The Newport Papers

*Thirteenth in the Series*

# SAILING NEW SEAS

by

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**COMMANDER-IN-CHIEF, U.S. ATLANTIC FLEET**

**with**

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# SAILING NEW SEAS

**Admiral J. Paul Reason, U.S. NAVY**

**COMMANDER-IN-CHIEF, U.S. ATLANTIC FLEET**

**With**

**David G. Freymann**

Second printing July 1998

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# *Foreword*

It is a great pleasure for the Naval War College to publish Admiral J. Paul Reason's *Sailing New Seas* as the thirteenth in our series of Newport Papers. The purpose of this series, now in its eighth year, is to bring significant topics of national and maritime interest to the attention of a select group of readers.

This Newport paper presents the ideas of one of the Navy's most senior leaders. Admiral Reason's topic is the course the United States Navy should steer in the "typhoon of change" characterizing today's and tomorrow's world. He begins by describing what the technological, managerial, and social hurricane of the Information Age means for warriors who go to sea. He then addresses, in general terms and in specifics, the response such an upheaval requires. While acknowledging the traditions that made the Navy great, Admiral Reason proposes a new way to think about the fleet as a whole, one that discards the "industrial age model" in favor of the "flight deck paradigm" of a high-performance organization operating at the edge of chaos. He concludes by stressing the importance of rapid adaptability to the Navy's paramount measure of performance—warfighting.

This is an insightful blending of the implications of the "trans-industrial age" to future warfare, the criticality of data, the relevance of an extraordinary naval model of leadership, and the requirement for a new mind-set in the United States Navy. It is a brief essay, because the author recognizes that quickness and individual initiative are far more important than "top-down direction" and "the voice of experience" in readying today's Navy for tomorrow's challenges. "The task at hand," he writes, "is to lever the Navy from the Industrial Age to the trans-industrial age, using data-based arguments to increase the efficiency and quickness with which it accomplishes its missions."

I invite the reader to embark with Admiral Reason for a high-speed sortie into the future.

Robert S. Wood
Dean of Naval Warfare Studies

# *Preface*

We in the Navy of the United States are anchored in the strong holding ground of our successful past, yet already we feel and see the leading indicators of a storm that threatens to wreck us at our hard-won anchorage. We face not a small squall and some temporary discomfort, but a typhoon more ominous than any we have encountered since 1944. This time it is a typhoon of change. Now is not the moment for backward-looking nostalgia, timid inaction, nervous knee-jerk reactions, or mere hope. We must weigh anchor, pick the right course, and do all the difficult things necessary to sail onward at best speed, within the typhoon, through new and uncharted seas.

America is the land of opportunity and transformation—it thrives on both. Naturally, American Sailors are used to change and excel at it. The Naval Services led the way in steam, ironclads, carrier aviation, amphibious warfare, nuclear power, and sea-based missiles. To preserve our naval preeminence, we must continue to be at the forefront of innovation and adaptation.

The purpose of this Newport Paper is to stimulate thinking, discussion, and new approaches within the Navy. It is meant to be a primer for every Sailor of new seas. Not an academic work, it is more firmly rooted in my own observations and perceptions than in the scholarly work of others. Some of the unusual conclusions presented here grew out of wide-ranging and spirited discussions held among the leaders of the Atlantic and Pacific Fleets in the spring and summer of 1997.

Welcome aboard.

Make all preparations for getting underway.

Rig for high winds and heavy seas.

## *Acknowledgments*

As with most works, many have had a hand (or, better said, a brain) in the preparation of this Newport Paper. Members of my "Board of Directors" helped clarify ambiguities. This Board included:

- Vice Admiral Vernon E. Clark, formerly Commander Second Fleet, currently Director for Operations (J-3), Joint Staff
- Vice Admiral John J. Mazach, Commander Naval Air Force, U.S. Atlantic Fleet
- Vice Admiral Richard W. Mies, Commander Submarine Force, U.S. Atlantic Fleet
- Vice Admiral Henry C. Giffin, III, Commander Naval Surface Force, U.S. Atlantic Fleet

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- Dr. Roger N. Whiteway, Director for Warfare Requirements and Program Planning, U.S. Atlantic Fleet
- Rear Admiral John M. Luecke, Deputy Commander-in-Chief, U.S. Atlantic Fleet
- Rear Admiral David R. Ruble, Director, Logistics/Fleet Supply Officer, U.S. Atlantic Fleet
- Rear Admiral Arthur Clark (retired), former Fleet Maintenance Officer, U.S. Atlantic Fleet

And, finally, I acknowledge the assistance of Lieutenant John Freymann, USNR, a Navy junior and Ph.D. candidate at the University of Chicago. I suspect he deeply enjoyed giving advice to an admiral and to his father, and having them follow it. Without his writing and thinking ability, and his frequent judicious challenges, this Paper would be less readable and less intelligible.

All these people have my admiration for their patience and my deep appreciation for their assistance.

The dogmas of the quiet past, are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think anew, and act anew. We must disenthrall ourselves, and then we shall save our country.

— Abraham Lincoln, *Annual Message to Congress*, December 1, 1862

If we first know *where* we are, and *whither* we are tending, we could then better judge *what* to do, and *how* to do it.

— Abraham Lincoln, *Republican State Convention*, Springfield, Illinois, June 16, 1858

# *Part One*

…*where* we are, and *whither* we are tending…

# Introduction

## A Time of Change

*We are faced with something new and profoundly different. . . . The world is changing in ways both fundamental and, from our perspective, almost incomprehensible.*
—William R. Brody, President, Johns Hopkins University

EMINENT SCHOLARS AND FUTURISTS hold that the entire world, particularly the United States, is in an era of rapid and radical change, profound and thoroughgoing change that has never before been quite so rapid and radical as it is now. Take a good look around: sober reflection indicates that the prophets of change are right.

Many of these pundits see the previous transition from agricultural to industrial societies as a slow-motion example of what the world is currently going through. The development of the Industrial Age started very slowly, accelerated to a rapid pace during the nineteenth century, then eased to a more measured pace in the twentieth century. Now another transition is taking place as the world hastens from an industrial to a *trans-* or *post-*industrial era, known popularly as the "Information Age." The present shift began slowly, but is moving quickly today, far more quickly than the former transition.

Our intellects and our institutions (e.g., schools, churches, businesses, governments, armed services) have developed and matured in the late Industrial Age, the twentieth-century period of gradually increasing industrial complexity. We perceive the world around us through Industrial Age lenses. We think and speak in Industrial Age terms. We educate, organize, and govern ourselves on the basis of Industrial Age patterns. We fight with Industrial Age weapons in Industrial

Age ways. But now Industrial Age institutions, concepts, and terms are rapidly becoming or are already outmoded and irrelevant, while different organizations, ideas, and vocabularies are speedily developing to handle the realities of the new era. Like the movement from the agricultural era to the Industrial Age, but to a greater degree and at a faster rate, the trans-industrial* period is transforming almost every area of human endeavor, including agriculture, industry, communications, commerce, government . . . and *war.*

This "jump-shift," this "radical bend," this "new age" is leading to wholly new ways of fighting (new ways of producing wealth lead to new ways of destroying it). Warfare systems based on old ways and concepts can be outmaneuvered and neutralized by systems based on new ways and concepts. Bravery and speed and surprise will be just as important as they were at Trafalgar and Midway, but the weapons and tactics will be different.

The urgent question is this: *How is the mighty United States Navy, with its minds and organizations deeply rooted in the mature Industrial Age, to change quickly and efficiently into a Navy that can fight and win in a dynamic, trans-industrial age?*

Aye, mates, there's the rub.

> *Not only will the unimaginable happen, it will happen faster than you can imagine. Change comes hardest to those with the deepest traditions.*
>
> —Mario Marino, founder of Legent Corporation.

## The Change Machine

Incremental programmatic and organizational adjustments, more money, and improved Industrial Age weapon systems and platforms will not be enough to ensure that the U.S. Navy remains the preeminent navy. The usual responses (no matter how sophisticated) to variations in the late Industrial Age environment will not suffice, because the world has profoundly changed and is changing still. A new age calls for a new change machine. Metaphorically speaking, a fulcrum and lever, and the wisdom to use them effectively, are needed to move the Navy into the next era. (Should fulcrum and lever prove to be too slow, then powder and shot should not be spared.)

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* Many different terms are used to describe the "new age," such as "post-industrial age," "information age," "Third Wave," and "knowledge age." There are objections to each. This Paper seeks to avoid those objections by coining and using a new term, "trans-industrial age," which refers to an age in transition from the Industrial Age to something else. It is left to a future generation to find a more precise name for the present era of change.

The fulcrum consists of the mission and mission-related tasks. What must the Navy be able to do, and how swiftly? In what environment, against what threats? What tasks must be accomplished to execute the mission in the time required? The Navy must answer those questions, then *continually* and *rapidly* update the answers.

The lever is data. There was a time when enough resources were available to satisfy nearly every national military need and most national military desires. It used to be that service-specific arguments, decorated with soft numbers and buttressed by personal experience and well-earned reputation, carried the day in budgetary debates. No longer. Now the Navy needs other, more cogent arguments, built upon hard, objectively measured, incontrovertible data. Credible, accurate data that is relevant to warfare missions and tasks constitutes the lever with which the Navy can be moved into the new age. Indeed, such data is the only workable lever for the present and future world (see pages 58–63).*

> *Does it contain any abstract reasoning concerning quantity or number? No. Does it contain any experimental reasoning concerning matter of fact and existence? No. Commit it then to the flames: For it can contain nothing but sophistry and illusion.*
>
> —David Hume, 18th century

Yet it is not enough simply to possess the tools for change. To use the lever and fulcrum correctly, wisdom is needed—wisdom which stems from a thorough understanding of the Navy's missions, mission-related tasks, capabilities, and readiness.† From this wisdom must flow appropriate warfare concepts and theory. With this wisdom the Navy can determine what it requires to accomplish its missions quicker, better, and cheaper. Clearly, missions and mission-related tasks, and the concepts for accomplishing them, must drive the requirements process.‡ And, in turn, defining the missions and tasks requires an understanding of the Navy's environment and the threats the Navy can expect in that environment.

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* By data is meant something more precise than what has usually been called "data"—namely, mere numbers generated by analyses of questionable relevance and rigor, supported by authoritative voices of experience. Data is *real* information, derived from accurate, verifiable measurements based on well-defined, meaningful standards. Numbers are fluff, often prettily dressed up as "data."

† Readiness again raises the issue of data. Evaluation of the Navy's readiness must be based on meaningful, consistently applied, quantifiable measures of effectiveness (see page 62). Current assessments of readiness are too often inadequate, inaccurate, misleading, or irrelevant.

‡ The other way around is illogical and foolish.

## The Navy's Environment

People often talk about shaping environments, but it is an inescapable fact that the technological environment shapes people and their societies (Karl Marx was right on that score).[1] It is doing so today, probably faster and more thoroughly than even the most astute observers realize. Computer technology is transforming commerce, finance, social relations, and the armed services, to name just a few, at an incredible pace. And the transformation is just beginning, steadily accelerating with no slowdown in sight.

Information can now be acquired with astonishing ease: an individual can effortlessly, cheaply, and quickly gather information that had previously been difficult to access, or had not been available at all. Information can also be distributed and analyzed much faster than before, and it can be manipulated and used in ways never before imagined, to accomplish tasks not thought possible. The World Wide Web is a case in point. Growing at an exponential rate and evolving rapidly in complexity, the Web is remolding whole sectors of society: commerce, finance, communications, education—the list goes on.

These new information capabilities catalyze the development and refinement of other capabilities, rendering older ones unnecessary or irrelevant. With regard to the Navy, the information technology explosion makes possible (list not exhaustive):

- The manufacture of more precise and more lethal weapons, with a consequent decrease in requirements for large amounts of on-hand ammunition
- The ability to incorporate into weapons hitherto unfathomable advances in maneuverability, speed, guidance, and range, thus alleviating the need to optimize those qualities in launching platforms
- Decentralized, quicker, and better combat decision making through the use of data distribution systems, expert systems, and redundant communications
- A diminished need for the Navy to have weapons of mass destruction (WMD), together with the development of more effective defenses against the use of WMD by others
- The distribution and dispersal of combat power, with attendant reductions in dependence on foreign bases and in the number of military assets that are large, tempting targets for weapons of mass destruction
- Dramatic reductions in warship manning
- Improved efficiency in the generation and use of energy

All of the foregoing sounds wonderful; however, lest the Navy be dazzled by the promise of technology, certain caveats must be kept in mind to maintain clarity of vision. The technology sword cuts both ways: technology and information are widely distributed and easily accessible, *worldwide.* With the increase in technological distribution and diversity, uncertainty likewise increases. The Navy must learn to deal with greater levels of tactical, operational, and strategic uncertainty. Furthermore, new technologies bring new vulnerabilities, usually unknown or unanticipated. The double-edged sword of information availability obliges the Navy to reexamine its plans and tactics continually in order to identify and then eliminate or minimize its vulnerabilities. Lastly, the increasing speed of change makes it *necessary* for the Navy to quicken its response cycle *radically* in all its activities and functions, else it runs the risk of being outmaneuvered, frustrated, and defeated.

Developments in the technological environment are profoundly affecting the international environment. New technologies are altering the ways in which wealth is produced and distributed, which in turn is causing rapid (and potentially dangerous) social, economic, and political change. International friction, fragmentation, shifting alliances, and new power relationships ensue. Economic competition is intensifying on a global scale, accompanied by the emergence of multinational companies having no firm commitments to any one nation and exerting considerable influence on world trade.

Particularly relevant to the Navy is the growing vulnerability of free use of the seas. While growing more vital with increasing worldwide dependence on international trade, free navigation of the seas, already made vulnerable by cheap and low-technology weapons, is becoming even more vulnerable with the appearance of new and dispersed technology that enables the swift development of new weapons and ways of using them.

For reasons related to the impacts of technology, the political complexion of the world changed radically in the 1980s. The history has been recounted before, but it bears review. The world in which most Americans matured was polarized by the United States and the Soviet Union. *De jure* or *de facto,* most other countries aligned themselves with one superpower or the other, as their national interests dictated. The Soviet Union and the United States used cultural ties, economic ties, diplomacy, and raw power (more or less gently applied) to gain and retain the commitment of these countries. Friendly persuasion was usually used with those countries who were in positions affording some semblance of neutrality and who could play one pole against the other.

That world no longer exists. The Soviet Union is gone and has not yet been replaced by a major power that has the ability and desire to compete with the

United States in a traditional (Industrial Age) military sense. American popular culture (not to be confused with values and mores) is spreading throughout the world and, aided by modern communications, is rapidly becoming the dominant and pervasive world culture, even in countries whose leadership would strongly prefer otherwise. Most emerging and developing economies depend very much on access to the American market, relying on sales in that market to provide cash needed to fund modernization. For speedy development, often facilitated by ways to leapfrog expensive Industrial Age infrastructure, such economies also turn to technologies that are most highly advanced and available in the United States.

In short, the Cold War situation, in which the United States needed the good will and cooperation of other nations more than they needed that of the United States, has been reversed. Over time, the United States will probably adjust its international relationships accordingly. However, it is judicious to realize that the current situation is just as transient as the Cold War was—history confirms the impermanence of political arrangements.

On the domestic front: although the people of the United States support a defense establishment sufficient for current needs, changes in relative economic strength and in domestic political and economic priorities may lead to erosion of support in the future. That handwriting is already on the wall and has been for many years. Rapid changes in technology, international politics, and international economics will lead to much greater uncertainty (and political wrangling) in determining how best to provide for the national defense. Changing and widely varying social and educational standards, combined with economic demands for trained and disciplined workers in the civilian workplace, will render it difficult for the armed forces of the United States to attract as many qualified people as they do now.

## The Threat

This is not the place for a detailed listing of destabilizing forces in the world, but it is worth noting that rapid change frequently causes social, economic, and political instability. Instability is not a necessary consequence of rapid change, but it is a likely outcome. Traditional social structures, including family and religious structures, are often severely traumatized by sudden, swift change. The ensuing shock and aftershocks those structures undergo can be extremely stressful for the members of any nation or organization. Extreme social stress leads often in turn to extreme (radical) behavior. In the current state of affairs, all states and organizations, however modern, are subject to the risk of change-induced

instability. Moreover, the international situation is becoming so fluid that any state or organization can become an ally, and any can become an enemy (or an unhelpful neutral).

It would be dangerously imprudent for the military and political leaders of the United States to think that because American armed forces appear to be stronger than any others, they are also smarter than others are and have no critical vulnerabilities. Such arrogant opinion can become fatal delusion, for there are many asymmetric threats, and more are coming. Low-tech, self-sacrificial, asymmetric, unconventional (including but not limited to chemical and biological weapons)—these adjectives describe the kinds of threats that U.S. forces are unaccustomed to countering. Dangerous already in themselves, such threats are actually more sinister because they are stealthy: they do not appear on late–Industrial Age mental or institutional radar screens. As an institution, the Navy tends not to see these kinds of threats because they are hidden by ingrained paradigms of cognition and thought.*

It is unlikely that any hostile organization or state will challenge the U.S. Navy with aircraft carriers, nuclear submarines, or amphibious task forces. That course would be foolishly playing to American strengths. Rather, it is far more likely that enemies will look for, find, and exploit vulnerabilities. Yet—and this may seem intuitively obvious, but is worth stating plainly—U.S. forces are well prepared to counter expected threats, unprepared to counter unexpected or unimagined threats. Preparedness of that kind is not enough. The list of real threats which the next Navy and the Navy-after-next must be ready to meet should be expanded to include all those present and future threats for which *today's* Navy was *not* built.

Weapons of mass destruction rank high on the list of threats to be addressed. Some WMD, such as nuclear weapons, can be developed only by advanced industrial economies; nonetheless, these WMD can still be wielded by anyone able to buy or steal them and move them to a target area (a difficult task, but not impossible). Other WMD do not require a highly evolved industrial base for their development, and they are relatively easy to transport. These include chemical and, especially, biological weapons. If the methods of their acquisition and employment are imaginative enough, weapons of mass destruction may constitute asymmetric threats, circumventing defenses devised against them. Moreover, although WMD are reserved primarily for use against very expensive, massive, or massed targets,† they can also be used against discrete (point) targets.

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* The histories of medicine and physical science are replete with examples of how deeply rooted, authoritative patterns of thought concealed—and were later changed or discredited by—realities later confirmed by experiment. *The histories of naval and land warfare are no different.*

† That is, targets *inviting* targeting by weapons of mass destruction.

One asymmetry difficult to account for is the non-state. The United States normally considers other *states* as potential enemies. However, given the wide distribution of technology and knowledge, and the capabilities of well-honed terrorist and smuggling organizations, future enemies may not be other states and nations. Troublesome questions then arise: How is the United States to counter non-state threats? Can a state declare war against a non-state? What if the non-state is sheltered within the territory of another state? The rise of sophisticated, powerful, and hostile non-states suggests that finding answers to these and related questions should become a paramount national priority.

Adding further complexity to the issue of asymmetric threats is the changing status of the rules of war. Some parties seek new rules (e.g., the prohibition of land mines), others recognize no rules. New or newly radicalized states may not observe the rules of war, claiming that the old rules unfairly put them at a disadvantage or that the rules of war do not apply to them because their situation is unique and merits exception. That has happened many times in the twentieth century; it would be wise to expect it to occur in the twenty-first. Even more vexing is the fact that non-states are not parties to the Geneva Conventions nor are they members of the United Nations. Hence they usually do not regard international law or the rules of war as obligatory.

