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**SURFACE NAVY ASSOCIATION
(SNA)**



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**Fifth National
Symposium**

"Surface Navy Leading The Way"

26 - 29 October 1992
Washington, D.C.

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SURFACE NAVY ASSOCIATION
Fifth Annual Symposium
Proceedings

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PROGRAM OF THE NATIONAL SYMPOSIUM

Monday, 26 October 1992

Annual Board of Directors Meeting

Tuesday, 27 October 1992

BuPers Briefing for Active Duty Officers

CAPT Rick Farrell, USN; Head Surface Warfare Detailer

Luncheon

The Honorable Sean O'Keefe; Secretary of the Navy

Seminar Welcoming Remarks

VADM William H. Rowden, USN (Ret); President, Surface Navy Association

Surface Warfare SITREP

RADM Philip M. Quast, USN; Director, Surface Warfare

Surface Combat Systems in Littoral Warfare

RADM (Sel) David S. Bill III, USN; Director, Surface Combat Systems Branch, Office of the Director of Surface Warfare

Surface Warfare Issues and Perspectives

RADM (Sel) Thomas F. Marfiak, USN; Director, Surface Warfare Plans/ Programs/Requirements Branch, Office of the Director of Surface Warfare

Annual Banquet

ADM Frank B. Kelso II, USN; Chief of Naval Operations

Wednesday, 28 October 1992

**SNA Corporate Sponsor Vice Presidents/DoD Program Managers, Division Heads Breakfast
CSI**

CAPT George A. Klein, USN; Office of the Commander, Naval Command, Control & Ocean Surveillance Center

Surface Warfare

RADM George R. Meinig, Jr., USN; Commander, Naval Surface Warfare Center, Naval Sea Systems Command

Undersea Warfare

RADM Scott L. Sears, USN; Commander, Naval Undersea Warfare Center, Naval Sea Systems Command

Scenario Preparation Using Expert Systems

Mr. Joseph M. Saur; Mr. Richard E. Pearsall

Future Combat Systems: Vision and Acquisition Framework

Mr. B. G. Duren; Mr. J. R. Pollard

The Tactical Benefits of Multiple Sensor Integration in a Point Defense Role

LCDR Thomas L. Tanner, USN

SNA Corporate Sponsor Chief Executive Officers' Luncheon

ADM David E. Jeremiah, USN; Vice Chairman, Joint Chiefs of Staff

A New World Order

Department of the Navy Film

Battleships

Brute Force: "The History of Weapons at War" film series

Surface Action in the Persian Gulf

CAPT Doug Bauer, USNR (Ret); Navy Reserve History Unit

Persian Gulf Images

CDR John Charles Roach, USNR; Navy Reserve History Unit

Storm From The Sea

U.S. Naval Institute Film

OTMO Operations

CAPT Sandy Monroe, USNR; Navy Reserve History Unit

Open Forum Panel Discussion; 'The Leaders' Perspective'

VADM Joseph P. Reason, USN; Commander Naval Surface Force, U.S. Atlantic Fleet

RADM Philip M. Quast, USN; Director, Surface Warfare

Mr. Richard Marler; Senior Vice President, Ingalls Shipbuilding Division, Litton Industries

Mr. Ed Woollen; Vice President, Raytheon Company

Moderator: The Honorable James F. Goodrich; Former Under Secretary of the Navy

Thursday, 29 October 1992

Classified Session

VADM William A. Owens, USN; Deputy Chief of Naval Operations, Navy Program Planning

RADM E. D. Sheaffer, Jr., USN; Director Naval Intelligence, Office of the Chief of Naval Operations

RADM Philip M. Quast, USN; Director, Surface Warfare

RADM Edward B. Baker, Jr., USN; Assistant Deputy Chief of Naval Operations, Plans, Policy, Operations

Closing Remarks

VADM William H. Rowden, USN (Ret); President, Surface Navy Association



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REMARKS BY THE HONORABLE SEAN O'KEEFE
Secretary of the Navy

before the Surface Navy Association Fifth National Symposium, October 1992

Thank you for that kind introduction, Captain Rinn.

Flag Officers. . .distinguished guests. . .and, above all, Surface Warriors, thank you for inviting me to speak with you today.

I want to start by telling you a story my dad was fond of recounting--he was a submarine ED--but it's updated for contemporary events. . .this story is about three surface warriors who were captured by the Iraqis during DESERT STORM--one from an AEGIS Cruiser, one from a steam Cruiser, and one from a nuclear Cruiser. They dragged these three poor guys into the town square, where they had set up a guillotine, for a public execution. They took the AEGIS Cruiser guy to the guillotine first, put him under the blade, and asked him if he had any last words. Being a loyal SWO, he said, "Long live the Surface Navy." Then the executioner tripped the switch, the blade came speeding down--but it stopped just above his neck. Recognizing this as a sign from Allah, the Iraqis let him go. Then they pulled up the guy from the steam Cruiser. They asked if he had any last words. Being pretty smart, he also said, "Long live the Surface Navy." And the blade came speeding down--and again it stopped just above his neck. So again the frustrated Iraqis had to let him go. So finally they pulled up the surface nuke--I think it was the Engineer--from the nuclear Cruiser, put him into the guillotine, and asked if he had any last words. He looked up and said. . ."You know, I've been watching this machine for a while, and I think I know how you can fix it."

What that story tells me is that the past illuminates and informs both the present and the way forward. . .so today I'd like to talk with you about the future of the Surface Navy - which I think is very bright--by looking briefly into the past. . .to a very important day exactly thirty years ago.

On 27 October 1962, our nation--and indeed the world--stood at the brink of nuclear war. The Cuban missile crisis was poised on the edge of a razor--when men on both sides of the crisis struggled with options that ranged from launching preemptive strikes to simply backing down. Communications between the President and Khrushchev were at a seeming impasse. An American U2 was shot down over Cuba by a SAM, further heightening tension. It was as close as we have ever come to Armageddon. . .if all of time is a great clock, with the world fated to end when the hands of the clock strike midnight, on this day. three decades ago, the hands of the clock were perhaps one minute from midnight.

I was six years old--as old as my daughter Lindsey is today. Many of you in the room were even younger. . .but, most importantly for what I want to talk about today, a few of you--like Admiral Rowden--were already junior officers in the Navy, many steaming south toward Cuba, responding to the President's order of several days earlier to establish a maritime quarantine around Cuba to prevent the arrival of any additional missiles or offensive military equipment of any kind.

The CNO, Admiral George Anderson, was called to brief the President on the plan for the blockade. At the conclusion of his meeting with the CNO, the President said, "Well, Admiral, it looks as though this is up to the Navy." The CNO replied quietly, "Mr. President, the Navy will not let you down." As so often has been the case when a crisis explodes, the President has called and the Navy has answered.

