions become the responsibility of the players themselves. The result is—perhaps surprisingly—a much smoother flow of play. The cost for this smoothness is that each player must take his turn in order; there is no simultaneity of moves, as was the case with *Granite Island*. On the other hand, the cost of that small and even dubious benefit of simultaneity is the extraordinary burden it places on Control to manage and adjudicate the moves.

One solution to that problem is, of course, a truly automated adjudication system that would allow players to enter their move orders into a database system, which would resolve all of them automatically once all players had responded (or a deadline had passed). This “all-singing, all-dancing database,” as our game Controller termed it, would take over the bulk of Control’s management functions for *Granite Island* and allow Control to focus on the more complex tasks of evaluating those creative player moves that are outside the ordinary.

In our conception of the CDG approach to 4GW wargaming, the players would manage the mundane flow of play themselves, assisted by Control. Control's primary adjudication function would then revolve around creating new cards to introduce new elements into the game, or around evaluating cards submitted by the players—accepting, modifying, or rejecting those cards in accordance with Control's assessment of the validity of the effects those cards might produce.

Of course, there is one small fly in the ointment when it comes to player-managed games: the players must know the rules well enough to play the game correctly. This requirement is far more obvious in a game that uses, say, VASSAL than in one of *Granite Island*. During the latter, we players would tell Control what we wanted done and either he would ask us questions of clarification, or he would carry out our orders. This seems, on the surface, far less burdensome on the players. In fact, however, we found it most difficult to make good decisions without having an appreciation about the range of possible outcomes our actions might engender. In other words, we wanted to know the rules. (Of course, this could simply be the unfortunate downside of having “gamers” play the game, rather than typical NWC students!)

Constraining the amount of specialized knowledge of the game system that the players need to have in order to play the game, first at all and then effectively, is one of the critical elements of game design. It is one thing for War College students to spend several hours learning the rules of a game; it something different if senior officers and officials are the prospective players. Yet, players who know nothing of the game's rules must make decisions on some basis, and that basis typically defaults to their own real-world experience. To the extent that the game embodies new information and new perspectives, their real-world experiences may be poor guides to their best game actions. We experienced this problem in our play of *Granite Island*.

There are solutions, of course, and finding them is the game designer's job. Using experienced players to provide support and facilitation to senior officers is a technique with long traditions at the Naval War College. Distilling complex rules into easily grasped instructions is a bit more of a challenge, but one that has been met

successfully by commercial designers. It remains to be seen whether even such simplified rules can be made clear enough to let senior officers grasp the essence of the concepts quickly enough to play such a 4GW game.

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