The question is, What to do? What are the concepts for protecting the nation against the threats discussed above? What will the Navy's tactics be? No one knows. What will the Rules of Engagement be? No one knows. Do the United States and the other nations of the world need new rules? Probably, but even the U.S. in its leadership role has not given that matter adequate constructive thought.

In a nutshell, the problem is *unpredictability*. The Navy and the nation *must* recognize and face the existence of exceedingly high, and rising, levels of uncertainty. In the period from 1947 through 1990, the crystal ball was relatively clear; now it is distressingly cloudy. It is just not at all easy today to peer into the future and make reliable predictions. The litany of unknowns is daunting:

- No one knows who the enemy will be.
- No one knows if the enemy will be a state or an organization.
- No one knows what weapons and technologies the enemy will have and how they will be used.
- No one knows when the enemy will strike.
- No one knows what the enemy's objectives will be.
- No one knows what tactics the enemy will use.
- No one knows what rules, if any, the enemy will observe.
- No one knows which rules the Navy will be allowed to use.

> *Necessity is the mother of invention.*
> —(Proverb)
>
> *Necessity is a ferocious teacher.*
> —Michel de Montaigne, 16th century

No one knows. But inaction is not an option, especially for the Navy. Ways *must* be found to deal with chronic and extreme uncertainty; with the inability to predict anything in the long term; with radical, rapid, pervasive change; and with much more limited budgets. It is necessary that this be done, and the sooner the better, for later is likely to be too late.

## The Response: Become Quicker, Cheaper, *and* Better

*The United States struggled for forty-five years to create a defense establishment that could effectively and efficiently prepare for and wage a conflict such as World War II or a possible global clash with the Soviets. Hopefully the Pentagon will not take as long to reorganize for the security challenges of the post-Cold War era, in which organizational adaptability and quickness are major assets.*

—Senator Sam Nunn

*A dynamic world requires a defense organization that can prepare quickly for a wide range of challenges.*

—Senator Sam Nunn

The new strategic imperative is *quickness.* Survival of the fittest is now survival of the fleetest—Jack Tar be nimble, Jack Tar be quick. To become quicker, three things are required: flexibility, agility, and speed.

Flexibility is the ability to respond to change. Maximizing flexibility demands distributed information, a decentralized decision structure, simple decision rules, and mission-based orders. The flight deck of an aircraft carrier is a perfect small-scale example of a flexible organization (see pages 22–25). Its crew is composed of well-trained, sharply focused, mutually supporting personnel. It is a supple, highly responsive, flat organization. Information is widely distributed, and there are redundant methods of distribution. The flight deck operates on the basis of simple decision rules, with authority for action placed at action levels, dependent upon position, skill, and information rather than rank.

Agility involves alertness, the ability to move swiftly and easily in any direction, and the capacity to change direction on short notice. The agile organization is *flat*: it has no tall, vertical, thick-walled "stovepipes." The agile, flat, broadly dispersed organization is quick to aggregate whatever forces are needed for emergent missions. In such an organization, decision making is decentralized,

with decisions made quickly by the persons at the point of the spear—they have the most to gain or lose. Information is widely distributed and accessible, not tightly controlled and compartmented, with all *necessary* and *relevant* information (not *all* information, merely) passed in digestible form to decision makers at the cutting edge of mission execution.*

As to speed, fighter pilots have it right: speed is life. The Navy must be able to move faster than any potential enemy, and not just in its fighter aircraft. It must be the fastest in developing and fielding new technology; in developing the tactics that use new technology; and in developing measures to protect new vulnerabilities. The Navy must be able to redirect its effort and direction much more rapidly than anyone else. The Navy's cycle times and combat decision time must be made so short that no one can turn within the Navy's wake—its information and decision loops must be too fast and tight to counter. Operational security must come primarily from speed of action (which includes speed of decision) rather than from information classification systems.

The Navy must not only become quicker, it must also do things cheaper. The days of plenty are long gone, and yearning after them or trying to recover them is futile. Expanding entitlement expenditures, economic dislocations due to forces of change, increasing global competitiveness, and the absence of clear and present danger will all serve to decrease the share of American resources allocated to defense. Certainly the Navy will save money by becoming quicker, for time is money (spent in salaries, fuel usage, wear and tear, inventory storage, lost opportunities, inefficient use of capital investment). One conspicuous imperative is the reduction of waste: wasted time, wasted talent, wasted people, wasted opportunities, wasted capital investments, and wasted fuel, parts, food, etc. A related task is the removal of unnecessary duplication in mission-tasking and organizational structure.

Everything the Navy does must and can be done faster and cheaper—but *not* shoddily. Faster and cheaper do not necessarily imply worse, and the times demand that the Navy do things *better;* quality of performance must improve, continuously. The Navy is justly proud of its ability to do things well. That is good. However, in naval technology and warfare the Navy has been so much better than its competitors that it expects the margin of excellence to continue. That is bad. Those who have been at sea on the ships of other excellent navies know that in some regards the preeminence of the U.S. Navy is already being challenged in quality though not (yet) in quantity. Given the worldwide free flow of information and rapid rates of technological and economic change, the Navy

* The last two sentences of this paragraph identify the hallmarks of "flat organization" in the context of this paper: namely, decentralized decision making and timely flow of relevant information.

cannot assume that it will remain the undisputed heavyweight naval champion. It must instead work constantly to stay in shape, learn new moves, and become quicker than all contenders. The Navy must keep its focus on the *correct* missions and on the ability to adapt and change.

While the Navy grows quicker, cheaper, and better, it ought also to become more dispersed. Weapons of mass destruction are the ultimate Industrial Age weapons, and the Navy must be able to deal with them. One method of countering WMD is to eliminate or hide concentrations of wealth or power which would invite their attention. To that end, the effectiveness of WMD may be greatly reduced by segmenting and dispersing naval forces. Modern technology facilitates that task and also enables the control and assembly ("mix-and-match") of dispersed forces and weaponry as the situation demands.

§§§

A final thought: Homeports are indeed homes. Despite rumors to the contrary, the Navy and the other armed forces are not isolated societies. In fact, military and civilian communities are becoming more closely intertwined, to the extent that dispersed units of the armed forces take on the complexions of their host communities, in varying degrees. The armed forces need more effective representation in civilian communities to enhance the mutual benefits of close military-civilian relationships. The military is already relying very much on the material and human resources of civilian communities; increasingly it is drawing its ideas from them.

Gone are the days when the military led civilian society in technology and organizational ability. The military now has more to learn than it has to teach. It can learn valuable lessons from successful American companies in many areas, including:

- Rapid, timely, and economic worldwide distribution of material, information, and services
- Decentralized management of operations around the world
- Customer service
- Reliability of equipment
- Advanced manufacturing techniques
- Encouraging innovative leadership
- Recruiting premium talent
- Rapidly redirecting organizational focus
- Fostering organizational vigor
- Networking and information management

- Supplier integration
- Data collection and analysis
- Food services
- Dynamic incorporation of new and advanced technologies

Many citizens in the civilian sector are ready, willing, and able to teach the Navy. They share the sentiment expressed by the director of human resources at Solar Turbines: "It's our Navy too, you know."

# *Part Two*

…*what* to do…

# What Needs to be Done

AN ENVIRONMENT CHARACTERIZED by rapid change and chronic, extreme levels of uncertainty is an environment on the edge of chaos. It is a great place to be in, because it is where the action is, where the opportunities are, and where the future will be defined. As discussed previously, such an environment *already* surrounds the Navy. Responding to it effectively—i.e., becoming quicker, cheaper, and better—requires consideration of:

- The Navy's essential capabilities
- Operational command and control
- Management of the Navy as a whole
- The Navy's force structure (ships, aircraft, and submarines)
- Fleet organization (to be discussed in depth)
- Warfare community representation and leadership

The following sections discuss these matters in the sequence above. Although the sections may be read independently, it must be remembered that they are interrelated

## Essential Navy Capabilities

The most essential Navy capabilities are sea control, forward presence, and power projection. These capabilities are not new, but in the current climate of change their characteristics and relative priority must be reevaluated.

### *Sea Control*

The American economy relies heavily on international trade. In fact, *all* the economies of the world, including those of the developing nations, and all

multinational companies depend for their prosperity upon uninterrupted worldwide commerce. World trade is vital and growing in importance; there is really no such thing as an isolated economy anymore. Although the international economy increasingly includes electronic financial exchanges and traffic in knowledge labor, it still depends for the most part upon the exchange of raw materials, product components, and finished goods. That trade requires free use of the seas, currently guaranteed to the world by the United States Navy, courtesy of the American taxpayer.

Over the course of the twentieth century, the U.S. Navy has become *the* dominant sea power. In the latter half of the century, the United States has, in a spirit of enlightened self-interest, willingly used its Navy to maintain the "freedom of the seas." Indeed, freedom of the seas has not been significantly challenged for over fifty years *only* because of America's power and will to maintain it. All multinational corporations and peaceful nations have consequently enjoyed free use of the seas for legitimate trade. Although they may assume that freedom of the seas will continue, it is only prudent for the U.S. Navy to assume that it will not—at least, not without challenge. Despite the recent historical record, freedom of the seas *can* be challenged, and, in a dynamic and uncertain world rife with technological, political, economic, and social change, a challenge is *inevitable.*

*Freedom of the seas is the most important product of the United States Navy.* It is the preeminent economic gift of the American people to the rest of the world. Without it, world trade and world economies collapse.

*Sea control is therefore the fundamental capability of the Navy.* There is no forward presence on the sea without control of the sea. There is no power projection from the sea without control of the sea. There is no initiation or support of littoral warfare from the sea without control of the seas between the United States and the engaged littoral. *Sea control is absolutely necessary,* the thing without which all other naval missions, and most national missions, precariously risk catastrophic failure. It is impossible to overemphasize this point.

> *In fact, at the core of U.S. security requirements lies one prerequisite—sea control. U.S. military strategy is based on forward presence and power projection—maintaining a presence in key regions and, when necessary, deploying and sustaining sea, land, and air forces overseas. If we cannot command the seas and the airspace above them, we cannot project power to command or influence events ashore; we cannot deter; we cannot shape the security environment.*
>
> —Admiral Jay Johnson, Chief of Naval Operations

## *Forward Presence*

There are four methods of maintaining forward naval presence, and all four can be employed simultaneously: forward basing, deployment, cruising, and sprinting. *Forward basing* involves and is limited by political obligations and vulnerabilities. Where these are not too serious and present few impediments, forward basing is a quite effective and efficient way to maintain presence.

*Deployment* is the scheme the Navy has used since the 1950s. The U.S. Navy is well practiced at it—quite expert, really. However, deployment suffers from a serious drawback: it is expensive in terms of time, consumption of capital naval investment (i.e., ships and aircraft), fuel, and outlays to fund current-year operations.

*Cruising* can be thought of as an "infesting the oceans" variation on the Marine Corps concept of "infesting the battlefield." The U.S. Navy cruised extensively earlier in this century, even after World War II. Cruising is not practiced now, but with today's shipbuilding, weapons, and information technologies it is a feasible, easily implemented method. It may be perfectly appropriate to the "Navy-after-next."

Cruising can use large numbers of relatively inexpensive, slow, simple, lightly manned, self-sufficient, high-endurance ships spread over the oceans in a broad network. Such ships can be armed with missiles (offensive and defensive) and carry combat troops, two helicopters, and inflatable boats. Notional cruises are about five months long, "round the world," with adequate liberty and "show the flag" port calls. Cruising units can be aggregated to whatever extent necessary to counter emergent threats. A network of cruising warships is readily expandable and can be the mobilization focus of the Naval Reserve. It can augment or be augmented by deployed or sprinting forces.

Relatively junior personnel man the cruising ships, and they respond to mission exigencies in accordance with simple decision rules in which they are thoroughly drilled. Cascaded expert systems support the crews, utilizing both locally generated data and "demand-pulled" or "command-pushed" data from remote locations.

Lastly, forward presence can also be achieved through *sprinting*—i.e., moving forces at high speed from bases in the United States to areas of crisis. Of the four methods of maintaining presence, sprinting has the least deterrent effect. To exert an early influence, U.S. forces must be visible in a region *as*, not after, political unrest begins to deteriorate towards crisis. Another drawback is that sprinting naval forces may frequently lack staying power; high-speed mobile forces can easily "outrun" their logistics "tail." Still, sprinting (or surging) is currently the

option usually exercised in the face of rapidly developing crises. In the absence of prearranged bilateral agreements, naval surges are attractive courses of action because of the self-sufficiency of afloat expeditionary forces.

## *Power Projection*

Like the other services, the Navy has placed a premium on power projection since the beginning of the Cold War. The United States did not think that the Soviet Union had developed the capability to invade and occupy the American continent. However, the U.S. was very concerned that the Soviet Union would invade and occupy *other* countries. Also of concern was that the U.S.S.R. would use its massive strategic strike capability to neutralize the power of the United States. To deter Soviet military action against the U.S. and its allies, America developed a credible power projection capability able to be used against the Soviet Union. Since the U.S.S.R. was generally not considered to seriously threaten the ability of the United States to maintain freedom of the seas, the U.S. Navy emphasized power projection over sea control—sea control efforts were focused primarily on countering Soviet submarines.

Now that the Soviet Union is defunct, *it is time for the Navy to reconsider its power projection role,* beginning with the obvious, fundamental question: "Why must the Navy be able to project power?" In brief, the Navy requires the ability to project power in order to support three missions:

- Sea control
- The establishment of a foothold on foreign territory, thereby enabling the fullest projection of Army and Air Force power deeply and broadly against an enemy
- Strategic operations and deterrence*

Paramount among these three missions is sea control (because it must precede the other two): controlling the seas to maintain free navigation by the United States and friendly countries and to deny the seas to countries hostile to the nation or its friends. Sea control requires the will and capability to neutralize military power that can challenge free use of the seas. Thus sea control entails the ability to project power:

- Against forces on, in, or over the sea
- Landward in sufficient depth against forces that may be brought to bear against seagoing commerce or naval forces.

* The Navy provides ballistic missile submarines and trained crews to STRATCOM, which plans and directs deterrent patrols and strategic operations.

Littoral warfare is especially relevant to the first two of the three supported missions—controlling the seas and gaining footholds on foreign territory. To dominate the battle spaces related to these missions, the Navy and Marine Corps must be able to:

- Counter hostile forces brought to bear against the battle spaces
- Isolate and interdict the battle spaces as necessary until the power provided by the other services can be applied
- Supplement the isolation and interdiction efforts of the other services once they are established in theater.

## Command and Control

Responsive command and control is an essential part of sea control, forward presence, and power projection. That seems obvious, but the key word is *responsive.* By that criterion, Industrial Age systems of highly structured and centralized command and control are inadequate at the edge of chaos. They are too slow, too vulnerable, insufficiently agile, and unable to collect and process all the relevant information they need. The evolving environment requires decentralized command supported by timely flows of relevant information.* Mission commanders must thoroughly understand mission objectives and must sharply focus on mission execution. They must be supported with pertinent information provided from all sources via redundant delivery systems. Two simple examples of this mode of operating at the edge of chaos are the use of wire-free communications to support damage control efforts and the simultaneous use of multiple, interconnected (aurally and visually) observers and action personnel on the flight deck of an aircraft carrier (see next section).

Mission commanders ought to be equipped with cascaded expert systems that feed decision nodes by: 1) consolidating externally received information with organic input; 2) reducing information to digestible amounts in readily understandable formats. Furthermore, mission commanders should be provided with, and trained in, the use of simple decision rules. They can then apply the rules to consolidated information and act accordingly.

Now, suppose a large-scale version of this decentralized system of command and control is also the way to run the entire Navy in the future. . . .

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* That is, the evolving environment requires an agile, flat organization (see pages 11–12).

## Managing the Navy of the Future Using a Flight Deck Paradigm

In an article written several years ago, John Pfeiffer reports on the work of three professors (University of California, Berkeley) who studied "high-reliability, complex organizations which, in the throes of adapting to fast-changing times, manage to achieve remarkably low failure rates."[2] Primary emphasis in the article is given to flight operations aboard a Navy aircraft carrier. Thus, some of what follows is familiar to naval professionals, but all of it merits close attention.

In the complex and rapidly changing world of a carrier flight deck during flight operations, very complex procedures must be executed quickly and perfectly, or catastrophe results. Information for decision making comes in fast-flowing floods. Scores of decisions and actions must occur nearly simultaneously and are often followed by torrents of more information and equally urgent decisions that likewise allow no margin for uncorrected error.

The flight deck is not unique. Rapid development of technology and ready availability of large amounts of time-sensitive information are causing many other organizations and activities (at least in their critical parts) to exhibit similar characteristics: high speed; high tension and stress; extreme complexity; no tolerance of uncorrected error; operations at the edge of chaos.

Information demands and flows are increasingly large and fast in all professions and businesses. Huge amounts of information (good and bad, and who knows which is which?) arrive constantly. Decisions must be made faster, and the impacts of those decisions develop faster. Such is life in the quickly moving and turbulent world.

### *Vertical (Centralized) Management*

The old, Industrial Age organization (there are many such, and the current Navy organization is one of them) is unsuited to operations at the edge of chaos and is rapidly becoming obsolete. It is composed of big wheels supported by staffs of experts; gradations of smaller wheels; and cogs.* The standard organization chart shows it well, although most of the cogs do not even show, and the experts—given little real power—are put into small boxes off to the side of the supported wheels. The Industrial Age organization's vertical decision structure, with its concentration of power at the top, cannot quickly digest the data and

* Wheels and cogs are the terms Pfeiffer uses in his article.

information provided it. As a result, it responds too slowly, and too often inappropriately. By its very nature it is condemned to be inadequately efficient and effective in the evolving environment.

In spite of this archaic structure's inherent systemic deficiencies, many organizations expend considerable effort, and legions of consultants earn a good living, trying to make it work in the new, modern world. Society educates more big wheels (and then pays them well) because it assumes (out of habit) that more big wheels can make the thing go. Does the old structure actually work? Ask the cogs.

The Navy still uses that type of vertical organization for parades and pay, but should not use it for operations at the edge of disaster and chaos. The flight deck certainly does not use it. Every person on the flight deck is an expert, doing one task (or a few tasks) very well. The tasks are significant in the most extreme sense: if done well, people live; if done poorly, people die. Every flight deck crew member understands that complex, fast-moving, merciless environment, and knows that everybody on the flight deck is an expert. When speaking as an expert in a certain area, a crew member—whether officer or seaman—is listened to, even deferred to. Experts demand to be heard, and are heard, because they are experts. Furthermore, any "cog" acting as an expert can shut down flight operations, and no officer (not even an admiral) will contest the right, obligation, and authority to do so. Such behavior is not punished; rather, it is supported, recognized, and rewarded.

There is one important caveat to note: in all organizations "there tends to be a chronic gap between 'taskers,' who give orders, and 'operators,' who must carry them out."[3] For the flight deck and organizations analogous to it, the obvious conclusion is that taskers should not give operational orders. The key is to train the operators well and then tell them what to do, but not how to do it. (Actually, operators need more than good training and a clear mission order. They also need information, as discussed below.)