You all know how the story turned out. Confronted by the American naval quarantine and the threat of global war, Krushchev accepted the President's pledge not to invade Cuba and backed down, removing the missiles. The naval quarantine was finally lifted on November 20th, after U.S. warships verified the departure of the missiles.

I am struck by the parallels between the Maritime Interception Operations that continue in the Persian Gulf today and the naval quarantine of Cuba exactly thirty years ago. Many of the same issues that Surface Warriors are wrestling with in the Gulf today were present off the coast of Cuba in 1962--a volatile political situation, highly specific rules of engagement, the glare of publicity, the possibility of a misstep escalating into a major international incident, the difficulty of identifying enemy, neutral and friendly shipping--all in all, a murky situation in almost every regard.

I think the past is indeed a prologue to the future--especially for the Surface Warfare community. We will continue to call on you to exercise extraordinary qualities of judgment in meeting difficult identification scenarios. As has been the case in the past, one mistake can reverberate around the world--look at the STARK incident. But we cannot shy away from duty. Our new maritime strategy dictates that you will operate extensively in dangerous littoral areas, just off the coasts of the world, where over seventy percent of the population lives. We will continue to call on the Surface Navy. . .and I know you will not fail. That is your future--challenging, demanding, and ultimately very rewarding.

Now let me tell you how I see the future of the Surface Navy from my perspective as a Service Secretary, responsible for organizing, equipping, and training our forces.

As you know, we have just issued a new Department of the Navy paper, ". . . From the Sea," that lays out our plan to prepare the naval service for the 21st century. This is the maritime component of the President's National Security Strategy--which moves us from the Cold War era to a strategy tailored for regional contingencies. There are two important ideas from that paper I'd like to emphasize for the Surface community.

The first is that the days of simply sending Carrier Battle Groups as the prime solution to every contingency are past. We must tailor our forces to national needs. As surface warriors, you should expect to operate extensively in situations without carriers--in what we might call "non-traditional" battle groups--very often in a highly integrated fashion with Marines. A few examples might include a group of minesweepers, with frigates for missile protection--for mine clearance operations; a hospital ship and an amphibious assault ship, with a couple of Cruisers--undertaking a disaster relief mission; a squadron of PCs with an LPD for logistic support--for drug interdiction; or the overwhelming power of a combined carrier battle group and amphibious ready group with embarked Marines--for a major contingency involving Americans at risk overseas. The theater unified commander will call upon the forces necessary to respond to the likely contingency.

The point is that we will require imagination, creativity, and maximum flexibility from our surface forces, who will be a major part of these "tailored forces." You will be called upon to undertake a wide variety of missions--many non-combatant in character, like the Hurricane Andrew response--in this era of restless peace.

The second major idea I'd like to highlight in ". . . From the Sea" is the concept of shaping our forces for operations with the Marine Corps, as well as extensive joint and combined operations. Our Surface Navy forces--fully integrated with Marines--should expect to operate within a joint structure--like a Joint Task Force; and within the larger structure of an international coalition conducting combined operations. We will need to provide joint and combined commanders with capable, ready ships. Most importantly, you who sail on our surface ships must be trained, willing, and able to conduct joint and combined operations. You must understand the logistics, communications, tactics, and operational art of our fellow U.S. Services. In addition to fully integrating with the Marine Corps, you will work with Army helicopters and special forces groups, with Air Force composite wings, and with Coast Guard small craft. Likewise, you must be able to smoothly and effectively integrate your ships with allied forces around the world.

The challenges are many, but believe me, you in the Surface Navy are well positioned for this brave new world of joint and combined operations--you cut your teeth on international operations, and your natural flexibility and mobility will stand you in good stead in the conduct of joint operations as well.

What does this mean for the size and structure of the Surface force over the coming years?

First, I am confident we have the right mix of warships today to meet immediate demands on the Surface Navy. Our TICONDEROGA Cruisers, ARLEIGH BURKE Destroyers, SPRUANCE Destroyers, and OLIVER HAZARD PERRY Frigates form the core of the world's best CRUDES combatant force. We have invested in the superb TARAWA and WASP class Amphibious Assault ships, which will give us a total of ten big deck

Amphibs as we enter the next century. Our WHIDBEY ISLAND Dock Landing Ships are also superb. We have significantly upgraded our mine warfare capability with the AVENGER and OSPREY class mine-counter measure and coastal mine hunter classes. And our new SUPPLY class fast combat support ships are important additions to our logistic capability.

Second, we will continue to build the best ships in the world. Our ARLEIGH BURKE Destroyers will continue to improve and modernize with each flight including the addition of a helo-hangar with flight IIA, beginning construction in 1994. We are beginning design exploration for the LX--part of a new generation of amphibious assault ships. And we are conducting a long range study to identify technologies and capabilities for an affordable destroyer for the next century--the DD21. All of these new warships will be tailored to the littoral warfare concepts discussed in ". . .From the Sea." They will need both the defensive strength to operate in the dangerous coastal region; and, more importantly, the operational punch to make real contributions--at everything from disaster relief efforts to full-scale combat.

I spoke earlier about the hands of the great clock coming so close to the apocalypse hour of midnight on October 27th, 1962. And I told you that the past often illuminates the future. Yet today, the hands of the clock have been retarded. . .we do seem further away from global war than at any moment in my lifetime. . .I grew up in the generation which prepared for global thermonuclear war by building shelters, posting civil defense signs, and listening to endless tests of the national emergency radio broadcast system. . .and we've finally won that long struggle, pushing the hands of the clock backward. . .

But it hasn't happened without sacrifice and pain and danger. And it won't stay that way just because we want it to. We achieved peace by demonstrating resolve and refusing to shy away from potential conflict. And the Surface Navy has been a major component in winning the peace we enjoy today. You earned the peace on the long midwatches, steaming from the Indian Ocean into the Persian Gulf. . .you earned it on the endless deployments, commanding the sea lanes around the world. . .you earned it with forward presence in hundreds of crises during the long years of the Cold War. . .in simplest terms, you earned it at sea. And for your efforts, our nation is deeply grateful.

The next century will present us with challenges we can only dimly glimpse today. The hands of the great clock must never again move forward toward midnight. Our continued vigil should assure that. But whether we face the emergence of a new global threat. . .or only a seemingly endless procession of conflict and tension in many different regional settings. . .I know we can count on the Surface Navy. In the 17th century, Oliver Cromwell said that "a man-of-war is the best ambassador." We will once again count on our Surface Navy to be fine ambassadors, as well as warriors, as we said into the challenges of the 21st century. Thank you and God bless.

REMARKS BY VICE ADMIRAL WILLIAM H. ROWDEN, USN (Retired)
President, Surface Navy Association

before the Surface Navy Association Fifth National Symposium, October 1992

Welcome to this the Fifth Annual Surface Navy Association Symposium, the theme of which is Surface Navy Leading the Way. Before I set the stage for what is to follow in the next several days, I would like to recognize a couple of senior people who are attending today's proceedings: Admiral Jim Hogg, President, National Security Industrial Association; Mr. William Kelly, National President, Navy League of the United States. It's nice to have you both here. Now to set the stage.

At lunch we heard the Secretary of the Navy speak of the strategic concept of the Navy in the white paper, "From the Sea, Preparing the Naval Service for the 21st Century". He told us in general terms when, where, and how the naval service intends to protect this nation against threats to its national interests. Now we need to understand how the Navy will work to develop, program and produce the weapon systems necessary and proper to execute its strategic concept.

Almost forty years ago an article in the Naval Institute Proceedings argued that the fundamental element of a military service is its purpose and role in implementing national policy. The article went on to say that this purpose should describe how, when and where the service expects to protect the nation's interests against some threat to their security. This was called a service's strategic concept. The piece opined that without such a concept a service "wallows among a variety of conflicting and confusing goals and ultimately suffers both physical and moral degeneration".

This article was written soon after World War II when the Navy was struggling with a proper strategic concept for that new era. Discussing this, the article noted the necessity for change and that change would require a fundamental revolution in naval thinking. At the heart of this change was the realization that the domain of decisive military action had shifted from the sea to the land and particularly the land coastal area. It went on to speak of warfare in the littoral areas of the world.

Strategic thinking in terms of littoral warfare is not new. Then, as now, the primary weapon systems capable to execute the strategy are: Carrier based air power; Fleet based amphibious power; and Naval artillery. Clearly, in order to employ these systems effectively the enemy's order of battle must be known (surveillance), the battle space must be secured (domination of the battle space), and the operation must have the staying power to succeed (sustainment). The point is, that naval thinking has focused on littoral warfare ever since the United States became the foremost world naval power at the end of World War II. So what's the big deal now? Why are we discussing littoral warfare as if it were discovered just this morning? Because it gives the Navy a strategic concept and the focus necessary to proceed into the 21st century.

In the years following World War II the United States was unable to disarm. We tried to, but the North Korean incursion into south Korea in 1950 and subsequent military confrontations between East and West convinced the U.S. public that the United States should remain armed. Initially we were armed with forces that had won World War II. As they became obsolete or worn out they were replaced in kind with weapon systems that were modernized from World War II battle experience or more recent military action. Force structure and organization remained essentially the same. Even when force modernization resulted from significant engineered technology breakthroughs, such as nuclear powered submarines, jet airplanes, or guided missiles, these weapon systems were introduced into the force structure dating to World War II. Since we had not disarmed and the principal threat remained a central land power, this was the most logical organization. Then about twenty odd years ago, the Office of the Chief of Naval Operations became organized around the basic weapon systems of the Navy: ships, submarines and aircraft. Each developed its own program and budget resources for equipping the Navy. Each developed its own constituency. Indeed, each constituency thought its forces were sufficient to accomplishing successfully the military task at hand with minimum help from anybody else. This way of doing business was sufficiently well financed, or, put another way, had sufficiently strong public political support to survive and even prosper under the circumstances of the times.

With the end of the Cold War and, concurrently urged by the perceived economic woes in this country, a political uproar has developed for a change in the country's military investment strategy. The country has become convinced that there is a jointness synergism within the armed services that has not been properly developed in the past. The Navy has been a favorite target for attack for resisting jointness because it was the service that most resisted unification in the first place. To compensate for this, the Navy of late has bent over backwards to declare its jointness to anyone who would listen. In fact, it has recently reorganized itself to reflect greater jointness at headquarters and in its operations. These efforts, along with the enunciation of a new strategic direction for the Navy, are proper reactions to the signs of the times and are not necessarily detrimental to our service.

What could be detrimental to our service is a failure to produce forces appropriate to its strategic concept. To do this the Navy first must logically and convincingly demonstrate an ability to translate its strategic concept into appropriate execution forces because public willingness to provide resources to build these forces turns on the weight of this logic. Given public support, the Navy must organize to produce the required forces. Naval forces are made up of ships, aircraft and submarines. The Navy has been organized around these basic fighting forces and this organization successfully produced today's Navy, which has been proclaimed by the present naval leadership to be the most capable naval force in the history of the world. More recently, the Navy organized into joint functional warfare areas. This organization must be able to translate forces appropriate to these functional warfare areas into programs to produce ships, submarines, and aircraft. It remains to be seen how it will handle this critical task. This symposium will touch on many issues in this challenging area.

We will lead off this afternoon with the Surface Warfare Directorate of the Office of the Chief of Naval Operations and its review of programs which are designed to execute the strategy and upon which the Navy's budget is built. This evening we will hear from the Chief of Naval Operations, Admiral Frank Kelso, with his views on the new strategic concept. Tomorrow morning the material organization which is responsible to engineer operational requirements into producible weapons systems. Around noon tomorrow there is the opportunity to hear several professional papers as well as view films and displays of professional and art interest. Tomorrow afternoon we will hear from a panel representing fleet surface type commanders, Navy headquarters staff and the industrial base. Finally on Thursday morning, we will wrap up with a classified session that focuses on intelligence, strategy and programming issues of the Navy.

RADM Phil Quast is the Director of Surface Warfare and is charged with developing forces for the Littoral Warfare mission of the Navy. He has brought with him today two of his lieutenants, RADM (Sel) Tom Marfiak and RADM (Sel) Dave Bill, who are responsible to RADM Quast for the ships and weapons systems in which Surface Warriors sail. I know their messages will set the stage for close examination of the symposium's theme, "Surface Warfare, Leading the Way."

REMARKS BY REAR ADMIRAL PHILIP M. QUAST, USN
Director, Surface Warfare

before the Surface Navy Association Fifth National Symposium, October 1992

Good afternoon. It's a sincere pleasure to be here today to provide a SITREP on Surface Warfare. Needless to say, when I reported in as the Deputy OP-03 this past winter, I did not expect to be here as the "point man" for the Surface Navy . . . a real privilege to provide you a SITREP.

Before I get too far along in talking about "The Surface Navy in a Sea of Transition," I would like to comment on a topic which seems to be foremost on the minds of many, based on the many questions I've received, particularly many surface warriors: the impact of the recent OPNAV organizational changes and how they are affecting the community; our future; and the way we do business these days in the "E" ring.

The reorganization was aimed at: reducing the stove-piping approach we have historically used in programming; improving efficiency; reducing parochialism; the more thoroughly integrate the one Navy/USMC team.