## *Flat (Decentralized) Management*

Many organizations facing environments and situations similar to those on the flight deck have assessed requirements and possibilities differently. They see the new technology in information distribution and processing as an opportunity to take more centralized (tighter) control of operations. They assume that with more information from operators in the field, obtained more quickly and

processed in greater detail, decisions about execution ("how to do it") can be made, and made better, at a centralized command facility.

That assumption is *false.* Take the flight deck: not all the significant information regarding the "beat" of the flight deck can be communicated to a decision maker in the bowels of the ship. Likewise, the "beat" of the battlefield, in business or war, cannot be fully communicated to a decision maker—a "big wheel"—at a headquarters. The smells, the tensions, the noises, the pulse, the feel, the events unconsciously seen and recorded peripherally—all these cannot be verbalized or digitized, transmitted, and reconstituted accurately, completely, and quickly enough.

Experts must make some decisions on the scene (actually, *many* decisions, in fast-breaking and dangerous situations). However, no expert can "know it all." No expert can make sense of the turbulent flow of events, *in toto,* just by looking at the whole operation—although every expert must have a general understanding of it. Areas of expertise, responsibility, and authority must be kept to a level to which the expert can be trained and within which the expert can be fully aware of all important, relevant information. In other words, every expert must be focused on an aspect of the chaotic environment small enough to be ordered and understandable; and the organization must recognize each expert as the primary (and, in some cases, absolute) authority within that area, regardless of rank.

The organization must also acknowledge that even the best-trained human can make mistakes if given defective or inadequate information, or if the ability to recognize and use information is impaired by exhaustion or overloading. Therefore, each expert must be supported to ensure that appropriate information is received and processed correctly. Providing proper information support to the expert sounds like an simple matter, but it is actually difficult. Consider: if the expert receives conflicting information, which source should be believed? If the expert receives more information than can be digested, what warrants immediate attention? True, information can be correlated and checked for quality before the expert receives it, but then it may arrive too late (actually, it is *likely* to arrive too late).

The solution is to limit input to the expert to factual observations, and—where feasible—to have at least three paths for transmission to the expert. If multiple paths of transmission are not feasible, or if the input consists of analyzed information, then the input should be sent from one source. If there is too much incoming information for the expert to digest, it should be sorted, partially analyzed, and then presented by supporting expert systems that can be programmed and activated at will.

*Flight deck management is the epitome of decentralized management.* It has five salient, essential properties:

- Experts are trained to do certain tasks in the desired way.
- Experts are given full responsibility and authority to do those tasks.
- Experts are provided the information they need.
- Experts are depended upon to accomplish their tasks.
- It is assumed that the experts have done their jobs unless they report that their jobs cannot be done, or have not been done.

## *Learning from the Flight Deck*

*The inescapable fact is that in times of rapid change, centralized management does not work well in a complex, technologically sophisticated society.* Does the reader want confirmation? Ask the old Soviet Politburo. Ask a combat commander in a modern military force. Ask the field or sales representatives of companies selling the products of new and swiftly developing technologies. And lastly, *ask the cogs.*

*It would be fitting to use more flight deck management throughout the Navy (and, in fact, throughout the Department of Defense), because it is the management system most suited to command and control in combat or at the edge of chaos.* Every commander—and, indeed, every civilian manager—has wrestled with the question of where control of operations and tasking should reside. The specific answer varies with the technological level of the organization and the operation at hand. The answer has usually been: as far up the command ladder as possible, without saturating the command staff, and as far down the command ladder as absolutely required. As the Navy's data collection, transmission and processing technologies advance, the tendency is for the Navy to move decision making further up the command ladder, because it is believed that all relevant information can be acquired and utilized at the higher levels of command.

That is the wrong way to go. More and better information must be sent to the lowest level that has a directly involved decision maker with the scope and training to understand and digest the information fully. The Navy must have and depend upon experts operating in a loosely managed structure based on information freely flowing in all directions (on a sort of "information bus"). The management system of the future—a future which has already arrived—is the flight deck system writ large, the most appropriate system for a technologically advanced, responsive next Navy.

The flight deck has burst the bounds of its specific context, and it is not much of an exaggeration to say that the entire Navy faces a flight deck

situation as it heads into the twenty-first century. In flight deck situations, a strict and rigid chain of command based on organizational rank does not work. What *does* work is a strict and flexible chain of command based on skill and knowledge. What *does* work is having team members support the objective of the organization by doing their jobs well during operations in or at the edge of chaos. What *does* work is having the organization exist primarily to support its experts, enabling them to perform expertly within their areas of responsibility.*

In sum, here is what the flight deck teaches the Navy:

- The function of the command levels is not to give *ad hoc* direction to the team, but to define its tasks and to give the team the training, tools, information, and support needed to accomplish its tasks.
- For every sailor, officer and enlisted, the Navy must:
  - Define a reasonable scope of responsibility and authority
  - Provide training to do assigned tasks exceedingly well
  - Provide accurate information needed to do the tasks
  - Recognize the experts' authority and importance and reward their performance

Here endeth the lesson, but not the job—namely, becoming the next Navy. *Now* is the time to start. To that end, let us take a closer look at force structure and fleet organization.

## Force Structure

There are really three force structures to be examined: one for today, the second for tomorrow (the next Navy), the third for the day after tomorrow (the Navy-after-next). Since the world is changing far faster than it did at the deliberate pace of the recent past, all three structures must be considered simultaneously. The Navy does not have the luxury for sequential change through gentle stages at a measured pace. There is no time for that, because everything is happening all at once.

Today the United States boasts the best Industrial Age navy, one already in transition to a trans-industrial (or post-industrial, or information, or knowledge-age) navy. In the future, as in the present, the Navy must be able to thwart or defeat enemies and weapons of both the Industrial Age and its successor. Some countries will be converting from agricultural to industrial economies, as others move from industrial to trans-industrial economies. All countries will

* In a certain sense, the organization subordinates itself to its experts during edge-of-chaos operations.

change at different rates, and in some countries (such as China and India today), various parts of society may leapfrog over whole stages of development. Gradual, sequential change is out of the question for them, just as it is for the United States.

The extremely complex political-military environment will require some naval forces similar to those of the present, augmented by the ships and aircraft programmed for procurement over the next few years. That will be the composition of the next Navy, tomorrow's Navy. The nation needs it, but in and of itself the next Navy will be inadequate for the day after tomorrow. Buying large quantities of today's military tools to fight developing asymmetric threats is simply not feasible; America's defense budget cannot afford it. Moreover, how many additional aircraft carriers, nuclear submarines, stealth bombers and fighters, Super Hornets, main battle tanks, and Aegis cruisers will we need to counter people smuggling asymmetric weapons for use against the United States on its own territory? To counter terrorists and their methods? To counter advanced biological weapons in the hands of non-state enemies skilled in smuggling and terrorist techniques? Answer: more than the nation can afford.

The Navy's experience in fighting drug smuggling is instructive. One obvious lesson is that it is very expensive to use sophisticated and powerful Cold War–era combat systems against small and dispersed smuggling vehicles. Using battle groups (with operating costs of about half a million dollars per day—not counting the costs of capitalization, depreciation, and military personnel) to counter light planes and small boats is a bit rich. And the degree of success does not come close to justifying the cost. Cheaper and simpler systems in larger quantities often prove to be more effective as well as more economical.

As the threats and challenges change, and as capabilities for greater precision evolve, some economical and very unconventional naval forces can be developed—forces with higher orders of flexibility, agility, and global presence ability. They will be equipped with additional, and quite different, tools to fight the threats of the day after tomorrow. Such forces will be the nucleus of the Navy-after-next. That Navy cannot yet be exactly defined, but the stage for it can be set now.

It must be assumed that the Navy-after-next will be composed of ships, aircraft, and submarines (though perhaps not exclusively—who knows?). However, some speculation is useful, and a few simple observations are appropriate.

## Ships

Powerful Navy ships tend to be large and expensive (see sidebar), but they can become cheaper and simpler as the information age progresses. In the future—more so than today—the second stage of the weapon system will frequently be incorporated within the round. It will be less important to have heavy hulls that carry heavy, second-stage machines. With speed, range, and maneuverability increasingly engineered and built into the round, there will be diminished need for the same parameters in the combatant hull itself. Still, the total weapon system will be quicker, even though the launching platform may not be as fast and maneuverable as earlier platforms.

Advanced information technology and better information will enable much more accurate targeting and weapon guidance. Naval forces will not need as many pieces of ordnance to provide the requisite explosive power for target destruction. As well, magazine capacity for equivalent destructive power will decrease, and ammunition replenishment will drop in frequency. There will be a less critical requirement for replenishment ships to haul ammunition to the battle area, because the combatant ships will be carrying what they need for the fight. Indeed, transfer of munitions at sea is an inefficiency that the Navy—thanks to technology—will be able to reduce significantly or even avoid altogether.

Since the cost of weapon systems will be concentrated in the rounds, each hull will not only be relatively cheaper but also more lightly manned, requiring fewer people to maintain, operate, and protect a ship and its weapon systems. As components of a larger force dispersed over a wide area, such ships can be knit together into a tight, resilient network for offense and defense.* The ships will go into harm's way—there is no avoiding that—but the naval force's damage control "compartments" will be separated by miles of seawater while remaining mutually supportive. Of course, deploying such a force avoids the risk of presenting a few expensive, massive targets to WMD.

*None* of the foregoing is "pie in the sky." The "vision" can be engineered and built with today's technology (see sidebar).

As to the matter of size, tonnage is cheap in comparison with any other parameter. In fact, it can cost more to build a small ship than a large one, even if the combat systems of each are identical. *The critical measure of expense is life cycle cost*

* Computer-based communications already give the Navy the ability to communicate as efficiently and effectively between ships as within a single ship. Concentrating weaponry into one large ship no longer necessarily affords any greater ability to concentrate fires. Therefore there is no reason to accept the risk of putting most of the eggs into a few baskets, so to speak.

## Why Navy Ships Are Big

*There are many reasons why Navy ships are big, but a few merit special note. The considerations listed here apply to the whole gamut of warship types of the Industrial Age, from the Royal Navy's old sailing ships of the line to the most modern aircraft carriers and cruisers.*

Almost all combatant ships are the first stage of the various weapon systems found aboard them. That is, the ships are the platforms which carry the heavy machines that constitute the second stages of the weapon systems. The second stages—those which deliver the warhead to the target area—are guns or airplanes or missiles. Because these second-stage machines are usually big and bulky, the ship that carries them is itself necessarily big and bulky. And, generally speaking, bigger guns and bigger planes—hence bigger ships—have been needed to put more range into the second stage.

The direction and guidance of the weapon systems of the Industrial Age are imprecise relative to more modern weapons. Thus many pieces of ordnance (such as shells, bombs, missiles, mines, and torpedoes) are required to ensure target destruction. Moreover, ships expend imprecise ordnance rapidly when engaged in combat, and neither returning to port nor replenishing daily underway is desirable during hostilities. Thus, large magazines are required, and large magazines entail large ships. As well, large replenishment ships are required to carry more ammunition to the battle areas.

Ships must go deep into harm's way because most current weapons have limited range. Thus, ships require excellent speed, superior maneuverability, and elaborate damage control measures, including extensive compartmentation. All these add more size and weight to ships already large.

And cost: the propulsion power, maneuverability, and size are dearly paid for. Consequently, Industrial Age warships are built with as much combat capacity as possible.

In addition to making optimal use of ship size, concentrating weaponry into one large ship facilitates communications. For Industrial Age warships, intra-ship boatswain's pipes, bugles, sound-powered phones, and FM headsets are more reliable forms of communication than ship-to-ship signal flags, semaphore, flashing light, CW Morse, and UHF. If the same amount of firepower is distributed among many different ships, it is difficult to control. Put another way, given Industrial Age communications constraints, it is easier to concentrate fire from one Industrial Age ship than from many.

Of course, such ships require many people to maintain, operate, and protect them. Large ships, large crews. And large crews need more space for messing and berthing.

The tendency, then, is to make Industrial Age ships very large indeed and to load them with expensive, complex weapon systems and many people. These ships are formidable, deadly, big, and valuable.

*per unit of combat effectiveness.* If building a larger hull with no attendant decrease in combat effectiveness can reduce life cycle costs, the choice is obvious—build the larger ship. One possibility is to equip cheap commercial hulls (usually neither fast nor maneuverable) with modularized combat systems. In addition to economy, these could realize the advantage of disguise (denial of information through deception) while moving inconspicuously in the world's merchant traffic patterns.

## *Aircraft*

Like Navy ships, powerful Navy aircraft tend to be large, heavy, and expensive (see sidebar). They too can become smaller, lighter, and cheaper as the information age progresses. Some aircraft will not need human aircrews. Remotely piloted, they will also be remotely reprogrammed as required while in flight. Not all remotely piloted aircraft will need to be recovered; consequently, their airframes will not have to be as rugged as those that have to endure carrier landings. Precision* weapons will allow aircraft to destroy targets with fewer, smaller weapons. Smaller and fewer weapons mean smaller—hence less vulnerable—aircraft.

## *Submarines*

For the future, submarines must retain their traditional and most effective functions. However, the challenge for the submarine force will be to maintain stealth characteristics while simultaneously improving command and control connectivity.† Sea denial capabilities, long the "bread and butter" of the Silent Service, will be enhanced by the incorporation of new technologies. Revolutionary life-cycle cost advantages will also be realized when crew sizes decrease and when every facet of design, construction, operation, and maintenance reflects that a nuclear submarine will be used for no longer than the lifetime of its first—and only—nuclear reactor core.

§§§

* Precision is really only half of the equation: precision and *speed* are the winning combination in a weapon system. A phrase for the next century is "Quick and Exact."

† Bistatic targeting for submarine-launched precision weapons may avoid some of the knotty and vexing problems of subsurface-to-surface communications.

**Why Navy Aircraft Are Big**

Piloted aircraft must carry at least one human, as well as the fuel required to carry the human and weapons to the desired ranges. The human is needed to operate and guide the weapon systems during the second stage of weapon delivery—namely, the delivery by aircraft. Because most of today's weapons are rather "dumb" (with some weapons dumber than others), the human provides a means to reprogram them during delivery from the ship to the target.

The aircraft takes a tactically significant amount of time to move the weapon to the target. During that time, tactical conditions may change, necessitating rapid human intervention in weapon delivery. Thus the human in the decision loop: the aircrew selects from a set of targets and assigns weapons, while continuously evaluating the tactical environment—based on information obtained through onboard sensors and via radio nets that relay information from other databases (a cruiser's or a carrier's, for example)—and making necessary adjustments. By bringing human observation and analysis (and instinct) in communication with the weapons, the pilot adds flexibility and agility to the second stage of weapon delivery.

Navy aircraft are large also because they must carry many weapons. To conserve warfighting time by making fewer transits, many weapons are carried per sortie. Moreover, targets and combat conditions may change in transit, so sometimes it is necessary to carry different weapons on the same sortie.

Obviously, a human is needed to return the aircraft (which is a recoverable second stage of the weapon system) to the ship (the first stage of the weapon system). The physical laws of impulse and momentum dictate the use of large, extremely strong aircraft. There is no getting around the fact that combat aircraft must be able to endure repeated launches and recoveries and survive combat damage.

Ships, aircraft, and submarines are quite effective at projecting American power, but nothing projects American power quite as convincingly as an infantryman—well-trained, well-armed, determined, probably tired and impatient—looking someone in the eye and telling him what to do. Nothing! The Navy, of course, does not have combat troops as the Army and Marines do. However, it is part of the same joint military team that is developing into a much more tightly knit force. A major Navy mission is to bring that infantryman's power to bear, wherever it is needed, and to provide that trooper with absolutely reliable and effective support. As the cruising force of the Navy-after-next evolves, the Navy can embark platoons of combat troops on board each of its many, more lightly manned ships. The Navy-after-next will include ground forces in its wide range of distributed firepower, assembling them into larger concentrations as occasions demand.

## Fleet Organization

The Navy has an effective fleet, good enough to do most of today's jobs very well indeed. It was built and organized on a model that was painfully developed and has proven to be effective, by heroes who deserve the greatest respect. The Navy is rather comfortable with the model. It is an organization with which today's admirals grew up, which they understand well, and to which they are loyal. However, it is not the right model for the future, or for the jobs that may be assigned to the Navy the day after tomorrow. The Navy cannot continue to be organized on the basis of its warfare specialties.

If an automobile company were organized the way the Navy is, it would have a Department of Drill Presses, a Department of Stamping Machines, a Department of Paint Stations, a Department of Foundries, and so on, with a vice president in charge of each one. Departments would be responsible for all operations, maintenance, and training related to their equipment, wherever in the world it happened to be. Every manager and foreman in each department would have a lapel pin denoting rank (by color: gold for managers, silver for foremen) and department (by shape: drill press, stamping machine, paint station, etc.). The company would have Drill Press Associations, Stamping Associations, Paint Shop Associations, and Foundry Associations. Each tool association would have rank and representation in the corporate offices roughly comparable to the perceived importance of the tool and to the power of the tool's association.

In reality, healthy and successful manufacturing organizations—actually, most commercial organizations of any type—instead organize themselves by product (or service) and function. Usually they use a matrix organization of functions and products/services within each business unit. Corporate staffs execute tasks (e.g., marketing, legal) that are common or corporate only. Promotion to and representation within corporate ranks is dependent upon *results*: that is, upon how well the functions and products/services are managed and how the bottom line is affected.

Of course, automobiles and industrial equipment are not the Navy's products. Nor are ships, submarines, or aircraft. Rather, *the Navy's products are the warfare capabilities it develops and refines in order to win battles and execute missions at sea and from the sea.* The Navy's business units are Fleets, Battle Forces (defined below), and Task Forces. Its bottom line is defined not in dollars, but in what it costs to execute warfare missions and tasks—costs measured in terms of the warfare currencies of time, casualties, capital equipment, and supplies. The Navy's tools are ships, planes, and submarines rather than foundries and drill presses.

Yet despite differences in detail, the Navy's current organization *is* analogous to the fictional business model described above. That organization must change. The Navy cannot afford its current structure: past, present, and future cuts reduce that structure's viability. Undeniable fiscal realities demand the planning and design of a different model.

*Organizational structure is one of the obvious places in which to realize savings of time, money, and billets.* The Navy is presently too hierarchical and too fragmented to be quick. It has too many staffs and too many distributed functions to be efficient. The Navy *will* be quicker and more efficient if it is organized less by its tools and more by its products and services, functions, and business units. Its increased efficiency will reduce bottom-line costs.

> *DOD must reduce the overhead of numerous duplicative staffs in both its administrative and operational chains of command.*
>
> —Senator Sam Nunn
>
> *There is a lot of waste and duplication to be cut.*
>
> —Senator Charles Robb

What "end state" should the Navy seek? Given an environment of pervasive, rapid, and (probably) accelerating change, it is not possible—at best, it is imprudent—to define an end state for the Navy based on things—e.g., ships, aircraft, and weapons. The end state ought instead to be based on qualities—namely, unsurpassed (and unsurpassable) agility, flexibility, and quickness.

## *A Notional Organizational Structure for the Next Navy*

*In light of the foregoing considerations, this Newport Paper sets forth a notional structure for the next Navy,* a structure that improves the effectiveness of the Navy while realizing efficiencies that will be necessary in the future. The proposed organization, composed of an operational structure and a support structure (see Chart 1), is intended to meet efficiently the needs of the next Navy while it prepares to become the Navy-after-next.