I received a fax from a friend shortly after the reorg was announced. "We trained hard - but it seemed that every time we were beginning to form up teams, we would be reorganized. I was to learn later in life that we tend to meet any new situation by reorganizing; and a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency, and demoralization." (Petronius Arbiter, A.D. 210)

Let me assure you that this reorg is not about "creating an illusion", not about covering up confusion, nor demoralization. It is for real! Although the final chapter is far from being written, I firmly believe it will produce a much better, much stronger, more capable Navy-Marine Corps team. And I am not saying this because it's the "party-line". To coin a frequently heard theme these days, it was time for a change. I sincerely believe that a change on how we do business was in order. There was "gridlock" evident, more evident in this downsizing environment.

This new organization may not be perfect, but it is an improvement, and much depends on those involved to make it work! People, not reorganization, are the key ingredients to success in any environment, and the Surface staffers are clearly the best in OPNAV. The former OP-03 staff is on-board: no resistance; no reluctance to try a new approach. They are eager and enthusiastic, and I am optimistic about our future.

There are some "grey areas", but we will work them out. Cooperation/communications is at an all-time high! The new N-8 org is a matrix type organization; non-traditional for the military, no "straight lines" of command and control like most of us have lived in! It "lacks neat diagrams" on how it should work. The new N-8 org has no neat lines, plenty of weaving, and unorthodox coordination. It is heavily dependent on communications and open mindedness, a willingness to question age-old assumptions. For it is a different world, no clear-cut super power threat anymore!

A recent Navy Times article indicated that the community had been "ripped asunder". One community official (unidentified) was quoted as saying, "There is no community, no cohesiveness and no integration". This is not true, simply not true! In that same article headlined "Surface Warfare Leaders Oppose Realignment" there was a quote by our SNA President, VADM Bill Rowden, who I believe hits the "reorg nail" right on the head: "It's an opportunity for some strengthening of the community". We concur! Well said, right on the mark, and the SNA can help us during this period of transition.

Secretary O'Keefe has given us an ideal point of departure in his luncheon remarks on the white paper, Preparing the U.S. Navy for the 21st Century. I want to go one step further and discuss the role I see for the Surface Navy as we transition to meet this overall vision of our future.

There can be no doubt that the world has entered upon a new era. What began with glasnost and perestroika in the mid-80's, and culminated in the dissolution of the Soviet state last Christmas, has left us all with mixed feelings. Our nation can take pride in having stayed the course of more than forty years of cold war, to triumph over communism and totalitarianism and set the stage for a "new world order". Virtually everyone in this room today can be proud of the part that he or she has played in the triumph of freedom from the forces intent on "burying us". Thankfully, our national military strategy of containment and strategic deterrence was never put to the ultimate test, and today we can actively pursue strategic arms reductions.

Those forty years were not devoid of engagement. The demands on our military services ran the gamut from forward peacetime presence through humanitarian relief efforts. Many of our surface warriors paid the ultimate sacrifice with their lives to permit our nation to lead the free world to victory. Most of you "paid your dues" to this accomplishment through selfless, dedicated service to our great nation. We all hope that in the days and years ahead a grateful nation continues to be grateful, and will not forget the price we paid for this precious, but unsettling peace!

Unquestionably, the world has changed dramatically in the last two years. It would be unreasonable, not to expect change in our national security policy. Not since the end of World War II has the nation faced greater uncertainty over the future direction of our

institutions. But we in the Surface Navy should not forsake our roots! Many would view the national security requirements of the new world order as if it came from outer space! We surface warriors however, will not be called on to do anything we haven't already done -- and done superbly. Those strengths inherent in the Surface Navy that saw us through the past are equally relevant to an uncertain future. These strengths - offensive capability, strategic and tactical flexibility, unparalleled professionalism, personal integrity - are the same solid professional cornerstones we need for the future.

Perhaps the most difficult task of this new world order is defining the threat. In 1946, the year following the defeat of Germany and Japan, few could have guessed the nature of the coming Soviet threat, and fewer still could have gauged its dimensions. In 1992, a year after the demise of the USSR, the greatest unknown with which we must deal is figuring the most likely source of conflict in an increasingly unstable world.

This becomes both a technical issue in terms of forces and capabilities and also a geopolitical issue of intentions and perceptions. Iraq is a case in point. As you may recall, we treated Iraq in the 1970's as a cold war antagonist, in the 1980's as a pragmatic alternative to Iran, and in 1990 as a mini-reincarnation of the Third Reich. Over that period of time, Iraq acquired weapons and technology first from the Soviet Union, then from the West, and finally from any source having access to modern weapons. This diverse arsenal posed some very real problems for us during the tanker war, then later in Desert Storm, in having to deal with so called "friendly weapons", such as the Exocet Missile, Manta Sea Mines, and ambiguous "IFF" signals.

The threat dilemma also has profound political dimensions in the way that it is perceived by the U.S. public. Clearly relieved of the threat of a belligerent superpower, and promised a peace dividend, the American people must perceive any future threat as a "clear and present" danger, as Tom Clancey would say, before they will be willing to back off of the current defense drawdown. This is unlikely to happen in the near term, and in the longer term American attitudes toward defense will more likely be shaped by events and economics than by some base force goal. Television has created a more informed, and yes, a more skeptical audience.

What is unchanged, as we probe the future, are important lessons of the past, which should be carried forward in our thinking as we consider future surface combat systems. I characterize these attributes as warfighting needs that must be addressed technically and tactically if we are to succeed in preparing the Surface Navy for the 21st century. I offer a few of the ones that I believe will be vital in view of the uncertain threat and are imperative if we desire to maintain a quality surface force.

The main warfighting need is firepower -- the capability to effectively engage the enemy by putting ordnance on the target. Secondly, to put ordnance on target we need

surveillance -- to maximize the probability of detecting and targeting enemy forces. Our combat systems must make direct use of advanced sensors -- shipboard and off-board, Navy and Joint, and associated real time data bases which will permeate the operational theater of the future. We are working at flank speed on this issue within the surface community, particularly within our AEGIS and big-deck amphibs, meaning our future command and control platforms for the littoral battlefield.

You may be asking why AEGIS? Why do we need an increase of C3I? Tomahawk planning could be an easy answer. And it certainly fits, particularly as we build more battlefield targeting capability into our next generation of TLAMS, attempting to provide the shooter with a last-second reorientation or re-targeting capability based on, say "BDA" coming from "the preceding TLAM shot", be it Tomahawk or another coordinated strike platform.

And how about TBMD, a relatively new and certainly exciting mission for AEGIS. TBMD - Theater Ballistic Missile Defense! A big issue: think Scud, think nuclear, biological and chemical warheads. As recently as last Thursday, we received a written commitment from Ambassador Cooper (SDIO) indicating total acceptance of our "road map a: proach" to bringing Navy full force into Star Wars; with AEGIS we have fifty mobile platforms having eighty per cent of the needed infrastructure. Ambassador Cooper indicated that he had substantially increased funding levels for Navy to not only provide improvements to AEGIS and Standard Missile Block IV A, but further downfield to an exo-atmospheric capability.

The third warfighting need is flexibility -- meaning the ability to perform or adapt to a variety of warfare tasks. Our combat systems must be flexible and automated to rapidly reconfigure to counter the threat in its many variations.

The final warfighting need, one which must be carefully balanced against the other three, is affordability -- which I define as the combat effectiveness of a system or ship relative to its life-cycle cost. I include affordability as a warfighting need because without prudent cost control we will not be able to field quality systems to meet the threat, sustain damage, fight hurt and survive. Future combat systems must be cost effective not only to meet stringent budget constraints, but also to prevent a force imbalance from occurring, upon which an innovative enemy can capitalize.

The lack of mine hunting and neutralization equipment in Operation Desert Storm proved to be a critical shortcoming to the entire littoral warfare operation, which might have been avoided if a balance force approach had been followed. This is not intended as a criticism; it was a conscious decision made years ago.

These four warfighting needs -- firepower, surveillance, flexibility and affordability - the forte of surface warfare, have a single common ingredient -- the well-trained, professional men and women who ultimately provide the winning edge in any conflict. The teamwork and dedication to excellence have been the standard of surface warriors and must remain the standard of performance in the years ahead. Maintaining our quality, professional, well-trained force is a major concern.

Some lessons from the past are instructive. Fifty years ago almost to the day, October 26, 1942, the Battle of Santa Cruz Islands was fought several hundred miles northeast of Guadalcanal. This was the fourth of seven surface actions to occur during the Guadalcanal Campaign, which lasted from August 7, 1942 until February 9, 1943, when the island was officially secured. The Battle of Santa Cruz was notable in that the Carrier HORNET was severely damaged by Japanese air strikes and later sunk by torpedoes, leaving only ENTERPRISE, herself damaged by three bomb hits, as the sole surviving U.S. carrier in the Pacific. Nevertheless, the American soldiers and Marines on Guadalcanal, who had seized the combat initiative at the time of the initial landing on August 7th and 8th, were able to hold firm while the enemy attack rose to a crescendo and was finally snuffed out on the night of 26 October. The Marines had held, and Henderson Field remained in American hands. Japanese casualties were roughly ten times the American losses and enemy ground forces no longer posed a serious threat.

In his book Fleet Tactics, Captain Wayne P. Hughes has noted that both carrier battles, the Eastern Solomons and the Santa Cruz Islands, were tied completely to events on Guadalcanal. He points out that in these naval duels, one side or the other always had the complicating problem of a beachhead or a convoy to protect. The Japanese did well in the early battles despite their handicaps because:

- the U.S. Navy failed to grasp that the killing weapon was the torpedo
- the U.S. Navy had no tactics suitable for night battle at close quarters
- Naval leadership was slow to learn. Because of the rapid turnover of tactical leaders, the pace of the battles overwhelmed the Americans.
- above all, the U.S. Navy did not exploit its decisive radar advantage - the edge in first detection and tracking that surface search radar gave - and in targeting that fire control radar gave. While not all ships had both advantages from the start, the radar equipment there could and should have been better handled.

They were failing to take advantage of a technological advantage; too tied to the past; "stove-piped tactics" one critic complained; lacking imagination and unwilling to be innovative, open-minded. That's a history lesson worth remembering.

From August 1942 to July 1943 the U.S. Navy suffered from these failings. Finally in August 1943, the Navy took advantage of the latent potential of radar, using new and compatible tactics developed by a young commander by the name of Arleigh Burke.

Just as the Guadalcanal Campaign forced far-reaching changes in tactics and equipment, so too will the new national security environment cause profound change in the Surface Navy's operational concepts. The focus has clearly shifted from global war to rapid deployment readiness of joint forces in regional conflicts and littoral contingencies, which include peacetime presence and low intensity conflict. While Desert Storm may prove to be the prototypical regional war, it is far more likely that the Navy and Marine Corps team will be involved in peacetime presence and show of force operations, such as those currently taking place off Somalia and in the Adriatic.

The "new direction" to provide the nation with naval expeditionary forces; shaped for joint operations; operating forward, from-the-sea, in the littoral areas of the world, is not new! These are our Navy/USMC roots! What this "new direction" again recognizes, is the synergistic effects of joint operations conducted from the sea. It recognizes that AAW/ASW/ASUW/MIW are not ends in themselves, but are the enabling warfare missions to provide "battlespace dominance", our new term for "control of the sea". It also recognizes that achieving battlespace dominance is essential to our ultimate mission, projection of power.

Dominance of the littoral battlespace, power projection and sealift are the basic business of the surface community. In this new littoral mentality, you may occasionally hear the term maneuver warfare. Maneuver warfare is a warfighting philosophy that seeks to shatter the enemy's cohesion through a series of rapid, violent and unexpected actions which create a turbulent and rapidly deteriorating situation with which the enemy cannot cope. The aim in maneuver warfare is to render the enemy incapable of resisting by shattering his moral and physical cohesion, his ability to fight as an effective, coordinated whole, rather than to destroy him physically through incremental attrition, which is generally more costly and time consuming.

Ideally, the components of his physical strength that remain are irrelevant because we have paralyzed his ability to use them effectively. Even if an outmaneuvered enemy continues to fight as individuals or small units, we can destroy the remnants with relative ease because we have eliminated his ability to fight effectively as a force.

Maneuver warfare was adopted as a warfighting doctrine by the Marine Corps under General Al Gray in 1989. This requires a concept of warfighting that will function effectively in an uncertain, chaotic and fluid environment. In fact, one that will exploit these conditions to advantage. It requires a concept that is consistently effective across the full spectrum of conflict, because we cannot attempt to change our basic doctrine with situation to situation, and expect to be proficient. It requires a concept with which we can succeed against a numerically superior foe, because we can no longer presume a

numerical advantage. And in expeditionary situations when public support for military action may be tepid and short lived, we must win in hours and days, not weeks or months! It requires a concept with which we can win quickly against a larger foe on his home soil, with minimal casualties and limited external support. In words taken from the conclusion of the white paper, "The Navy and Marine Corps team is changing in response to the dual challenges of a new security environment and a declining defense budget. The shift in strategic landscape means that naval forces will concentrate on littoral warfare and that maneuver from the sea joins maneuver warfare on land in the joint warfighting team approach to success in the sea, air, land and space battle." You can be assured that Admiral Burke recognizes this "new direction".

Littoral warfare opens a broad range of naval power projection options which include:

- precision-strike Tomahawk missiles
- tactical air power
- amphibious vertical assault and envelopment operations
- naval surface fire support, special warfare direct action
- attack helicopters, and maritime unmanned air vehicles.