Specifically, the primary objective of this reorganization is at least to maintain* quality in the "product line" (warfare capabilities) at current operational levels, while consolidating functions at the support levels. The reorganization is based on the following parameters:

* *At least* to maintain, not *only* to maintain. Improvement is always a goal.

**Chart 1**

| PRODUCTS | | FUNCTIONS: COMNAVUSA FUNCTIONAL COMMANDS | | | | | |
|---|---|---|---|---|---|---|---|
| | | Maintenance | Combat Support | Operations Support | Training and Doctrine | Fleet Submarine | Fleet Expeditionary |
| ♦ Sea Control<br>♦ Presence<br>♦ Power Projection<br>♦ Information Dominance<br>♦ Operations Other Than War | CINCLANTFLT$_{NEXT}$ | | | | | | |
| | 2ND FLT | | | | | | |
| | SOLANT | | | | | | |
| | 6TH FLT | | | | | | |
| | CINCPACFLT$_{NEXT}$ | | | | | | |
| | 3RD FLT | | | | | | |
| | 5TH FLT | | | | | | |
| | 7TH FLT | | | | | | |

Note: The products (warfare capabilities) are incorporated in the commands subordinate to CINCLANTFLT$_{next}$ and CINCPACFLT$_{next}$, each of which is a complete package of Navy warfare capabilities.

- Compliance with the law (Title 10 of the U.S. Code) in accordance with the intentions of Congress as specified in the Goldwater-Nichols Department of Defense Reorganization Act of 1986
- Distribution of functions and reduction of function duplication to realize savings in manpower and money
- A flattened structure to achieve speed and agility
- Decentralized decision making for maximum flexibility and quickness
- Increased regional presence to improve efficiency ashore and to increase involvement with civilian communities

Many models can be made to work, and any model can be made not to work (or, by its critics, made to *seem* unworkable). Most corporations that have tried various solutions to their own problems have failed in *implementation,* regardless of how accurate their diagnoses and prescriptions were. They simply could not stomach their own medicine. The real challenge facing the Navy is not so much to determine what its problems are and how to solve them, but to do what needs to be done.

The Navy is still in the diagnosis and prescription stage. Yet to come is the really tough part: taking its medicine. However difficult that task may be, it must be done, for to *do* nothing is to invite disaster, no matter how much is *said.*

## Notional Operational Structure

### *The Chain of Command*

"The National Command Authorities (NCA), consisting of the President and the Secretary of Defense, or their authorized alternates, exercise authority over the Armed Forces through the combatant commanders for those forces assigned to the combatant commands and through the Secretaries of the Military Departments and the Chiefs of the Services for those forces not assigned to the combatant commands."[4] Our concern here is with the operational chain of command, which flows from the NCA to the combatant commanders, also known as combatant commanders-in-chief (CINCs). Each CINC holds warfighting responsibility for a geographic area of the world and is directly responsible to the NCA for mission execution and readiness. A component commander from each of the armed forces serves each CINC.

In the next Navy, the naval component commanders for the CINCs are Commander-in-Chief, U.S. Atlantic Fleet ($CINCLANTFLT_{next}$) and Commander-in-Chief, U.S. Pacific Fleet ($CINCPACFLT_{next}$). Each has a broad geographic scope, but a narrow functional scope. The geographic scope of $CINCPACFLT_{next}$, with headquarters in Pearl Harbor, Hawaii, is roughly equivalent to that of the traditional CINCPACFLT. $CINCLANTFLT_{next}$, with headquarters currently in Naples, Italy, has a geographic scope roughly equivalent to the areas of responsibility traditionally assigned to CINCUSNAVEUR and CINCLANTFLT, combined. In this construct, PACOM and CENTCOM are serviced by $CINCPACFLT_{next}$; EUCOM and SOUTHCOM are serviced by $CINCLANTFLT_{next}$.

*These fleet commanders focus on joint warfare capabilities, the true products of the Navy.* The agile, responsive support structure of the next Navy—the notional Commander, Naval Forces in the United States (COMNAVUSA)—is responsible for supporting the fleet commanders across the full range of combat functions.

### *Operational Structure: Primary Staff Functions of the Navy Component Commander in Support of Serviced Combatant Commanders*

In support of the CINCs whom they service, $CINCLANTFLT_{next}$ and $CINCPACFLT_{next}$, as currently directed by CJCS:[5]

- Make recommendations for force employment
- Accomplish all operational missions assigned by the combatant CINCs

- Select and nominate specific Navy units for assignment to other subordinate joint forces
- Conduct joint training
- Inform combatant commanders of changes in logistic support that will significantly affect their planning and ability to execute their missions
- Develop program and budget requests that comply with the combatant commanders' guidance on warfare requirements and priorities
- Inform combatant commanders of program and budget decisions that may affect planning of joint operations
- Provide naval force data in support of joint operations and exercise plans

$CINCLANTFLT_{next}$ and $CINCPACFLT_{next}$ are also responsible for the following service-specific functions within each combatant command:

- Internal administration and discipline
- Training in Navy doctrine, tactics, and techniques
- Naval logistic functions
- Naval intelligence

Within their own commands the Navy component commanders are responsible for:

- The training and readiness of battle fleets and task groups
- Navy operational and battle planning
- Definition of Navy tactical warfare requirements

### *Operational Structure: Direct Subordinates of the Navy Component Commanders*

Directly subordinate to the Navy component commanders are the Numbered Fleet Commanders (NFCs)/Joint Force Commanders (JFCs). COMSOLANT, SECOND, and SIXTH Fleets are subordinate to $CINCLANTFLT_{next}$; THIRD, FIFTH, and SEVENTH Fleets are subordinate to $CINCPACFLT_{next}$. *Each NFC/JFC has **direct** liaison with the supporting functional commands under COMNAVUSA.*

Immediately below the numbered fleet level are the next Navy's six *battle forces,* with each battle force commander directly subordinate to a numbered fleet commander. Each battle force is built around a permanently assigned core of two aircraft carriers and two amphibious assault ships; other ships, aircraft, submarines, ground forces, and expeditionary units are assigned as appropriate. Like an NFC/JFC, *a battle force staff has **direct** liaison with the functional commands subordinate to COMNAVUSA.*

Each battle force is the primary nexus for the administration, training, and command and control of the combat units assigned to it. That is, there are in the next Navy six principal junctions where support and operations connect—namely, the six battle forces. In each battle force the shore support for ships, aircraft, and submarines converges with the operation of combat units on, above, or under the sea. In particular, a battle force is the point at which all single- and multi-unit underway training is tied together. The responsibility for training a given battle force and its units lies solely with the battle force commander and key subordinates in command. That is, the battle force commander, staff, and subordinate commanding officers—rather than several dispersed training commands afloat and ashore—coordinate, conduct, and evaluate single- and multi-unit training in accordance with fleet-wide guidance and standards established by the next Navy's Fleet Training and Doctrine Command (see page 42). The battle force is the point of crossover between the administrative and operational structures.

On a smaller scale, a *task force* is a subset of units drawn *ad hoc* from *within* a given battle force for assignment to an NFC/JFC. It is organized and trained to meet specific needs of a combatant CINC. At the direction of a CINC, specialized assets may be assigned to augment a task force. For example, a task force requiring a more robust surveillance capability could draw on SEAL teams, MPA, special mission submarines, UAV squadrons, etc.

Also directly under the Navy component commanders are forces with highly specialized missions. These forces, composed of units often found in relatively small numbers,* can be assigned as elements of task forces or as corps-level forces with specific missions.

Lastly, $\text{CINCLANTFLT}_{next}$ and $\text{CINCPACFLT}_{next}$ each have a Fleet Tactics and Planning Support Group. The Group trains task forces in joint warfare tactics (training in unit tactics falls under the purview of battle force commanders), and it supports an NFC/JFC in campaign (operational level) planning.

## Notional Support Structure

Commander, Naval Forces in the United States (COMNAVUSA) provides support in training, tactical development, personnel, maintenance, communications, intelligence, and logistics to the Navy component commanders, *worldwide.* COMNAVUSA is the provider of all forces to $\text{CINCLANTFLT}_{next}$ and

* For example: MPA, SeaBees, submarines, salvage units, replenishment ships, unique training assets.

CINCPACFLT$_{next}$ for operation by their subordinate commanders. Headquarters for COMNAVUSA is Norfolk, Virginia.

COMNAVUSA is a supporting structure whose very design aims at improving response times and reducing expenditures by consolidating common functions and eliminating redundant support billets. Commanders in the supporting structure have responsibility for fewer functions. However, their geographic scope is (world)wide while their functional scope is narrow.*

COMNAVUSA is an unequivocal, thoroughgoing shift away from the organizational structure of today's Navy. The shift is driven by the need for the next Navy to utilize the organizational schemes of successful modern businesses—schemes proven to work in the trans-industrial age. The Navy's current organization is built around platform stovepipes (air, surface, and subsurface), each one incorporating the primary functions of maintenance, training, logistics, and personnel management. That method of organization has been effective, but also *inefficient.*

The next Navy's organization realizes efficiency in a modern matrix scheme, in which the columns are *functions* (e.g., maintenance, training, personnel, logistics), and the rows are *warfare capabilities* (see Chart 1). One advantage that immediately results is a sharpening of command focus. COMNAVUSA focuses on effective accomplishment of functions necessary to enable and sustain naval warfare; CINCLANTFLT$_{next}$ and CINCPACFLT$_{next}$ focus on the operation and fighting of naval forces at sea. As the Navy component commanders for the combatant CINCs, they have control of all Navy operations, either directly or through their subordinate commanders. Subordinate NFCs are routinely assigned as joint force commanders or as the Navy component commanders of joint force commands.

Efficiency is also immediately achieved by an elimination of redundancy. Today's Navy has six major type commands, each one having its own maintenance organization, composed of experts and supporting personnel. *Without cutting the numbers of "value-added" maintenance experts,* the next Navy obtains the following benefits from the consolidation of redundant functions:

- Greater interaction between experts in the same functional field (efficient use of talent)
- Reduction of the number of supporting personnel required to serve the experts (efficient use of people)

Furthermore, the next Navy is more efficient by virtue of its improved, streamlined coordination among functions. The organizational structure of

* New information technologies enable this to be done. Learning the effective and efficient use of these technological advances is imperative.

today's Navy is seriously weak in its coordination of functions between platforms of different types: among its thick-walled stovepipes, functions are duplicated at great cost (in people and money) and with little or no inter-type coordination. That arrangement does not appropriately use the information technology of the current era, and it does not facilitate joint operation of the U.S. Armed Forces. The organization of the next Navy corrects those deficiencies. Since functions are not duplicated across platform types, many fewer staff personnel are required to coordinate special platform needs across functions. Coordination of functions for specific operational needs falls to the naval warfighting staffs.

As in today's Navy, in the modern matrix the Navy component commanders, $CINCLANTFLT_{next}$ and $CINCPACFLT_{next}$, represent the combatant CINCs to the Navy (and vice versa). Also in continuity with the current structure, the numbered fleet commanders may act as joint force commanders or as naval component commanders for JFCs. However, the NFCs currently have little impact on the functional support they receive, except through the traditional fleet CINCs (CINCLANTFLT and CINCPACFLT), often via the platform type commanders. In contrast, the next Navy's modern matrix provides flatter, better, and more efficient support of the NFC/JFC and the other naval operators.

### *Support Structure: COMNAVUSA Staff (Centralized Functions)*

Briefly, the COMNAVUSA staff functions are: Navy component commander for USACOM; battle technology innovation; comptroller; fleet warfare requirements; measuring and monitoring fleet readiness; public affairs; and legal services.*

COMNAVUSA will be the *Navy component commander for USACOM.* USACOM is a unified combatant command whose missions are to:

- Plan and execute operations within its area of responsibility
- Conduct joint training of assigned CONUS-based forces and JTF staffs
- Provide trained and ready joint forces to supported CINCs as directed by the National Command Authority

*COMNAVUSA remains the single* ***point of contact*** *for USACOM on all matters related to Navy component functions.* While retaining overall responsibility, it transfers the following operational functions of the USACOM Navy component

* A note on staff composition: the COMNAVUSA staff includes a Chief Operating Officer (civilian), but not a deputy commander. The Chief Operating Officer ensures the continuity of policy and management expertise that can be gained only through long-term, deep, accountable involvement.

**Whither USACOM?**

Over time, USACOM will probably evolve into a joint training and readiness command similar to that suggested in the Goldwater-Nichols Act of 1986. This concept was supported by General Colin Powell, CJCS; envisioned and ordered by Secretary of Defense Les Aspin in 1993; and approved by President Bill Clinton on September 29, 1993. Specifically, USACOM will probably develop into an organization that:

- Forms, trains, and provides joint task forces (or groups or elements) to the combatant CINCs or Joint Force Commanders, in response to the mission requirements of the other CINCs and the Secretary of Defense.
- Provides military support and assistance during natural disasters or civil disturbances in CONUS
- Plans for the land defense of CONUS
- Turns over responsibility for all nations, territories, and non-national seas in the current USACOM area of responsibility to other combatant CINCs
- Divests itself of NATO responsibilities as SACLANT

When the ocean areas currently assigned to USACOM pass to other combatant CINCs, COMNAVUSA will directly execute *all* Navy component functions for USACOM.

commander to $CINCLANTFLT_{next}$ and/or $CINCPACFLT_{next}$:

- Make recommendations for force employment
- Accomplish assigned operational missions
- Select and nominate specific Navy units for assignment to other subordinate joint forces
- Conduct joint training
- Inform USACOM of changes in logistic support that have significant effects on planning
- Provide force data in support of joint operation and exercise plans
- Conduct training in Navy doctrine, tactics, and techniques

COMNAVUSA directly executes the following service-specific functions within USACOM:

- Develop program and budget requests that comply with USACOM guidance on warfare requirements and priorities
- Inform USACOM of program and budget decisions that may affect planning of joint operations
- Provide internal administration and discipline
- Execute Navy logistic functions within the command
- Supervise Navy intelligence matters and activities

In the *battle technology innovation* area, the staff is under the direction of a senior civilian executive, and administers the Navy Science Assistance Program

(NSAP). COMNAVUSA staff is linked to the technical network of warfare centers; program executives; OPTEVFOR; private industry; Navy and other service laboratories; university laboratories; national laboratories; and foreign navies. The staff identifies fleet needs that may be met by the utilization of new technologies and—within the constraints of security requirements—communicates these needs to elements of the network. To be effective in this endeavor, COMNAVUSA staff must maintain awareness of promising new technological applications and concepts. (Given the explosive rate of technological development, that is a challenge.) Lastly, COMNAVUSA staff conducts and analyzes experiments for assessment of technical initiatives, and facilitates "fast track" integration of innovative technologies with new or modified doctrine, tactics, and techniques.

The COMNAVUSA *comptroller* provides resources directly to operating forces and to Naval Region Commanders* for the infrastructure within their responsibility. The comptroller also:

- Centralizes budgeting, and monitors and manages budget execution
- Works with operating forces to maximize readiness at the lowest possible financial costs
- Distributes accountability to decision levels
- Compiles and submits resource requirements to Financial Management Budget (FMB)

COMNAVUSA staff has overall responsibility for the definition and submission of *fleet warfare requirements.* It consolidates warfighting requirements from $\text{CINCLANTFLT}_{next}$ and $\text{CINCPACFLT}_{next}$, and combat support requirements from the functional commanders. COMNAVUSA then submits all fleet warfare requirements to the Navy budget and program authorities. As a Navy component commander, COMNAVUSA advises USACOM of Navy budget and program decisions affecting joint warfare requirements. Similarly, COMNAVUSA advises $\text{CINCLANTFLT}_{next}$ and $\text{CINCPACFLT}_{next}$ of those decisions affecting their own functions as Navy component commanders.

COMNAVUSA is the central authority for *measuring and monitoring fleet readiness*, setting standards and objectives in concert with serviced commands and organizations. The staff establishes measures; collects data into a single, widely accessible database; and provides expert feedback to managers of serviced commands and organizations. Attached to the staff is a neutral measurement and analysis group similar to NWAD Corona, incorporating skills and personnel found in organizations of inspectors general. COMNAVUSA uses

* These are notional entities whose functions are described below.

*non-financial* measures of combat readiness, combat efficiency, organizational efficiency, and organizational effectiveness.

Lastly, COMNAVUSA is in charge of fleet *public affairs* and *legal services.*

### Support Structure: Direct Subordinates of COMNAVUSA (Decentralized Functions)

Functional commanders in the next Navy's COMNAVUSA are analogous to the level of executive management often referred to as type commanders in today's Navy. Six executives, assigned as Echelon III commanders, execute the functions required to support forces afloat. Their commands are Fleet Training and Doctrine Command; Fleet Maintenance Command; Fleet Combat Support Command; Fleet Submarine Command; Fleet Expeditionary Command; and Fleet Operations Support Command. They are described in more detail below.*

*Fleet Training and Doctrine Command* (three stars, unrestricted line):

- Fleet Manpower Distribution Center
- Fleet Tactics and Doctrine Center (incorporates SWDG, SUBDEVRONs, VXs, NSAWC, and NAVDOC)
- Fleet Training Center (includes some fleet schools)
- Naval War College
- Fleet Chaplains Center

Fleet Tactics and Doctrine Center develops, formulates, and evaluates doctrine and tactics for naval platforms, units, battle forces, and task forces (see Appendix B). It maintains close working relationships with joint and unique service commands also focused on tactics and doctrine.

Fleet Training Center provides standards and measures for all fleet unit training, as well as measurement guidance and analysis to battle force commanders in support of unit and force training. The standards and measures focus on the tasks essential to the execution of Navy missions, and emphasize time as a measure of readiness (see page 62).

*Fleet Maintenance Command* (ships and aircraft; three stars, unrestricted line):

- Director, Maintenance Resources (senior civilian executive)
- Industrial Facilities Manager (two stars, restricted line)
- Director, Fleet Technical Support Center (one star, restricted line)
- Director, Maintenance and Modernization (one star, restricted line)

* N.B. Flattening is not necessarily related to rank—the Navy can have a flat organization with twice as many three-star admirals. Rather, flattening is related essentially to how many (or how few) wickets a decision must go through before action is taken. Put another way, the question to ask in assessing the flatness of an organization is "How convoluted is the path that a customer must take to get the needed product or service?"

- Maintenance Processes Manager (senior civilian executive)

Director, Maintenance Resources includes Budgets and Schedules; Human Resources and Maintenance Training; Business Measures and Analysis; Contracts; and Comptroller Linkage.

Industrial Facilities Manager includes Fleet Maintenance Facilities; Industrial Policy; Manufacturing; Repair; Technology; and Intermediate Maintenance.

Director, Fleet Technical Support Center includes Ship Systems; Combat Systems; Aviation Systems; C4I Systems; FTSC Detachments; Technical Library; and Platform Configuration Records.

Director, Maintenance and Modernization includes Regional Maintenance Centers; Surface and CV/CVN; Submarines; Aircraft; Craft and Boats; Components; and Maintenance Requirements.

Maintenance Processes Manager includes Quality Assurance; Work Documents; Job Control; and 3M.