Don't be too surprised - it may even include an airship hovering over the littoral battlefield, providing a clean and concise radar picture, capable of spotting and tracking Exocets or Scuds from well over 1000 miles away! The flexibility, mobility and firepower which can be brought to bear by the Navy and Marine Corps team against an adversary's critical vulnerabilities remains the essence of maneuver warfare from the sea.

In conclusion, joint operations in the littoral environment place demanding requirements on the Navy. However, they are not new. The Surface Navy has been here before -- in fact, it's what we do best! We understand the requirements, the warfighting needs and the concepts that characterize littoral warfare. Don't let anyone tell you otherwise. We must again articulate the Surface Navy role in joint warfighting doctrine. Maneuver warfare doctrine meets this doctrinal challenge and offers the essential basis for integrated joint force operations. Then, within that framework, we must develop and field surface warfare systems, tactics, and force structure that can effectively keep the peace in the next forty years or, if necessary, win in war.

The Secretary gave us the overall framework. I have told you what I see as the vital role of the Surface Navy in achieving his objectives. Dave Bill and Tom Marfiak will provide outlines of the Surface Navy's future from a combat systems and a doctrinal perspective. Use all of this as a starting point. Start at this symposium. Let's move out smartly in preparing the Surface Navy for the 21st century.

We appreciate your interest and support. Thank you.

REMARKS BY REAR ADMIRAL (Select) DAVID S. BILL III, USN
Director, Surface Combat Systems Branch, Office of the Director of Surface Warfare

before the Surface Navy Association Fifth National Symposium, October 1992

Good afternoon members of the Surface Navy Association. Let me begin by acknowledging the wealth of experience and leadership represented by the surface warriors assembled here for this Fifth Annual Surface Navy Association Symposium. There are too many surface warrior superstars to name each one individually, and I think it fitting to thank all the members of SNA whose professionalism and dedication have significantly assisted in advancing the Surface Navy to where it is today -- second to none!

Today I will share some thoughts about surface combat systems in littoral warfare. I will talk about the four critical operational capabilities defined in the white paper as they relate to our surface combat systems programs.

In the shift in focus from a global, superpower threat to the emphasis on regional, conventional warfare and crisis response, we are presented with different threat considerations in which reduced sea room, radar clutter, background shipping and air traffic, shallow water and restrictive rules of engagement combine to impose formidable challenges.

Let me first review the challenge of the littoral threat.

- The threat includes naval mines, which have had a lower priority in the past.
- Air, surface or land antiship cruise missiles which will become increasingly more sophisticated in the future and more difficult to deal with in close proximity to an enemy's coast.
- Fast patrol boats, which will present a targeting problem and for which our weapons systems are not optimized.
- Tactical ballistic missiles, which may soon pose a serious threat to the conduct of joint warfare operations in the littoral, and
- Diesel-electric submarines, which become a particularly difficult problem in the coastal waters. These are different from the threats we have considered in open ocean warfare planning. As a consequence, our sensors, weapons and tactics must be modified accordingly.

Most importantly, the threat to naval operations in the littoral environment must be viewed in a broader, warfighting perspective if we are to accomplish our mission in the joint warfare context. The naval commander may need to be more concerned with supporting troops ashore or providing overland AAW protection than defeating a strictly naval threat. Even greater change is required in our approach to warfare, as we move our emphasis to that of an enabling force.

The shift in focus to littoral warfare will require that we adapt our existing force structure to the needs of a naval expeditionary force. We must selectively develop new systems and modify or upgrade current systems to meet this altered threat. I would like to relate our combat systems programs to the four operational capabilities defined by the white paper.

These four key operational capabilities -- command, control and surveillance, battlespace dominance, power projection and force sustainment are not new, but must be addressed from the maneuver, expeditionary, littoral warfare perspective.

Not only have we reordered our warfare priorities in our planning, as I briefed last year, but we have also modified some of our key combat systems requirements. I have grouped some high priority, POM 94 combat systems programs under the appropriate operational capability to help you better understand our current thinking.

Let me begin with command, control and surveillance. Our command and control scheme must be organized to take advantage of opportunities when and where they occur and surveillance must be closely integrated into battlespace dominance and power projection. In a maneuver campaign, such as the land phase of Desert Storm, subordinate commanders must make decisions on their own initiative, based on the overall "focus of intent". The bottom line is that they must know what the enemy is doing and be able to respond with appropriate weapons systems in a timely, effective manner.

A network of high performance, ruggedized commercial computers, such as the Navy's tactical advanced computers, TAC-3 and TAC-4, which will interact through fiber optic, distributed, digital interface networks, offer performance and affordability improvements that will substantially upgrade command and control capability.

Command and control for strike warfare will be significantly improved with the introduction of the Theater Mission Planning Center Upgrade (TMPCU) and Afloat Planning System (APS). TMPCU will support Tomahawk Block III mission planning and added missile capabilities, while dramatically reducing mission planning time. TMPCU OPEVAL has just been completed and an April 93 BLK III System IOC will be realized.

The Afloat Planning System, which will host TMPCU software in downsized, ruggedized hardware, is planned for installation in carriers and several rapid deployment suites. APS will provide battle force commanders with the ability to plan new or to modify existing TLAM missions to respond to developing scenarios. Rapid deployment suites will

enhance coordinated strike planning when co-located with a joint task force commander, either ashore or afloat. Coordinated strike planning will also be improved by two strike planning aids that will be integrated with APS, the Tomahawk Strike Coordination Module and Mission Display System. Both systems will support more rapid, integrated, strike planning, as well as strike plan rehearsal and validation at the force level.

Our surveillance efforts will continue to emphasize the exploitation of space and electronic warfare. The goal is to provide battle group commanders with more accurate, timely and properly evaluated information, while denying or managing the data available to the enemy. The white paper states "particular emphasis will be placed on the ability to collect intelligence through covert surveillance early in a crisis". To accomplish this, there is an increased requirement for improved tactical surveillance organic to the battlegroup.

To address this need in the short term, the Pioneer RPV Systems that were used during Desert Storm aboard battleships will be staged on selected amphibious ships. For the future, we hope to include in the OSD-sponsored, Joint UAV Program a close range maritime UAV which can operate from sea-based platforms and satisfy a newly defined, multi-faceted mission need statement.

For those of you that doubt the utility of the UAV, this videotape shows the effectiveness of the first generation Pioneer during Desert Storm. It illustrates that real-time-battle-field-surveillance, effective weapons and accurate battle damage assessment can have a devastating effect on the enemy.

The use of the Airship is also an option that may provide the battlegroup with long-endurance, all-weather, over-the-horizon surveillance. An approved requirement exists for this capability, and I wouldn't be surprised to see previous efforts in this area revitalized.