*Fleet Combat Support Command* (three stars, unrestricted line; deputy is the director of Logistics Support):

- Logistics Support (two stars, Supply Corps)
- Strategic Lift (one-star, unrestricted line)
- Combat Engineering Support (two stars, Civil Engineer Corps)
- Health Affairs (one star, Medical, Dental, or Medical Service Corps)

Logistics Support includes FISC Operations, Plans, and Policy (there are six FISCs—Yokosuka, Pearl Harbor, Puget Sound, San Diego, Norfolk, Jacksonville); Acquisition; Fleet Inventory Management and Fuels Service; and Ordnance Management Service.

Strategic Lift includes Military Sealift Transportation Service (MSTS); Combat Logistics Force; and Cargo Handling Support Group.

Combat Engineering Support includes Navy Mobile Construction Battalions and Underwater Construction Teams.

Health Affairs includes Fleet Hospitals; Medical and Dental; Sanitation; and Mortuary Affairs.

*Fleet Submarine Command* (three stars, unrestricted line):

- Maritime Patrol Command (two stars, unrestricted line)
- Underwater Surveillance Center (one star, unrestricted line)
- Fleet Strategic Submarine Force (one star, unrestricted line; worldwide operations)
- Fleet Submarine Force (two stars, unrestricted line; worldwide operations)

*Fleet Expeditionary Command* (two stars, unrestricted line):

- Mine Warfare Command (one star, unrestricted line)
- Navy Special Warfare Command (one star, restricted line)
- Fleet Special Operations and Construction Command (one star, line or staff; CBs, EOD, ACUs, MDSU, etc.)

*Fleet Operations Support Command* (two stars, unrestricted or restricted line; Commander double-hatted as the Fleet Information Officer):

- Fleet Network Services
- Fleet Information Services
- Fleet Information Warfare Centers

Fleet Network Services is responsible for ship-to-ship and ship-to-shore connectivity, and for LAN and WAN operations.

Fleet Information Services includes Intelligence Service; Cryptography Service; and Database Maintenance.

In addition to the six functional commanders there are eight Naval Region Commanders (two stars, unrestricted line) subordinate to COMNAVUSA. They maintain close ties to civilian communities and Federal Executive Boards. To the extent feasible, the Naval Region Commanders consolidate all common functions of tenant commands in a given area.* Such functions include administration; public safety; fuel; food services; child care; personnel support; brig; rolling stock; public affairs; legal services; medical/dental; environmental health and safety; building maintenance; public works; utilities; housing; construction; and recreation. The Naval Regions are:

- Naval Region Washington, D.C.
- Naval Region Northeast
  - Federal Regions 1 and 2 (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey)
  - Europe and Africa
- Naval Region Mid-Atlantic
  - Federal Regions 3 and 5 (Delaware, Pennsylvania, Maryland, Virginia, West Virginia, Ohio, Indiana, Michigan, Illinois, Wisconsin, Minnesota)
  - Canada
- Naval Region Southeast

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* One way for Naval Region Commanders to consolidate functions is to make the commanding officers of major commands within the regions perform additional duties as functional managers. Functional management thus goes to subordinate commanders, not to the staff of the Naval Region Commander. This method of consolidation has the merit of broadening a commander's geographic perspective with a functional perspective that encompasses an entire region and crosses warfare community lines. The Naval Region Commander arbitrates disputes among functional managers in a region, but is not routinely involved in functional management.

  - Federal Region 4 (North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky)
  - South America, Puerto Rico, Caribbean
- Naval Region Midwest
  - Federal Regions 6 and 7 (Louisiana, Texas, New Mexico, Oklahoma, Arkansas, Missouri, Kansas, Nebraska, Iowa)
  - Central America
- Naval Region Southwest
  - Federal Region 9 (California, Arizona, Nevada; not Hawaii)
  - South Asia
- Naval Region Northwest
  - Federal Regions 8 and 10 (Washington, Alaska, Oregon, Idaho, Utah, Colorado, Wyoming, Montana, North Dakota, South Dakota)
  - Northeast Asia
- Naval Region Pacific
  - Hawaii
  - Guam, Central Pacific, Southwest Pacific, Southeast Asia

## Warfare Community Representation and Leadership in the Next Navy

Airplanes, missiles, submarines, ships, and boats are *tools* with which the Navy's products—*warfare capabilities*—are built. *The next Navy* is *organized on the basis of functions and products*, not tools. Functional commanders command the combat support structure, and joint force commanders (who are often numbered fleet commanders) apply the naval warfare capabilities required by the combatant CINCs.

Senior submarine, surface, air, amphibious, and mine warfare specialists are designated the "champions" of their respective warfare communities. However, three-star community representation and leadership is discontinued, just as three-star program sponsors were downgraded on the staff of the Chief of Naval Operations in 1993. The Navy no longer needs community representation and leadership at the headquarters level—just as industrial firms no longer need drill press, foundry, and welding machine community representation and leadership at the corporate level.

Nevertheless, in the next Navy, significant warfare community representation continues at the headquarters level in the office of the Deputy Chief of Naval Operations for Resources, Warfare Requirements, and Assessments (N8, OPNAV). By

virtue of its focus on program sponsorship, N8 is charged with planning for future technologies and programs within the "toolkits" of the warfare communities.

The numbered fleets have air, surface, submarine, and amphibious warfare specialties represented by staff warfare specialists. These staff experts submit inputs to $CINCLANTFLT_{next}$ and $CINCPACFLT_{next}$ (via the NFCs) on near-term warfare requirements. Staff warfare specialists also link with the functional structure and influence it through their expertise.

The six battle force commanders have staff elements and subordinate flag officers with warfare specialty foci. Each submits inputs on requirements definition and program administration directly to an NFC.

Most of the fleet schools will maintain a community focus.

§§§

The bottom line: warfare community representation and leadership are reduced in the next Navy. Now is the time to do this. It is a notion whose time has come—*again*. Decades ago, Navy leadership had all flag officers remove their badges of community identification at the time of promotion to flag rank. The wisdom behind that action must once again prevail as the Navy steps forward into the era of genuine joint warfare effectiveness.

Some excellent Sailors may be unable to make this adjustment. Over the years they have developed an intense loyalty to the tools of their trade, often at the expense of higher loyalty to the Navy. It is time to help them find remunerative employment in follow-on careers. They should be rewarded handsomely for their years of good and faithful service. (The reader should understand that not an ounce of sarcasm is intended here.) They have followed their leaders, have served the Navy and the nation well, and have made many sacrifices. The Navy and the nation owe them a tremendous debt of gratitude.

# *Part Three*

… and *how* to do it.

# Getting from Here to There: The Most Difficult Part

*And, of course, the toughest part of the equation is how we get from here to there.*
—Senator Charles Robb

*One may know how to conquer without being able to do it.*
—Sun Tzu

CHANGING AN ORGANIZATION as large and complex as the Navy is a challenging undertaking. No one person and no one staff can know or resolve all the issues and details. What is more, not even all the Sailors and all the staffs can know all of the issues and details before change begins. Nonetheless, a destination, a goal, or a port to steer for is required; this Newport Paper seeks to define that goal. Once the goal is defined, action can—must—begin.

The Navy must be willing to sail in these new seas, to leave the comforts of old, familiar shores and cruise into the unknown. It must make all preparations for getting underway. Then it must weigh anchor and depart the anchorage, being careful to keep the anchor at short stay in case something goes wrong. The following are the steps the Navy should start taking now.

- Single up all type commanders, focusing them on unit-type training, tactics, and safety. The six type commanders become three:
  - COMNAVSURFOR—Commander, Naval Surface Force, Norfolk, Virginia

- COMNAVAIRFOR—Commander, Naval Air Force, San Diego, California
- COMSUBFOR—Commander, Submarine Force, Norfolk, Virginia.

During the period of transition, each type commander takes the former geographic counterpart as deputy (e.g., COMNAVSURFPAC becomes Deputy, COMNAVSURFOR).

- Shift to a battle force structure
- Move all fleet maintenance to a single Fleet Maintenance Command
- Move all fleet supply, inventory management, and ordnance management to a single Fleet Combat Support Command
- Establish the naval regions as described herein

When the Navy is well clear of the anchorage and in the channel, it must get some way on, leave the harbor, and steer for sea. At that point it should:

- Institute $\text{CINCPACFLT}_{next}$, $\text{CINCLANTFLT}_{next}$, and COMNAVUSA as described herein
- Eliminate type commands and shift to functional commands as described herein
- Focus the fleet inspectors general on non-financial standards, measures, analysis, and management assistance in support of training and readiness

§§§

Each of the commands and staffs involved in any of the changes recommended is laden with highly educated and thoroughly experienced talent. This talent must be channeled as necessary to *lead* the entire Navy and the broader joint structure into the twenty-first century. Change can be implemented only through leadership that is effective, even (at times) inspiring.

The voyage the Navy faces now is different from any other that it has taken. To ensure the Navy successfully navigates and dominates the new seas it sails, Navy leadership needs some new tools and weapons, and the understanding to use them competently. Specifically, these are:

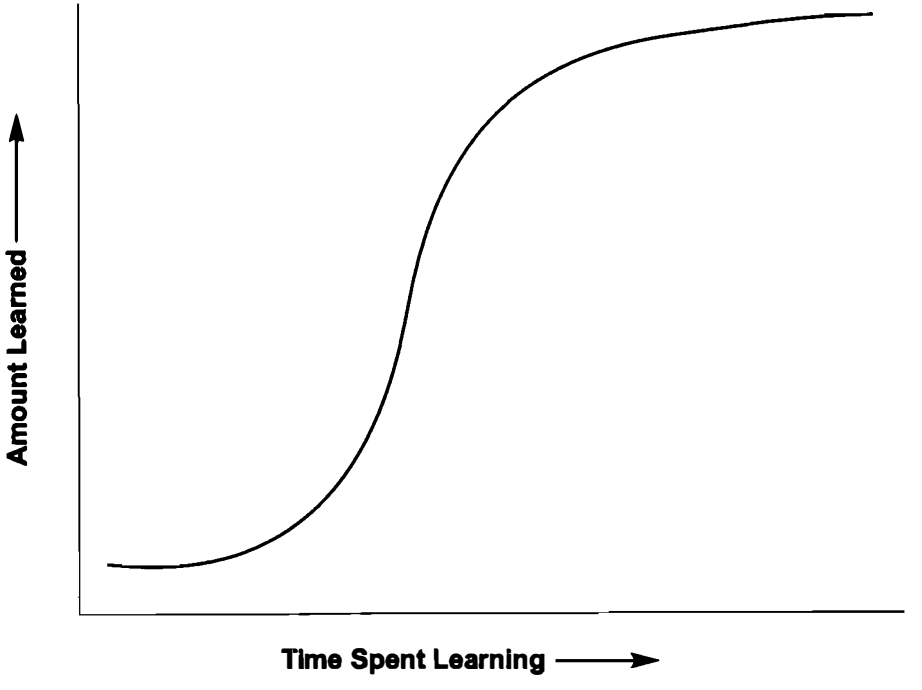
- Organizational quickness
- A focus on time as a measure of readiness, effectiveness, and efficiency
- A refined, streamlined requirements process

## Get Quick

*All Organizations Should Give Primary Emphasis To Developing Quickness.**

The reader is probably familiar with an object called "the learning curve," the S-shaped curve that shows how the rate at which one learns something varies with time. The learning rate starts slowly; gradually and then more rapidly increases; and finally tapers off to something very close to the initial learning rate. Plotting "Amount Learned" on the vertical, and "Time Spent Learning" on the horizontal, a typical curve looks like this (see Figure 1).

**Figure 1: The Learning Curve**



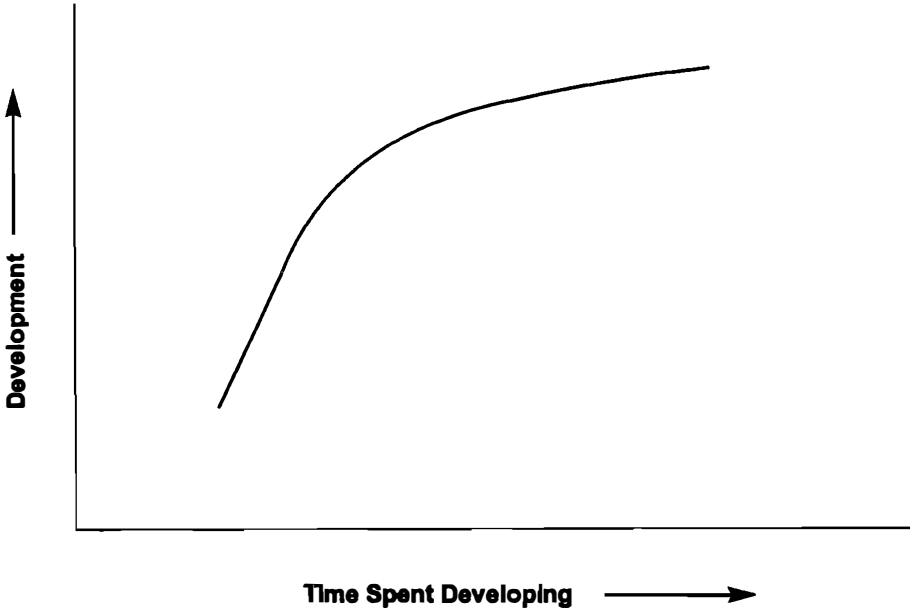

The learning curve describes the rate at which people learn calculus, for example. Initially baffling, or at least tedious, it soon starts to become clear. Then they rapidly absorb differentiation, integration, partial differentials, and multiple

* In the context of this paper, '*quickness*' implies the ability of an organization or person to adapt itself rapidly and agilely to a changing environment. This section uses the S-curve to demonstrate *why* the Navy must become a quicker organization by decreasing its decision cycle times. Read patiently and carefully, and the point—GET QUICK—will be clear.

integrals. However, learning may slow down a bit when they hit vector calculus, multivariable analysis, Bessel functions, and Gudermanian functions in hyperbolic trigonometry.

Similar S-curves are used to describe phase transitions in the natural sciences and in the development of business organizations (from entrepreneurial beginnings, through rapid expansion, to maturity).* The S-curve applies also to the development of societies. It shows how societies evolve during what is called a "paradigm shift" (in one parlance) or a "phase shift" (in another). The Renaissance was such a shift, as was the Industrial Revolution. For example, an S-curve can be used to describe the rates at which industrial society developed during the Industrial Revolution: initially changing very slowly, then very rapidly, and then very slowly again. Modern industrialized societies are now at the far right side (the flatter portion) of the curve. That portion of the curve looks like this (see Figure 2).

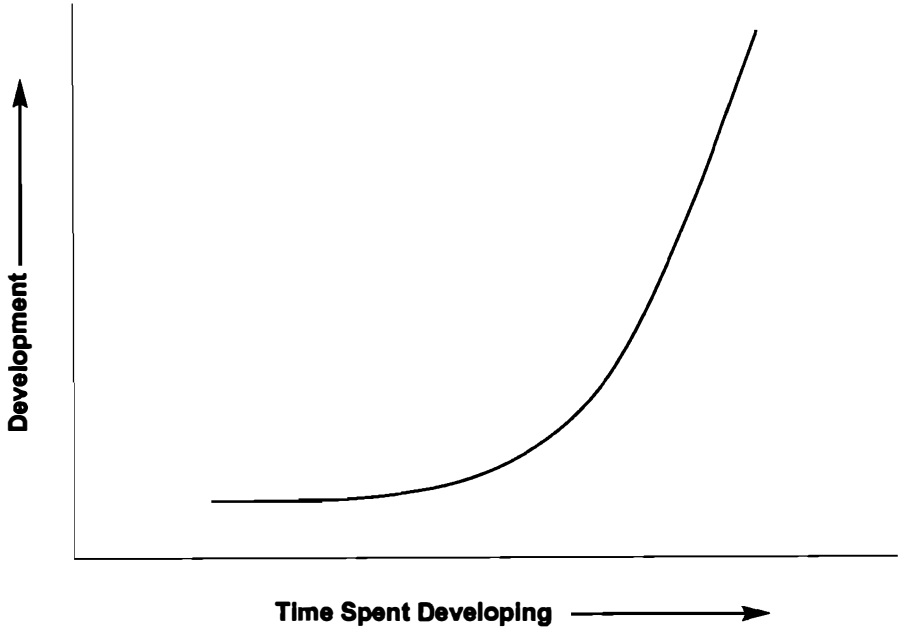
**Figure 2**




* In 1981, Jonas Salk used an S-curve to describe the evolution, growth, and development of living systems. He claimed that the S-curve applied not only to biological systems, but also to social systems. Although Salk's claim was accepted by some, it was criticized by others. Nevertheless, over the next decade the S-curve concept was successfully applied by some authors and consultants to management theory and technological innovation. In the development of complexity theory, biotechnologists, economists, chemists, and physicists have used S-curves to describe phase transitions of coevolving social and technological structures.

An S-curve also describes how human society is developing during the current trans-industrial revolution. In this case, the world is now on the left side of the curve and—as this writer and many others believe—just entering the steep slope portion. That means that the portion of the curve relevant to this period looks something like this (see Figure 3).

**Figure 3**



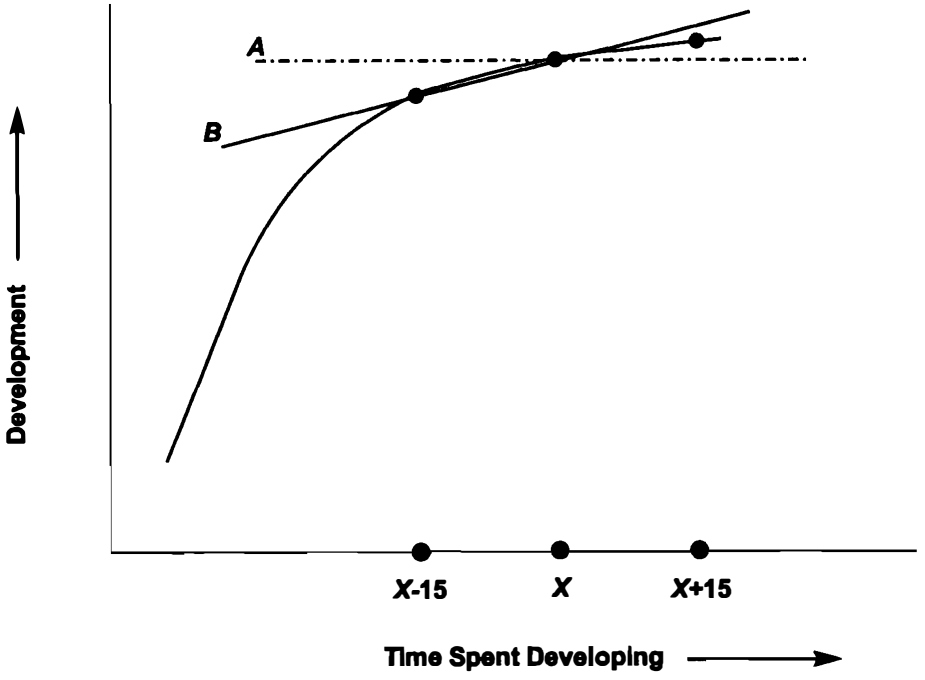

Of course, there is no way of knowing, without the wisdom of hindsight, what the exact shape of the curve really is or where the trans-industrial world is located on it.* However, if the above assessment of the trans-industrial period is close to correct, then organizations today face a very different problem on the steep portion of the trans-industrial curve than they did in the flattened, right-hand portion of the industrialization curve.

To make this point clearer, consider portions of the curve more closely and with a more analytical eye, starting with the mature end of the industrialization curve.

* The writer suspects that the steep portion of the trans-industrial S-curve, because of the very rapid rate of change in this era, will be much steeper than the analogous portion of the industrialization S-curve. But that opinion need not be argued for this discussion.

Referring to Figure 4, suppose the Navy is at time $x$ and wants to define how it must develop to execute its missions—and thus survive and prosper—fifteen years from now, at time $x+15$. (This assumes it takes about fifteen years to reorient the Navy completely.)

**Figure 4**




Line *A* represents the *extension of the present* as a flat line into the future. It is the projection commonly used by people who, for one reason or another, do not want to acknowledge change.

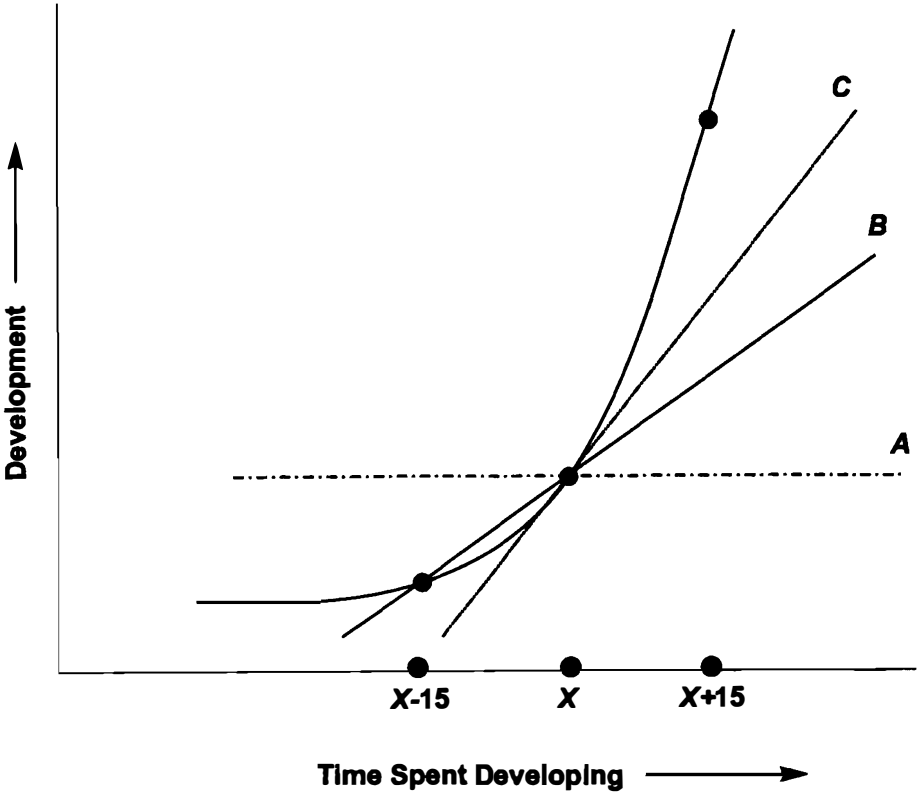
Line *B* represents a projection from an *understanding of the past.* It looks back at how things were (the time interval depends on how good the line-drawer's sense of history is), and extends from that point through the present. This is the approach that uses "the voice of experience." In the Navy's case, this is the voice of admirals supported by experienced staff officers and civil servants.

Note that at time $x+15$, the lines come somewhat close together in this section of the curve (the mature portion of the industrialization curve, where the

nation's institutions—including the Navy—and its citizens grew up). In fact, at $x+15$ the "no change" line *A* is below the curve by about the same amount that the "voice of experience" line *B* is above it. Regarding future needs, then, this means that in a world of political discussion and compromise, in a time of adequate resources, the development agreed upon is probably very close to what will actually be needed at year $x+15$.

Now consider the beginning portion of the new S-curve. *This is the trans-industrial section*—the part of the curve that applies to the current era. Again, suppose the Navy is at time $x$, and it wants to define how it must develop to execute its missions (and thus survive and prosper) at time $x+15$, fifteen years into the future (see Figure 5).

**Figure 5**




Line *A* again represents the *extension of the present* as a flat line into the future. At time $x+15$ this line is furthest from the curve; that is, *A* illustrates what is

probably the most unrealistic approach in the definition of future needs. However, because the nation has been in the flat, later portion of the *industrialization* curve (the one it has grown to know and love), there is a tendency among some to continue to use this approach, especially since it seemed to work reasonably well in the past (see Figure 4).

Line *B* again represents a projection from an *understanding of the past.* It looks back at how things were (how far back depends on how good the line-drawer's sense of history is), and draws from that point through the present. As the "voice of experience" approach, it is more realistic than line *A*, but it still misses the curves in Figures 4 and 5 at time $x+15$. In the mature industrial curve (Figure 4), *B* misses the actual curve (reality) on the high side—which is what American society and the Congress have for years been trying to tell the Navy. However—and this is very significant—in the young trans-industrial curve (Figure 5), *B* misses the actual curve on the *low* side. That is, the "voice of experience" approach now undershoots reality.

Line *C* represents a projection from an *understanding of the present.* This line is tangent to the curve at time $x$, and is what the approach of the "futurists"* really is. *C* is a more realistic approach than *A* or *B*, *if* the line is accurately drawn. However, since not all "futurists" draw line *C* in exactly the same way, how is the Navy to know which one has drawn it correctly? It is exceedingly difficult for an institution deeply rooted in the past to understand perfectly the realities of the present.

Note that in the young trans-industrial curve—the one the Navy dimly perceives and does not yet understand—all lines badly undershoot the curve at time $x+15$. No prediction comes close enough to future reality to make the Navy feel comfortable about the way it will be going.

What can the Navy do? One imperative is apparent: shorten the interval between time $x$ and the targeted future by quickening the Navy's organizational perceptions and reactions. The Navy can then more accurately predict and define, and more effectively meet, the requirements of the future time.

For example, suppose the time interval for reorienting a Navy is three years, not fifteen.† Even a succession of five iterations of the worst predictor (line *A*,

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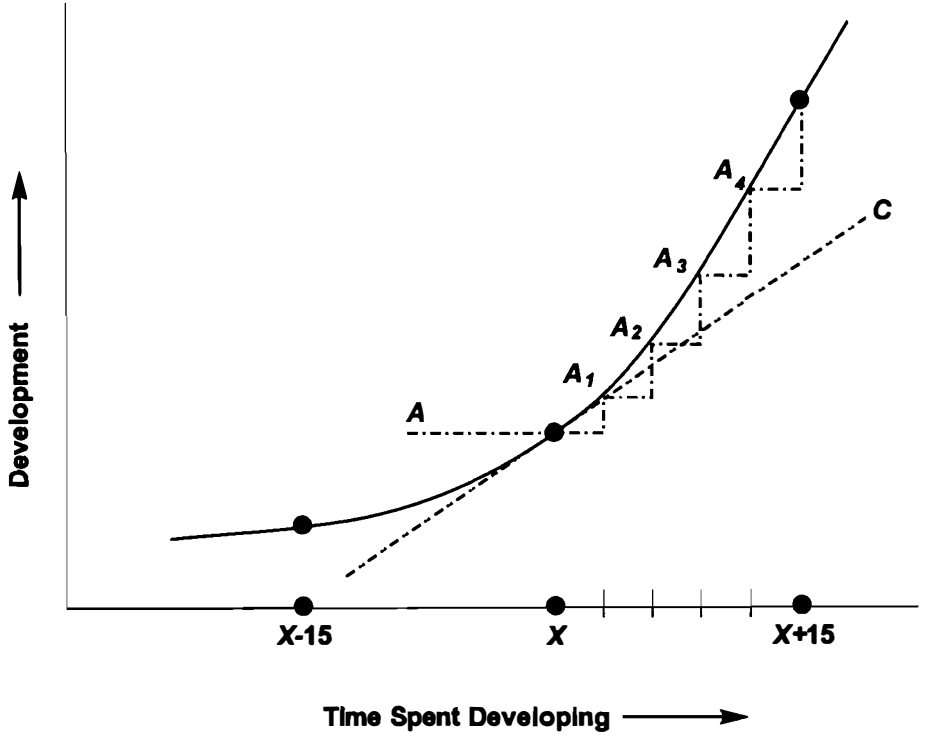
* They would more appropriately be called "presentists," because they are extending the line tangent to the *present* into the future. Some critics cynically discount the value of what futurists do. However, it is far better to look ahead, try to form some vision of future conditions, and be ready to adjust quickly to new realities than to divert one's glance from the future and focus myopically on the present. One's vision of the future can be refined or revised in response to change. The process of anticipation and revision is ceaseless, and any good watch stander knows and practices it.

† A notion preposterous to minds still comfortably anchored on the mature portion of the industrialization learning curve.

the flat line projection), incorporating corrections every three years, gives at $x$+15 a result better than that of the best (*C*) of the lines in Figure 5, projected over the fifteen-year period as a whole (see Figure 6).

**Figure 6**




The moral of this story is that the Navy's crystal balls, carefully polished over many decades and carefully tuned to the old S-curve, are full of fog in the new era. The Navy cannot see far enough down the road it is now taking. The rate of change is outstripping the Navy's ability to illuminate the way. That is why the Navy—indeed, any organization—that wishes to survive and prosper in the future must give primary emphasis to developing quickness.

Survival of the fittest is survival of the fleetest.

**Integrating New Technology into the Fleet**

There are three major parts in the process of integrating new technology into the fleet:

- *Research and development.* Identifies promising technologies and develops applications of them to naval warfare.
- *Contracting, acquisition, and installation.* (For the purposes of this discussion, includes associated logistics, maintenance, and maintenance-related training). Produces the developed and tested applications and sees that they are properly installed and supported in the fleet.
- *Tactical integration of the new application into naval warfare.*

This process is too slow to accommodate rapidly evolving technologies. It takes years where it should take months (e.g., the "accelerated" Cooperative Engagement Capability was conceptualized over ten years ago, and it is just now being integrated tactically). It takes decades where it should take years (e.g., it took twenty years to move Aegis into the fleet, and then a few more years for the fleet to understand how to use that system at its full capacity).

Much mighty labor and many long hours are required to make the process move faster for exceptional projects—drawing effort from the routine projects, which then slow even more. Not surprisingly, many people ardently seek to establish their own projects as "exceptional" (even those that are really routine), in order to make some progress. Result: the whole process clogs and slows down. Fingers point, people shout, and everyone works harder, but all are unable to make the process work as well as they know it must—today, but especially tomorrow.

Who is at fault? *No one.* The *system* is at fault. It was a great system, painfully developed through much hard work by skilled and dedicated people. However, it is now an analog, series-connected, highly ordered system in a digital, parallel-connected, disorderly world. The Navy pays high salaries to some people to maintain the system, to others to make it work, and to still others to subvert it. What the Navy really needs to do is *fix* it.

## Focus on Time

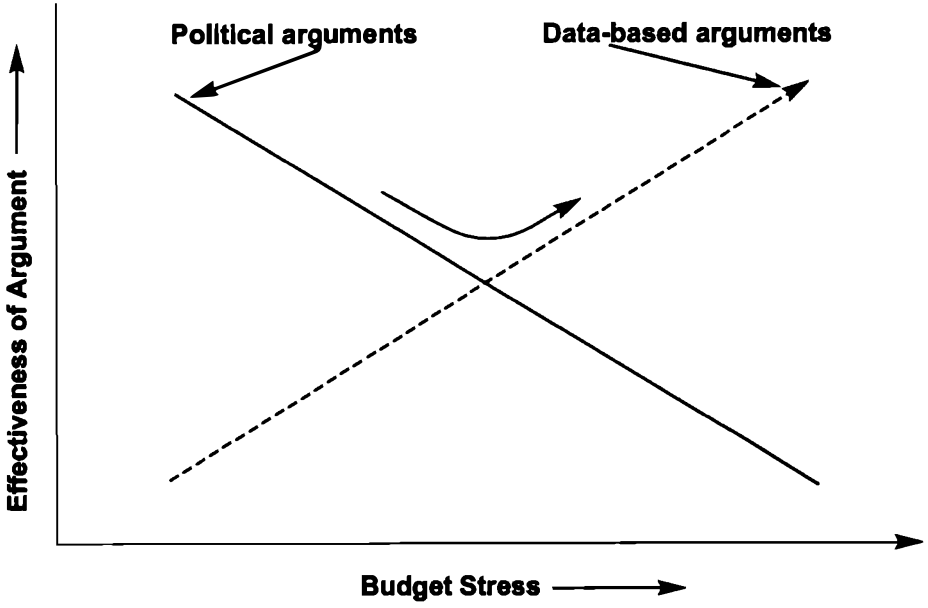
As discussed previously, **data*** is the lever needed to move the Navy from the Industrial Age to the trans-industrial age, from the mature section of the old learning curve to the young section of the new learning curve. The trans-industrial system, which is based on rapidly applying rapidly developing new

* Again, not merely questionable numbers, gathered as needed to decorate political arguments, but credible, accurate, and meaningful measurements related to issues of current import. Of course, data is a necessary but insufficient tool: it must be used in conjunction with the fulcrum of mission-essential tasks and the wisdom to use the data effectively.

technologies, is focused on effectiveness and speed ("cycle time") of development and application. At the same time, institutions of the old, industrial system find themselves in economic trouble and therefore pay increasing attention to efficiency as budgetary stresses and strains become intolerable.

By addressing the growing need for efficiency, the Navy thus has an excellent opportunity, *now*, to move itself into the trans-industrial age. To make its case in these times of ever greater budget stress, the Navy has to overcome political arguments (rooted in the old system) with data-based arguments. "X marks the spot" at which data-based arguments will be more effective than political arguments, and the Navy is near (or past) that spot (see Figure 7).

**Figure 7**




The trouble is that the Navy cannot use data-based arguments unless it has data, something which it sorely needs. To marshal its arguments, the Navy must emphasize *time* as the scarce resource and gather data on where time is being invested. Think on the following.

As the world moves into the trans-industrial age, time is becoming an extremely scarce and precious resource. But just a little careful observation reveals the fact that time is seldom thought of that way. It is poorly accounted for, and it is assumed to be always available. Almost no one has more of it than anyone else

does, and it is very difficult to buy more. Indeed, it is the one irreplaceable resource, especially in combat.

The proverb rings true: time *is* money—lots of money. Today's largest monetary expenses are in wages and salary. For example, fewer workers are required on shop floors; however, more (and better-paid) workers are required in the software and support activities that reduce the need for shop-floor workers, while improving the quality of shop output. As demand for "knowledge workers" increases, they become more expensive, and their time becomes more valuable. The same considerations, with minor changes of detail, hold true for the Department of Defense and for the Navy.

Efficiency, then, is absolutely critical. In general terms, efficiency means obtaining more useful output for a unit of input. In more specific terms relevant to the present era, efficiency means getting more useful output (increasingly thought of in terms of useful *knowledge*) from each unit of *time* which has been purchased from expert knowledge workers.

Thus the quantity "time" is a scarce resource in two ways:

- Accelerating rates of technological development drastically reduce cycle time (elapsed clock and calendar time), making it much more critical.
- The time of the knowledge worker is expensive. Scarce money means scarce time.

Although time is money, in the trans-industrial age time is increasingly a resource more critical than money. Money is becoming a mere abstraction for time, so that giving up time to save money is not much more than making a bad bargain. For the Navy, becoming quicker (while keeping "quality" at least at current levels) means getting more for its money.

More what? More output—more *useful* output, that is. Output is useful if it helps the Navy to reach its objectives and to execute its missions. If not useful, the output is at best irrelevant, at worst harmful.

## *Mission Accomplishment*

To review: the task at hand is to lever the Navy from the Industrial Age to the trans-industrial age, using data-based arguments to increase the efficiency and quickness with which it accomplishes its missions. The task involves seven steps.*

* Although the following discussion refers to the highest command levels, it should be noted that these seven steps can be done at *all* command levels, with appropriate adaptations.

1. *State the missions and objectives of the Navy.* This is a necessary action, but not a sufficient one. That is: it is vital to state the mission, but it is likewise vital to plan the execution of the mission.*

2. *Reexamine the missions of the Navy and restate them* ***in operational terms***. This involves defining how the Navy would go about executing its missions and achieving its objectives. No matter how the missions are restated, it is necessary that the operational statements include *time standards.* For example, suppose the mission is "take Lilliputian Island by 15 June"; the plan of action is the campaign plan (time-phased actions and support). If the mission cannot be stated with such precision, it can be stated in more general terms; e.g., "take a defended mountainous island in the Sea of Lopez within six weeks of initial action." The campaign plan can likewise be expressed in general terms.

3. *Develop detailed process flow charts for each mission and for each task of each mission.* Again, time standards are essential and must be specified for the completion of every task on the charts.†

4. *Determine the probability that each task will be done as planned.* To calculate a number reflecting the probability‡ that an objective or mission will be accomplished to a specified standard within a specified period, each detailed flow chart must be set up as a probabilities equation. For each step (task) in the equation, the probability of achieving the standard for that step, within the time allowed, must be determined. Time data relevant to a step can come from historical records, direct observation, automatic measurement, expert estimates, simulations, or models. The only requirement is that the time data be as accurate as possible—the quality of the data can be continually refined. The important thing is to get started.

5. *Improve the likelihood that every process will achieve its objective within the required time standards.* Experts who fully understand a process or sub-process

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* Some years ago, many organizations spent a great deal of effort on the idea of "vision"—namely, the vision of an organization, and how that vision is to be defined. This was an expression of the intuitively (but dimly) perceived need to base effort and expenditures on missions and objectives. The discussions associated with developing vision statements were usually quite accurate and inspired. However, most of the resulting vision statements were flawed: the problem was that they were not operational. They used impressive words and were posted in elegant formats, but the vision statements had little real impact because they had no operational plans of action and milestones for accomplishing whatever missions were envisioned.

† In the mid-1990s there was considerable interest in "process mapping" as a step in "Business Process Reengineering." And even before reengineering came into vogue, flow-charting was one of the major tools of Total Quality Management. Both process mapping and flow-charting were central to efforts made at gaining real knowledge of the processes by which a mission or objective is accomplished. The goal was admirable, the tools excellent, but the efforts generally failed. The problem was misapplication (actually, incomplete application) of the tools: process mapping and flow-charting were usually not integrated into a plan of action related to an operational statement of the mission.

‡ The calculated number will not express the actual probability. It will, however, reflect the probability; thus, increasing the calculated number will in fact also increase the actual probability.

examine it closely and improve it. Those who are experts* at each step (or subprocess) in a process examine that step to see if it can be accomplished quicker, cheaper, and/or easier, while at least maintaining quality at current levels.

6. *Use time as a key measure of readiness.* Specifically, use steps 4 and 5 to improve the probability of timely execution of each task and to improve continually the readiness of a unit to execute each task *quickly.*

In view of the paramount importance of time, it is wise to measure readiness in terms of time. In any dynamic, developing environment—especially in a combat environment—speed and quickness have an impact and quality all their own. For a Navy unit, readiness consists not only in being able simply to meet a standard, but also in being able to meet it *as quickly as possible.* In fact, the speed with which a standard is met can be more critical than the degree to which it is met.