I will address the second and third operational capabilities - battlespace dominance and power projection - together because they are closely related and need to be fully integrated. Clearly, dominating the battlespace is a prerequisite to effective and efficient power projection and enables us to maintain access to forces ashore for reinforcement and resupply. Against the global Soviet threat, the carrier battlegroup was the focus of open ocean warfare, which featured tactical defense-in-depth against potential submarine, air, and surface threats. Conceptually, this was to be followed by long range air and missile strikes against enemy airfields and ports.

Against regional and lesser-developed powers, our naval forces must be flexible and adaptable to seize reentry ports and bases quickly, thus enabling the heavy forces of the Army and Air Force to be introduced. Battlespace dominance will also require long-term maritime interdiction operations to interrupt trade and sever lines of communication.

Control of battlespace in the future will require an effective counter against tactical ballistic missiles. Naval expeditionary forces cannot afford to be vulnerable from the next generation Scud. Our tactical ballistic missile program is very exciting and has come a long way since last year. It is being developed in concert with the strategic defense initiative office with a goal of providing layered defensive capability against a wide range of tactical ballistic missiles.

The first part of the program involves modifications to the AEGIS weapon control system and SPY-1 Radar. These software modifications will give us the expanded capability to detect and track TBM's in flight. Tracking them, however, is only part of the solution. To engage the TBM, modifications to the front end of the standard Missile Block IV are required to deal with the challenging, high velocity target. We hope to feed our effort from seeker, fusing and warhead improvements already being developed for the Patriot System. These changes will provide an "area" defense capability against TBM's which will allow us to protect fleet concentrations, amphibious objective areas and other vital assets ashore.

The second part of our TBMD program is to provide a "theater" defense capability which will require the development of an Exo-atmospheric Interceptor.

Through a Joint SDIO - Navy effort, the Lightweight Exo-Atmospheric Projectile, of LEAP, will be tested aboard a Terrier missile first, and then on a SM-2 Block IV. In parallel, the potential use of a marine-ized, Army THADD (Theater High Altitude Air Defense Missile) in a Navy vertical launch system will be analyzed to see if we can leverage off that TBM effort. To be able to use the long range capability of these interceptors, we will consider sensor upgrades to provide organic detection capability compatible with LEAP weapon ranges. At the same time, we will also initiate efforts to help us design the battle management, command, control and communication system required to counter this challenging threat.

Another important aspect of TBM defense (as well as self defense) is the cooperative engagement capability. This will provide real time, extremely high rate transfer of sensor data to all participating units. Tests have already been conducted, aimed at tying together Navy surveillance assets with Marine Corps Hawk Units, Army Patriot Units, as well as the Air Force AWACS. The goal is to integrate all systems in a joint solution to the tactical ballistic missile defense problem.

We have spent the past year working extremely hard on ships self defense, one of the most critical aspects of battlespace dominance in littoral warfare. This important effort is being managed by a newly formed self defense program office under the leadership of RADM Tim Hood.

Proper identification is at the heart of all successful self defense engagements. One key to improved ID is the effective integration of cooperative and non-cooperative ID systems, with data fusion of all available information. Three systems are being developed:

- SARTIS which exploits target characteristics and will be installed on all AEGIS cruisers,

- The AN/SLQ-20 upgrade, which improves this non-cooperative ID system for DDG 51 and DDG 993 class ships and

- CIFF, Centralized IFF, which will provide automated data fusion for rapid evaluation of high interest targets.

With proliferation of increasingly more capable land and air-launched cruise missiles, high payoff improvements, which exploit sensor upgrades, system integration and weapons effectiveness, are key to AAW self defense.

AAW radar search will be enhanced with improvements to existing radars such as SPS-49, SPQ-9 and SPS-48, as well as research into advanced radar technologies.

The requirement for infrared-search and track, to augment radar detection of low altitude-low cross section antiship cruise missiles, remains valid. The proposedIRST system will detect and track targets at sufficient range to allow effective engagement. We are committed to its earliest possible fleet introduction.

The quick reaction combat capability - QRCC - will integrate the SPS-49, MK-23 TAS and CIWS radars, together with the SLQ-32 ESM, and Hardkill/Softkill systems to form several different ship self defense combat systems. The synergism gained through integrating these systems will produce firm tracks earlier and result in reduced reaction time.

To improve our hardkill systems, we will enhance the maintainability, reliability and capability of CIWS, while pursuing programs to improve the standard missile, Sea Sparrow and RAM which will be introduced aboard our first ship (LHA 5) in December. The requirement here is to enhance our AAW self defense effectiveness against low observable, sea skimming threats.

The Outlaw Bandit Program will continue. This program reduces the radar cross section of combatants significantly and increases the softkill effectiveness of improved offboard expendables and decoys.

To deal with shallow water, quiet, diesel submarines, the Lamps MK III with the Block II Upgrade, consisting of ALFS and ISAR, will play an important role, as will improvements to the shallow water performance of the MK 46 and MK 50 torpedoes. I should note that the MK 50 will be released for fleet introduction this week, adding a truly impressive capability to our ASW arsenal.

Additionally, an SQS-53 A/B product improvement program, which increases its shallow water detection performance, reliability, and maintainability, is planned for the DD 963 class and selected CG 47's.

Another important ASW program that will improve our ASW capability is vertical launch ASROC. VLA fills the medium range torpedo void by providing for quick reaction delivery of a MK 46 torpedo. We expect to receive the VLA OPTEVFOR report next month, on what we believe to have been a successful follow on test and evaluation, conducted last August. You can expect an early 1993 IOC.

Surface ship torpedo defense is an area of concern and we are addressing it in three phases.

Phase I - Improved NIXIE - which is in the fleet today.

Phase II - Detection and countermeasures against Wakehomers - which is currently in Techeval, and

Phase III - 360 degree detection with layered countermeasures - which is a joint program with the United Kingdom and is expected to have an IOC near the end of the century.

While our LAMPS helicopters will continue to play an important role in ASW, there is an expanded requirement for shipboard helos in the ASUW role in the coastal environment. The versatility of an armed helo to scout, target and attack surface threats make it an important asset. The SH-60 will be capable of carrying the Penguin Missile which has been procured in limited numbers, and will be operational next year.

The Army's AHIP helo has also proven to be very effective operating from Navy decks in the Iraq war, carrying a variety of gun, rocket, and missile payloads. Whether the armed helo ultimately is Navy or Joint is a matter of affordability and availability; but, however, it shows up, the armed helo will contribute to the mobility, firepower and flexibility of any Joint operation.

The capability to project power ashore lends substance to U.S. political initiatives, when the threat of military power is used to convince other nations to act in consonance with U.S. national interests. When the shooting starts, power projection covers a broad spectrum of offensive naval operations, including employment of Cruise missiles against enemy threats ashore.

Combat proven in Desert Storm, Tomahawk will play a pivotal role in striking critical enemy nodes early in a campaign to disrupt, disorient and divert him from engaging us effectively.