> *In small operations, as in large, speed is the essential element of success.*
> —General George S. Patton, Jr.
>
> *Speed is the essence of war.*
> —Sun Tzu

Each task in the Universal Naval Task List (UNTL) is either already measured in terms of time or *can* be measured in terms of time. Time measures are relatively easy to establish and understand. They can be highly accurate and credible, and are clearly meaningful to both combat operations and support.

7. *Conduct an investment analysis to determine where the Navy should put its effort and money to improve the probable effectiveness and the efficiency of each process.* To improve everything in a process at one time is usually impractical and unaffordable as well as unwise. Thus, for the improvement of a given process, the key is to find the best place to put money and effort. A sensitivity analysis on the probabilities equation associated with a process does just that: it identifies the terms that have the greatest impact on the result of the process. After it is determined how much must be invested in each step to have the same degree of impact on the result, the money and effort are spent where they will have the most impact.

## *Support*

A focus on time is also crucial in the management of all supporting activities, including purely administrative tasks. The steps to realize gains in efficiency are simple—but likely difficult, initially†—and are greatly facilitated by available methods of data collection, processing, and analysis.

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* The experts are most often those who do the process.

† Initially difficult, because different. In organizations a different task is initially a difficult task, no matter how simple it really is.

First, each support organization must *institutionalize a method that continuously records and analyzes man-hour expenditures by individual, function, product or service, and customer or objective.* Ceaselessly monitoring the trend lines in every process will flag problems; track costs; assist planning; and provide fresh, meaningful information necessary for improving efficiency.

Then support staffs must *lead and manage to reduce time costs constantly.* The Navy's competitors are always improving; new applications of technology pose new challenges; and competitive cycle times are inexorably shrinking. Incessant change brings with it an unending train of challenges and opportunities, necessitating continuous improvement in the Navy's deliverables, as well as steady reduction of its costs. *Process analysis to improve efficiency must be a* ***continuous*** *effort, not a one-shot affair.*

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> *A good solution applied with vigor* ***now*** *is better than a perfect solution ten minutes later.*
>
> —General George S. Patton, Jr.

There is no single recipe for implementing a focus on time. All Navy leaders can develop workable, data-based methods for their own organizations. Whatever the specific method, the important thing is to *focus on time* in every command, department, division, work center, and office. The time to begin is *Now.* The techniques that are devised can be refined or redesigned with experience.

## Refine the Requirements Process

### *Problems*

The requirements process today barely works; it stumbles along, hobbled by many problems. First, there is inadequate vision on which to base the definition of warfare requirements. The Navy needs better answers to the following questions:

- What is it that the Navy may be expected to do?
- How quickly will the Navy have to do it?
- How much is the country willing to pay—in the warfare currencies of casualties, time, and destroyed equipment—to do it?
- What is the plan for accomplishing the tasks?

Compounding the problem of inadequate vision is the fact that requirements are program-driven instead of mission-driven; service-driven instead of joint-driven; and, within the service, community-driven instead of service-driven. Requirements inputs are focused on specific procurement programs and warfare communities within the services. Usually, the question that is actually addressed, albeit implicitly, is "What do we want, and how can we justify it by relating it to joint warfare?"

Related to this is the worrisome fact that inputs are political rather than data-based. There appears to be little data support, related to warfare, for statements that this or that system (or number of systems) is or is not "critical"; "required"; "essential"; "central"; "needed"; "adequate"; "ready"; "key"; "fundamental"; "sufficient"; "efficient"; "robust"; "vital"; "minimum"; etc.—so goes the lexicon. *Professional opinion is no substitute for data* (particularly when professional opinions differ).

As to the definition of warfare requirements, component commanders are currently playing the wrong game. Component commanders naturally have a service focus, with close ties to service budgeting structures in the Pentagon. Thus they tend to concentrate on Pentagon currencies (programs, dollars) rather than warfare currencies (casualties, time, capital equipment, logistics, collateral damage).

To top the list, the entire process for defining and filling warfare requirements is *much too slow* for an era of rapid change. This problem is not addressed further in this Newport Paper, although it is ultimately the military's—not just the Navy's—most serious "warfare deficiency." The solution is well outside a fleet commander's fence lines. Some program managers are alert to this deficiency and are trying to do something about it. Given the "rules of the game," they can do only a little at a time. However, it is unlikely that incremental changes will be enough. Correction of this problem is an entirely separate ball game.

So from what source can the solutions come?

Not the Department of Defense or the Joint Chiefs of Staff. They do not have knowledge of mission-oriented warfare requirements. Moreover, they are too political, tainted with "inside-the-Beltway" concerns.

Not the Services. They do not have knowledge of mission-oriented joint warfare requirements. They may talk joint, but they seldom understand it or know how to begin to understand it. There is little interaction among component services on requirements issues. Within the Services, the perspective of each warfare community tends to be skewed by allegiances to favored programs. Lastly, they also are too politically interested.

Not Congress. The primary ties of members of Congress are to their voting constituencies. Most senators and representatives lack expertise in defense matters, and they have a completely political bias, by design. Even their hired experts are politically skewed (else they would not have been hired). Nevertheless, many members of Congress are aware of the military's problems.

Only the combatant CINCs can solve the requirements problem. Only they have direct access to the warfare experts who have to execute the missions in the field. Only they and their subordinate JFCs are truly joint. Only they and their subordinate JFCs are the genuine warfighters. Only the combatant CINCs stand a chance of being regarded as "honest brokers" in Pentagon politics.

## *Solutions*

To define warfare requirements and fill them, the warfighters must focus on the objectives they may be expected to achieve, as well as the associated strategy, campaign, missions, tactics, and tasks. These objectives should not be limited to, or even focus on, existing war plans. The warfighters must also think in terms of warfare currencies: time, casualties, capital equipment, logistics, and collateral damage.

The Services and Department of Defense must convert the CINCs' warfare requirements into resource requirements. They must also convert the warfare currencies and resource requirements into dollar equivalents for budget purposes, then prioritize and request the resources from Congress. The Services subsequently convert the provided resources into ready warfare capabilities through research and development, procurement, manning, maintenance, and training.

## *How to Make the Solutions Happen*

The combatant CINCs must pursue two courses of action simultaneously. One pertains to the definition of warfighting requirements and the other to combat support requirements. Each course of action consists of several tasks.

### Warfighting Requirements

1. State the set of strategic objectives the unified command will prepare to achieve.

2. Specify the campaigns the warfighters should prepare to execute in pursuit of the strategic objectives. If political sensitivities militate against specificity, then formulate each campaign generically.

3. For each campaign, specify the nature and size of the threats to be overcome and the assets to be assigned. Wherever possible, state the maximum allowable costs in warfare currencies.

4. Specify joint force commanders and subordinate component commanders for each campaign. It is desirable but it may not be possible to identify the JFC and component commanders who will actually be assigned the campaign. However, each candidate JFC and component commander should be involved in planning at least one campaign.

5. Task each JFC to work with associated component commanders and develop a set of plans for each campaign. Each campaign plan should have an associated set of plausible alternatives. The campaign plans must be prioritized by specific criteria, such as probability of success and costs in warfare currencies. "Gut guesses" by the JFC will have to suffice in the beginning, until there are games and simulations that are accurate enough to be of some help.

6. Task each JFC, assisted by the component commanders, to define the requirements for successful campaign execution:

- Today.
- Today, but at lower costs (again, in warfare currencies).
- In the future (CINC defines the time horizon for "the future"). If the time horizon is very far into the future, it will be quite difficult for the JFCs to do this job, and they will need considerable help from more senior staffs. The key to building an effective requirements system for an era of rapid and radical change is to design it not to look far out into the distant future but to adjust quickly to changes in the near future (see the latter part of the previous section on the learning curve).
- In the future—same future as above—but at lower costs (warfare currencies).

## Combat Support Requirements*

1. Task warfighters to specify the combat and combat support tasks, with associated time standards, required or expected of each type of unit or group vis-à-vis a certain threat. Much of this job will have been done already in the campaign plans.

* Combat support is primarily a service function and should probably continue that way.

2. Task the component commanders to measure unit readiness in each of the combat and combat support tasks, and to report their measurements to the receiving JFC when the units report for duty. (Current measures are not adequate to this task and must be redefined.)

3. Support those investments requested by the component commanders (these are their combat support requirements), justified by data-based arguments, that will:

- Either improve the readiness of units and groups to perform the specified combat or combat support tasks . . .
- Or enable units and groups to perform the combat or combat support tasks at lower costs (warfare currencies).

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Each combatant CINC collates both types of requirements, warfighting and combat support; prioritizes them; and submits them as the Integrated Priority List for the CINC's theater.

## *How to Start*

Start with the warfighting requirements rather than the combat support requirements. Pick one strategic objective, then pick one campaign (not currently in a war plan) in pursuit of that objective. Choose one JFC and one set of subordinate component commanders to be in charge of the campaign. Order them to develop one campaign plan and to formulate its associated set of warfighting requirements today; today, but at lower costs; in the future; in the future, but at lower costs (see above).

Evaluate the process. When satisfied with the process, expand it to the entire theater. Once that is done, apply the same rationale and process to the definition of combat support requirements.

# Conclusion: Haze Gray and Underway

As stated from the outset, this paper has been written to stimulate thinking, discussion, and new approaches. It is not meant to be the "last word" on the matters it presents; its recommendations are not prescriptive. Nonetheless, the issues and recommendations treated here should be earnestly and seriously discussed, not unquestioningly accepted or summarily rejected. Discussion should focus not only on the Navy writ large, but also on the Navy writ small—each work center, division, department, and command. What can Sailors do, locally and within their areas of responsibility, to find out:

- What should not be done that is being done?
- What is not being done that should be done?
- What is being done and should be done, but should be done better, quicker, and cheaper, or by somebody else?

Furthermore, what can be done, locally, to find out where time and talent are going, and whether they are being wasted or misused, and how to use them more efficiently in operations and support? Efforts to answer these questions and to implement the answers should and can start now, everywhere in the Navy.

*A more important task for every level of every organization is to define a prioritized list of its own particular missions and tasks, stated in operational and measurable terms.* When that has been done, the Navy can then answer the following questions and give genuine focus to its efforts, as a whole and in its parts.

- What are the specific implications of increased uncertainty for each organization in the Navy, and what is the proper response?
- Is decentralized command and control the way to go at all levels, in all functions? Which levels, which functions?

- How and where should the Navy define the standards and training levels necessary to support decentralized command and control, and how can the Navy accurately measure progress towards those standards?
- Is a cruising force the way to go in the Navy-after-next? If not, why not? If so, how?
- Is the proposed reorganization, or a version of it, the way to go? If not, why not? If so, how?
- What does a primary focus on sea and area control portend for the next Navy and the Navy-after-next? What are the practical implications?

Lots of questions, but *Now* is the time to act, *Now* is the time to change. The Navy cannot afford to wait for directions from "on high." Those of us currently at the peak of the Navy pyramid are the favorite children of old perspectives. Admirals know and understand those perspectives and the associated mechanisms and processes, as they must to ensure that today's jobs are done. With nearly every day scheduled from sunrise to sunset, the Navy's flag officers consequently find little time to develop new perspectives and new courses of action. Perhaps it should not be that way, but that is the way it is. *It makes no difference:* at this point there is no way of knowing exactly what the correct new courses will be, no matter how brilliant the admirals or the members of their staffs.

Given the above conditions, what the Navy needs is an interacting and chemically reactive soup of diverse ideas in every area of activity within the Navy (see Appendix C, p. 85). New perspectives and courses will evolve from the dynamic interplay and testing of these ideas in an open, decentralized, responsive, and unconstrained (but gently refereed) forum.

The Navy needs a better forum for ideas. One can be built on the Internet. That job should be done *now.* Who among us will do it?

The Navy needs a better, quicker, and cheaper testing ground for new ideas. One can be built with simulators. That job should be done *now* (not five years from now). Who among us will do it?

The crucial thing is not to temporize and search long and hard for perfectly safe courses to steer, but to get underway now and make for sea. That will take courage and the willingness to risk scraping a few rocks and shoals. After the Navy is on course in the new seas, it will have to take frequent fixes and adjust course as necessary. It has the tools for successful sailing, and its history gives it reason to sail confidently. And while the Navy and the next Navy are doing all that needs to be done in the service of the nation, they must also design and build the Navy-after-next—quickly.

Meanwhile, the clock keeps ticking, faster and faster. . . .

The winds and waves are always on the side of the ablest navigators.

—Edward Gibbon, *Decline and Fall of the Roman Empire*, 1776

# *Appendices*

# Appendix A

# Fighting Principles

*There are no new principles of war. However, different principles should receive different emphases in different environments. Some are especially appropriate to the Navy's current environment. This appendix highlights a few of those principles.*

**Fight humans, not just machines.** Machines do not yet think in terms of return on investment. Humans do. The less certain humans are of an outcome, the less inclined they are to invest effort (or wealth, or life, or time, or reputation) in its attainment. Uncertainty deters action. Increasing the enemy's uncertainty deters enemy action and thus buys more of the most precious commodity in battle: time.

But heightening uncertainty does not always work; and when it does not work, it is time to take action. Killing the enemy may be an option, but military action that emphasizes killing is not always the most effective measure. For example, martyrs do not fear death, at least not until after they are committed, and killing them usually breeds more martyrs. To be effective, find out what the enemy treasures and take it away; or find out what the enemy fears or hates or despises, and deliver it generously. The aim is to fight minds and wills. Defeating the enemy's will obviates the need to fight the enemy's machines.

**Expect surprise!** Currently, the United States Navy is the most powerful Navy in the world. Any enemy will plan to neutralize its power through surprise. To minimize surprise, the Navy should plan a variety of attacks against its own forces. It is a good exercise for junior officers and will simultaneously help them (and their commanders) to understand the enemy.

The best way to avoid being surprised by the enemy is to surprise the enemy first. However, the political situation or the Rules of Engagement may not allow naval forces to do that. The best way to accommodate surprise is to design and train the Navy to be flexible and to react quickly—very, very quickly, and more quickly than any potential enemy.

**Understand the enemy.** Understand the enemy's objectives, treasures, fears, strengths, and weaknesses. Anticipate the enemy's exploitation of one's own vulnerabilities. Then use this knowledge and understanding to take what is

treasured; give what is feared; turn the enemy's strength into a liability; attack the enemy's weaknesses; and guard one's own vulnerabilities.*

**Use intelligence wisely.** Intelligence can be a force multiplier; it can also be an Achilles heel. Which one it is depends upon the effectiveness of enemy counterintelligence. Understand that the enemy will try to deceive sensors or deny information to them. Realize and accept that one's having been deceived or denied information remains unknown until the enemy is "at the gates." The key concern is not how much intelligence information is in one's possession, but how reliable the information is and how many "warfare currencies" should be bet on it.

**Counter the enemy's surveillance.** Although there are times when the enemy should know one's force is present and capable, it is never desirable that the enemy know the exact location of all one's units or one's precise intentions (i.e., one must be unpredictable). That lack of knowledge engenders uncertainty and may cause the enemy to increase surveillance efforts. Observation of the enemy's surveillance will reveal something of enemy intentions and capabilities, and those are good to know.

To maintain or even increase enemy uncertainty, the enemy's surveillance system must be neutralized. There are five ways to do this: destroy it; deceive it; deluge it by flooding it with excessive information; deny information to it; or disconnect it from enemy fighting forces and control centers so that they do not receive correct information.

**Counter the enemy's targeting.** If one is located by the enemy, one must keep from being targeted by enemy weapons. The same five ways of countering surveillance systems apply to countering targeting systems: destroy the weapons platform; deceive the sensor; deluge the sensor with excessive data; deny information to the sensor; or disconnect the targeting sensor from the control surfaces of the weapon.

**Preplan responses.** Preplanned responses enable a combat unit to react quickly and automatically to tactical conditions and do not require an order from a senior commander. Do not confuse "intentions," which require implementation orders, with "preplanned responses," which do not.

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* Although respect is not necessarily prerequisite to understanding, it is wise to respect the enemy, or at least to respect what the enemy can do. Given its present vantage of military and economic preeminence, the United States is often tempted to arrogance, dangerously blinding itself to its own shortcomings and to an enemy's strengths. It is extremely imprudent to assume that the enemy is inferior because of fewer numbers, less wealth, and "strange" culture and appearance. Moreover, American culture is spread throughout the world, and the United States is often the focus of the international media. It is therefore likely that enemies of the U.S. understand it better than the U.S. understands its enemies—a situation fraught with danger for U.S. armed forces.

**Use the offense.** The best defense is still a good offense. However, a good offense must overwhelm the critical targets. In quick, fast-moving warfare, enemy decision makers and combat personnel are targets more critical than mere equipment and facilities.

**Know the danger curves.** Know which systems the enemy can bring to bear, their range, and the tactics for their employment. As additional enemy systems populate the battle space, they cause stepped discontinuities in one's danger curves. Defensive posture and/or momentum of attack must be increased upon entering the envelopes of opposing systems. In trans-industrial warfare, 'know the danger curves' applies not only to weapons systems but also to enemy information systems and enemy manipulation of neutral information systems (e.g., political forums and public media).

**Use tough, simple, and workable tactics.** Good engineering simplifies operation. Similarly, good tactics simplify combat. Like good engineering, however, good tactical design is rare. Good tactics:

- Are robust. They weather surprises and disappointment well.
- Are simple, very simple—indeed, extremely simple. They are easily learned and remembered.
- Rely on minimal, simple, tough, and fail-safe command, control, and communications.
- Are not predictable by the enemy.
- Do not kill friends.

**Simplify, clarify, and shorten tactical instructions.** Complex tactical instructions are seldom read carefully, if they are read at all. If read, they are seldom understood in the same way by all. If understood, they are seldom remembered in detail. If not carefully read, commonly understood, and accurately remembered, there is insufficient time in battle to review or clarify them. And then it is far too late.

**Mind the arithmetic.** Make sure there is enough matériel to support the tactics. Know the detection horizons and limitations—one's own and the enemy's. Minimize the detection and engagement holes, or at least make them unpredictable.

**Avoid the worst of all emissions control errors.** The worst emissions control error is to come out of the restricted emission condition too *late.*

**Define the timelines.**

- *One's own timeline:* make it shorter than expected to effect surprise and to deny the enemy both battle space and time.
- *The enemy timeline:* lengthen it by all possible means to increase the battle space and time available to one's own forces. In trans-industrial warfare, increasing the enemy's uncertainty does this best.

## *Obvious, But Frequently Neglected Principles*

**Know and understand one's capabilities.**

**Understand the tactics and execute them properly.**

**Know what one is talking about and how one will be understood.**

One's own capabilities, tactics, and clarity of communication cannot be adequately known unless tested under real stress.

# Appendix B

## Tactical Development

Tactics are methods for using weapons to achieve a military objective. If optimized, those methods are force multipliers that are within the Navy's control; are cheap to develop; and do not chafe the political concerns of Congress or industry.

To be effective, however, tactics must be developed in a timely manner. The current time-line for tactical development and evaluation is too long in a changing world. It frequently takes over three years from the statement of the need for a battle group tactic to the completed evaluation of a candidate tactic. Then there are usually another few years to the inclusion of the tactic in a Naval Warfare Publication.

Timeliness is not the only concern. Tactics must be appropriate, executable, and robust. Yet many of the tactics resulting from current processes do not meet those criteria. As a consequence, some are not held in high regard and, in some cases, are entirely ignored.

The Navy would therefore be wise to reform, quicken, and improve its processes for developing tactics. By taking the time *now*—during this world "recess"—to perfect the ability to develop tactics quickly, the Navy will enable itself to respond more agilely and effectively to the unknown dangers that will inevitably come its way in the future.

Although the Navy may today have enough power to counter any current enemies with current tactics, a focus on tactical development will enable it to accomplish its missions at lower costs in time, casualties, operating funds, and capital investment—and more impressively and more thoroughly besides. Simple and effective tactics will also facilitate faster and cheaper training, and reduce dependence on command and control. By developing a quick and efficient process for developing tactics, the Navy will be able to respond more promptly and effectively to technological innovations (foreign and domestic, friends' and foes'), new enemies, new enemy tactics, new situations, and new missions (including those of potential enemies).

Lastly, an emphasis on tactical development will enhance the fighting ability and the morale of Navy personnel involved in the process.

## *What Should Be Done*

As things now stand, the responsibilities for tactical development, evaluation, and training are fragmented among many commands. Although the current system works fairly well for unit tactics, it is generally inadequate for the rapid development and evaluation of group (multi-platform) and joint (multi-service) tactics. The following actions will facilitate quicker and better development of group and joint tactics.

1. Reconstitute the Naval Doctrine Command as the Fleet Tactics and Doctrine Center; subordinate it to CINCLANTFLT (in today's Navy structure), and give it responsibility for overseeing and coordinating *all* efforts in tactical development. Although the development and evaluation of multi-platform and multi-service tactics are its primary concerns, the Center also oversees the development and evaluation of platform tactics by SWDG, SUBDEVRONs, VXs, OPTEVFOR, and NSAWC.

2. Fleet Tactics and Doctrine Center establish Tactical Development Teams (see below).

3. Numbered fleet commanders forward to Fleet Tactics and Doctrine Center all fleet requirements for tactical development.

4. Fleet Tactics and Doctrine Center direct each request for the development of a group and/or joint tactic to the appropriate Tactical Development Team.

5. Fleet Tactics and Doctrine Center respond to all tactical development requirements by providing an *evaluated* tactic to the requesting command in: less than a year by 1 January 1999; less than six months by 1 January 2000; less than three months by 1 January 2001; and more quickly thereafter. These timelines will necessitate the use of computer simulations.

6. Fleet Tactics and Doctrine Center distribute tactics and updates electronically, keeping electronic tactical publications within 3,500 words (not including graphs, tables, and illustrations).

7. Fleet Tactics and Doctrine Center use uniformed personnel and civil servants, and representatives from the Center for Naval Analyses and non-competing university laboratories, to *evaluate* tactics.

8. Move (eventually) the Fleet Tactics and Doctrine Center and all tactical development and evaluation effort to the functional commander for Fleet Training and Doctrine Command subordinate to COMNAVUSA.

## *Tactical Development Teams*

Each Tactical Development Team is composed mostly of uniformed personnel. They are the ones who bleed, and so have a vested interest in quality tactics. It is also good training for them to think about tactics, and it enhances their professional development. Finally, uniformed personnel generally like to think about tactics, but currently have little opportunity or encouragement to do so.*

The Fleet Tactics and Doctrine Center identifies a cadre of uniformed tactical specialists and ensures that their expertise is recognized and put to use in the development of tactics. This requires procedures to:

- Identify uniformed tactical experts in various warfare areas, wherever they are in the Navy
- Organize them into Tactical Development Teams
- Link them together in an electronic network
- Enable these dispersed but electronically netted tactical experts to work together as teams

## *Evaluation*

Professional analysts and evaluators are to *evaluate* (not develop) tactics. There are professionals within the Navy establishment (Warfare Centers, Center for Naval Analyses, and university labs contracted to the Navy) that can help in the evaluation of tactics, although that is not within their present tasking.

## *Use of Contractors*

Tactics should not be developed by contractors. Contractors, despite being professional and dedicated, are more expensive than uniformed personnel and tend to be less up-to-date on naval operations and tactical requirements. Moreover, contractors do not have to put developed tactics into practice.

Contracting and review procedures, and the *de facto* requirement for contractors to think in terms of deliverable products, staffing considerations, and business considerations, slow the tactical development and evaluation process. If necessary, contractors can be used for administration, formatting, and publishing

* And that is the Navy's fault, not theirs.

of tactical documents (although this too can probably be done within the Navy establishment).

# Appendix C

# Complexity Theory

This is a much abbreviated discussion of some aspects of complexity theory and how those aspects of the theory apply to what the Navy must do between now and the Navy-after-next. Its contents are gleaned from or inspired by the writings of M. Mitchell Waldrop and Stuart Kauffman.[6]

## *Order, Chaos, and Complexity*

Systems can exhibit two extremes of structure: order and chaos. An exceptionally ordered system has little interaction among its elements. There is little flexibility within it. It does what its structure allows, and no more. It does not interact constructively with new systems, and therefore it neither learns nor evolves. It tends to be rigid. It is *Stalinist.*

A chaotic system has the opposite problem. It has few standards. It lacks the minimum levels of stability that are needed to maintain and nurture a learning system. It constantly reacts and seldom integrates. Its lack of structure allows everything, and therefore nothing evolves beyond its current state. It tends to be utterly fluid and turbulent. It is *Bosnian.*

In between these two extremes, at a kind of murky, turbid phase transition called "the edge of chaos," there is complexity. In this phase transition the elements of the system never quite lock into place, yet never quite dissolve into turbulence, either. This system is both stable enough to store information and active enough to transmit it. It is *American.*[7]

Complex systems on the edge of chaos can self-organize to react to their environment. To attain the levels of spontaneity and adaptation necessary for self-organization, they must be highly interactive with other related systems (no stovepipes allowed), and very quick to absorb, integrate, and change. The United States has developed such a system to manage its society; the Navy has developed such a system to manage an active flight deck (see pages 22–25). It is the Navy's task to develop a similarly flat, adaptive, and agile system to manage a successful (which means, *rapidly evolving*) Navy in the edge-of-chaos situation it faces in the trans-industrial world.

## *Coevolution*

Found in the region between order and chaos, *coevolution* is a process in which two or more related processes support each other in ways that cannot be foreseen before they begin to interact. It is somewhat different from random selection and survival of the fittest.

For example, the invention of the *internal combustion engine* led to the invention of the *automobile*, which began life as a rich gentleman's toy.[8] Development of the automobile led to development of gas stations, better roads, motels, etc., which in turn encouraged more people to buy automobiles. The growing population of owners and operators of automobiles began to live farther from work, meet people in distant towns, and distribute products more rapidly and efficiently. Tire and rubber industries expanded, and petroleum by-products fed the development of the chemical industries. Better steels and metals were developed, engineering skills were honed and polished, and all was done quicker, cheaper, and better than was possible a few years earlier.

Demand fed competition. Competition fueled the growth of the skills and resources that were applied to further development of the internal combustion engine, constantly improving it. This process unleashed an avalanche of applications, which in turn accelerated the rate of development of the engine and of the related industries it spawned. New applications spawned whole new industries in turn. Each development fed the others in ways totally unimaginable to the inventors and early producers of the internal combustion engine and the automobile.

Simultaneously, the internal combustion engine and the automobile pushed the horse out of its central position in society. The new drove out the old. Out went blacksmiths, saddle makers, stables, carriages, and harness shops. In a reversal of the former order, the horse became the gentleman's toy and the car became a family and social necessity.

§§§

As with the internal combustion engine and the automobile, so too with the Navy and its environment. No one knows, and no one can know, what Navy will be needed in the foggy distant future. What *is* apparent is that the nation must have a Navy that will rapidly interact—*coevolve*—with its changing environment. To build a Navy that thrives at the edge of chaos, some of the characteristics of complexity must first be considered.*

* Of course, this paragraph also applies to the Department of Defense, to the other Armed Services separately, and to all the Armed Services *jointly*.

## *Uncertainty*

Uncertainty is a fact of existence in the complex region between order and chaos. However, it is not the paralyzing uncertainty of chaos. As illustrated by the coevolution of the internal combustion engine and the automobile, new enabling ideas grow from new or freshly fertilized fields, and lead to other completely unexpected ideas in an avalanche of change that nothing can escape.

The Navy is now swept up in the avalanche of change that was initiated, at some unheralded and quiet moment, by the development of silicon chips and the computer. The implications of new technologies and rapid change are profound and engender uncertainties that cause severe disquiet and unease. The Navy is tempted to cling to the security blanket of its successful past, but that sort of cringing—however comforting—will not take it safely through the future, which is arriving *now.*

It is up to the Navy to learn, *now,* how to ride the avalanche of change. It must continually and quickly adapt. The consequences of the actions it takes, and whether they will succeed, cannot be known. Nonetheless, it is plain that a fixation on the past will not help the Navy. It is a fact that if the Navy does not *act,* it will not *succeed.*

What actions will help the Navy succeed? In an avalanche of rapid change, crystal balls looking far into the future are inevitably cloudy. Thus the best the Navy can do is be "locally wise," observing simple decision rules, and gathering (and digesting) relevant information to help execute its decisions wisely.[9]

## *The Elements of Success*

### Simple Decision Rules, Locally Applied
### *or,*
### What the Navy Can Learn from "Boids"

Birds are not very intelligent animals; they can respond to only the simplest of rules. Nevertheless, birds flock, and as a flock they move elegantly and smoothly in complex environments. If the directions for flocking, and for moving as a flock, were transmitted from the leader to each of the members, the leader and the members of the flock would require an elaborate communications system and considerable processing power. But birds have neither. How do they do it?

In the late 1980s, a gentleman by the name of Craig Reynolds developed a computer flock of "boids." His flock "flew" beautifully, but it was not built and

led by a leader from the top down. Rather, it was built from the bottom up, in a scheme in which each boid followed three simple rules of behavior, described by Waldrop as follows:[10]

1. Maintain a minimum distance from other objects in the environment, including other boids.
2. Match velocities with nearby boids.
3. Move toward the perceived center of mass of the group of nearby boids.

None of the rules was "form a flock," which would have been too hard for a bird/boid to execute. The rules were entirely local, referring only to what a boid could see and do in its own vicinity. The flock formed "from the bottom up." The boids were able to fly as a flock in a complex environment (from a boid's perspective) through:

- Simple decision rules
- Locally available information

The *same formula* works for more intelligent entities in much more complex environments, even those that threaten to overwhelm their inhabitants. By applying simple decision rules on the basis of information made available to it, the Navy can flourish in the complexity of its environment while continuing to learn and adapt.

## *Diversity*

The more ideas the Navy has available to it, the more interaction, stimulation, and coevolution is possible. The more structure the Navy has, the fewer the ideas the Navy gets. An intricate system of stovepipes and bureaucracies (such as the present structure of the Navy) tends to quash ideas and stifle creative thought. Too much structure leads to a highly ordered regime that tends also to be slower, less agile, and less flexible than a less ordered regime.

To open the floodgates that are holding back ideas, the Navy must:

- Reduce its structure
- Flatten its structure
- Minimize individual risk
- Reward ideas

## *Reactivity*

Ideas that do not interact cannot coevolve. For coevolution to occur, diversity of ideas must be catalyzed by communication (diversity without

communication among various elements is merely divisive and counterproductive). Modern technology fosters extensive and pervasive communication and thus makes possible *flat* organizations that depend upon and encourage such communication.

A high degree of reactivity—the rate and intensity of interaction between the various components of a mixture (any mixture, whether chemical, biological, or social)—must be sustained in the soup of diversity long enough to establish a course of development. The greater the reactivity, the shorter the time needed for interaction to evolve a new course (i.e., more options can be explored in less time).

# Appendix D

## Acronyms

| | |
|---|---|
| **3M** | Ships' Maintenance and Material Management |
| **ACU** | Assault Craft Unit |
| **C4I** | Command, Control, Communications, Computers, and Intelligence |
| **CB** | Naval Construction Battalion |
| **CENTCOM** | United States Central Command |
| **CINC** | Commander-in-Chief. In this document, the term evolves solely to denote a combatant commander-in-chief. |
| **CINCLANTFLT** | Commander-in-Chief, Atlantic Fleet |
| **CINCLANTFLT$_{next}$*** | Commander-in-Chief, U.S. Atlantic Fleet, next Navy |
| **CINCPACFLT** | Commander-in-Chief, Pacific Fleet |
| **CINCPACFLT$_{next}$*** | Commander-in-Chief, U.S. Pacific Fleet, next Navy |
| **CINCUSNAVEUR** | Commander-in-Chief, Naval Forces Europe |
| **CJCS** | Chairman, Joint Chiefs of Staff |
| **COMNAVAIRFOR*** | Commander, Naval Air Force |
| **COMNAVSUBFOR*** | Commander, Submarine Force |
| **COMNAVSURFOR*** | Commander, Naval Surface Force |
| **COMNAVSURFPAC*** | Commander, Naval Surface Force, Pacific |
| **COMNAVUSA*** | Commander, Naval Forces in the United States |
| **COMSOLANT** | Commander, South Atlantic Force |
| **CONUS** | Continental United States |
| **CV** | aircraft carrier |
| **CVN** | aircraft carrier, nuclear power |
| **EOD** | explosive ordnance disposal |
| **EUCOM** | United States European Command |
| **FISC** | Fleet and Industrial Supply Center |
| **FMB** | Financial Management Budget |
| **FTSC** | Fleet Technical Support Center |
| **JFC** | Joint Force Commander |
| **LAN** | local area network |
| **MDSU** | Mobile Diving and Salvage Unit |

* Term pertains to notional organizations described in this pamphlet.

| | |
|---|---|
| **MOOTW** | military operations other than war |
| **MPA** | maritime patrol aircraft |
| **MSTS** | Military Sea Transportation Service (formerly MSC) |
| **N8** | Deputy Chief of Naval Operations for Resources, Warfare Requirements, and Assessment |
| **NAVDOC** | Naval Doctrine Command |
| **NCA** | National Command Authorities |
| **NFC** | Numbered Fleet Commander |
| **NSAP** | Navy Science Assistance Program |
| **NSAWC** | Naval Strike and Air Warfare Center |
| **NWAD Corona** | Naval Warfare Assessment Division, Corona, California |
| **OPNAV** | Office of the Chief of Naval Operations |
| **OPTEVFOR** | Operational Test and Evaluation Forces |
| **PACOM** | United States Pacific Command |
| **SEAL team** | sea-air-land team; a naval force specially organized, trained, and equipped to conduct special operations in maritime, littoral, and riverine environments. |
| **SOUTHCOM** | United States Southern Command |
| **STRATCOM** | Strategic Command |
| **SUBDEVRON** | Submarine Development Squadron |
| **SWDG** | Surface Warfare Development Group |
| **UAV** | unmanned aerial vehicle |
| **UNTL** | Universal Naval Task List |
| **USACOM** | United States Atlantic Command |
| **VX** | Navy Air Development Squadron; Air Test and Evaluation Squadron |
| **WAN** | wide-area network |
| **WMD** | weapon(s) of mass destruction |

## Endnotes

1. Karl Marx, *Das Kapital*, vol. 1 (1867). Also, letter of 28 December 1846 to P.V. Arrenkov, quoted in Robert C. Tucker, ed., *The Marx-Engels Reader*, 2nd ed. (New York and London: W.W. Norton, 1978), pp, 136–142.

2. John Pfeiffer, "The Secret of Life at the Limits: Cogs Become Big Wheels," *Smithsonian* 20, no. 4 (July 1989), pp. 39–40. The professors referred to are Todd La Porte, Gene Rochlin, and Karlene Roberts. For more detailed information on their study of the flight deck, see their article, "The Self-Designing High-Reliability Organization: Aircraft Carrier Flight Operations at Sea," *Naval War College Review* 40, no. 4 (Autumn 1987), pp. 76–90.

3. Pfeiffer, p. 40.

4. *Joint Pub 0-2, Unified Action Armed Forces (UNAAF)*, p. 1–4. Another useful reference on the chain of command is the "Overview of National Security Structure" on the World Wide Web site of the Joint Chiefs of Staff, <http://www.dtic.mil/jcs/overview.html>.

5. *Joint Pub 0-2, UNAAF*, pp. IV–16, 17.

6. See M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* (New York: Touchstone, 1992); and Stuart Kauffman, *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity* (New York: Oxford University Press, 1995). Kauffman is a member of the Santa Fe Institute.

7. Kauffman, p. 293. "Stalinist" is the term Kauffman uses to describe the regime of extreme order, "Bosnian" and "American" are the author's own terms. Kauffman uses "Red Queen" to denote the regime of total chaos, and attributes the tag (p. 216) to Lee Van Valen, a paleontologist at the University of Chicago.

8. The following discussion about the coevolution of industries associated with the internal combustion engine is an extensive expansion by the author of a theme used by the Austrian economist Joseph Schumpeter, as quoted by Kauffman, p. 279.

9. See Kauffman, p. 28.

10. Waldrop, p. 241. For further information on boids, see Mr. Reynolds's web site at <http://hmt.com/cwr/boids.html>.

## Admiral J. Paul Reason, U.S. Navy

Admiral J. Paul Reason is the Commander in Chief, U.S. Atlantic Fleet. A 1965 Naval Academy graduate (B.S.), M.S. in Computer Systems Management (NPS), and study in Defense Policy at the Kennedy School (Harvard), he is a nuclear-trained surface warfare officer with more than twenty years experience at sea. Command of Cruiser-Destroyer Group One, USS *Bainbridge* (CGN–25), and USS *Coontz* (DDG–40) highlighted tours in carriers, battleships, cruisers and destroyers.

Ashore he served as Deputy Chief of Naval Operation for Plans, Policy and Operations; Commander, Naval Surface Force Atlantic; and Commander, Naval Base Seattle.

As the Atlantic Fleet Commander, Admiral Reason's duties include the training, maintenance, and readiness of naval forces deployed to the Mediterranean and Caribbean seas, South America, and the Persian Gulf. He is also responsible for the operations of most U.S. Navy bases and facilities along the East and Gulf coasts of the United States, in Puerto Rico, Cuba, and Iceland.

The Atlantic Fleet executes an annual budget of $5 billion to maintain, train, and operate a force of 125,000 active duty sailors, 191 ships, and more than 1,300 Navy aircraft.

## David G. Freymann

David G. Freymann was an officer in the U.S. Navy from 1959 to 1979, retiring from active duty in the rank of commander. He served in destroyers, PT boats, nuclear cruisers, and naval intelligence. Since 1979 he has been an internal consultant to COMTHIRDFLT, COMSECONDFLT, COMNAVSURFLANT, COMNAVSURFPAC, and OPNAV on various matters, including tactics, campaign planning, operational integration of advanced technologies, and organizational reform. He is currently employed by The Johns Hopkins University Applied Physics Laboratory and is attached to the CINCLANTFLT staff as Special Assistant for Innovation.

# THE NEWPORT PAPERS

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1. *"Are We Beasts?" Churchill and the Moral Question of World War II "Area Bombing,"* by Christopher C. Harmon (December 1991).

2. *Toward a Pax Universalis: A Historical Critique of the National Military Strategy,* by Lieutenant Colonel Gary W. Anderson, U.S. Marine Corps (April 1992).

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