We will continue to buy Tomahawk Blk III missiles, as well as supporting the Tomahawk Baseline Improvement Program.

This program will incorporate major modifications to the existing Tomahawk Weapon Systems to provide a precision, multi-mode strike Cruise missile with an imaging seeker and hard target penetrator warhead.

With the decommissioning earlier this year of MISSOURI, the last battleship has returned to the mothball fleet. While these national assets may never be brought back into service, the effectiveness of their 16 inch batteries is not at issue to those of us who have fired them in anger. I must add that I remain one of those who continues to believe that the battleship has an even more important role in the littoral, particularly in view of maneuver warfare requirements for responsive, all weather, long range surface fire support.

To address the capability gap left by the disappearance of the 16 inch gun, we are in the process of conducting a cost and operational effectiveness analysis, a COEA, which is evaluating new naval gun technologies and a variety of LVLS-launchable weapons, tailored to the fire support role. We are concentrating on the search for technologies and system already under development by other services. Key also is the more effective integration of Navy and Joint TACAIR in the fire support role.

Lastly, the fourth operational capability -- force sustainment -- connects logistics at the tactical and strategic levels.

Because over ninety percent of the logistics of war are supplied by sea, the Navy has a unique mission to provide joint service sustainment for all theater forces. This requires a comprehensive and responsive logistics support system, which includes fast combat logistics support ships, replenishment ships, maritime prepositioning ships, and strategic sealift ships. It also includes a host of task specific ships, such as towing and salvage ships, repair and maintenance ships, hospital ships and floating drydocks.

From the combat systems sustainment perspective, we need to adjust our weapon inventories to be consistent with the littoral threat, while maintaining production bases for selected critical weapons. We clearly need to ensure that we have adequate numbers of the right weapons to support protracted conflict without depleting our inventories at the end of hostilities and before we can gear up our industrial base. Our surface combat systems program, I believe, supports this strategy.

In conclusion, I want to leave you this afternoon knowing that the U.S. Navy is in the midst of fundamental change. The change in threat has caused us to refocus our strategy toward the littorals of the world that are vital to our national interests. Warfare in these regions employs Navy and Marine Corps expeditionary forces, operating from the sea, together with the other services and allies, in a campaign of maneuver. To win the littoral battle requires superior surveillance, and integrated command and control systems to target critical enemy vulnerabilities. Effective weapons are required to critically wound the enemy while protecting our own forces. If and when we are called up, we will dominate the battlespace and project war winning power.

I can assure you, we will continue to focus our resources and energy to keep our Surface Navy ready to respond and - second to none! Thank you for your attention and I believe I have time to answer any questions you may have.

REMARKS BY REAR ADMIRAL (Select) T. F. MARFIK, USN

Director, Surface Warfare Plans/Programs/Requirement Branch, Office of the Director of Surface Warfare

before the Surface Navy Association Fifth National Symposium, October 1992

Good afternoon ladies and gentlemen. Admiral Quast has given you an excellent SITREP on surface warfare. Admiral Bill has filled you in on surface combatant systems in littoral warfare. As today's clean up batter, my task is to draw for you the picture of how we will transition to tomorrow.

For those who fail to learn its lessons, the mistakes of history are repeated. After the Korean War our nation's strength was supreme -- unchallenged -- much as it is today. In that similar time President Eisenhower cautioned that "our program is not our strength today, it is rather the vital necessity today to ensure our strength tomorrow." That is why we are here and why this Surface Navy Association symposium is so timely -- to underline the vital necessity today that we ensure our strength tomorrow. The Surface Navy is at the core of a strong and flexible Navy for tomorrow.

These key issues influence our perspectives and the future of surface warfare. Our national security requirements are no less imperative than before the fall of the Berlin Wall and the disappearance of the Soviet Union. The proliferation of high tech arms has widened the threat, even as the geopolitical realities have become more complex. Resource constraints, in turn, create difficult choices we must confront successfully to preserve our core combat capability.

I would like to examine each of these issues, in turn, to develop perspectives for the future of surface warfare.

By many estimates the "cold war" is over. The threat of monolithic world communism has ceased to exist and even China appears interested in the fruits of capitalism.

The collapse of the Soviet Union dramatically lowered strategic tensions. Some people no longer feel they live "under the nuclear gun" and some would say we no longer need forces for nuclear deterrence.

Certainly, our nuclear deterrent -- the triad -- is undergoing significant change. Yet, it is in the area of conventional deterrence that our surface naval forces have a significant role. Today, an enduring requirement to contain/limit Third World conflict is recognized as a valid security requirement. Dramatically demonstrated in Desert Storm, it is an equally vital necessity to ensure our strength for the future.

These events and perceptions are important to the question of what we need a Navy to do. While the prospect of global war has receded, we are entering a period of enormous uncertainty in regions critical to our national interests. Just since the collapse of the Soviet Union the Navy and Marine Corps have been called on thirty-one times to respond to international crises. None of these thirty-one crises involved the Soviet Union; all involved surface forces.

The "bottom line" is that we need a Navy to shape the future by underpinning our alliances, to provide for ready, forward deployed capabilities to contain conflict or, optimally, to deter it and help preserve the strategic position we secured by four decades of sacrifice and vigilance.

A strong Navy, the Navy/Marine Corps team in its fullest context, is crucial to the future security interests of the United States and its allies. Freedom of the seas provides the Navy a unique ability for forward presence independent of diplomatic action.

Strategic deterrence is increasingly oriented towards conventional as well as nuclear force options. The tactical land attack missile has come into its own as a conventional deterrent system. Those who wish ill of the United States have to contemplate the prospect of precision, conventional strike weapons launched from the sea. One of the most important contributions of a strong Navy is early provision of a credible seaborne deterrent.

Control of the seas provides the Navy access to the Third World littorals to influence events across the shore, and as highways for sealift to build and sustain forces ashore.

As the months of sustained operations in Desert Shield preceding Desert Storm demonstrated, the Navy is an enabling force that can rapidly transit to the scene of a crisis and provide continuous, on-scene crisis response while land-based forces are built up.

Fully joint operable, naval forces contribute to the land battle through projection of precise power from the sea and through sealift to sustain large scale warfighting.

As an indicator of force structure issues, this slide shows Navy SCN over time in constant FY-92 dollars in green. Also shown in green are the FY-95 through FY-99 SCN expenditures projected in POM-94. The buying power of the Navy has been trending downward since 1984, and POM-94 estimates that we have "bottomed-out" may be optimistic. The yellow line shows the impact if we "steady-out" at FY-94 levels, and the red line shows what happens to the SCN account if recent trends are not reversed.

These projections show that each dollar must count, that old ways of doing business are likely to be challenged, that we must, to a degree we have not had to do before, critically examine each program, each endeavor to ask the question -- "Will this serve our country and our people well in the future?"

We must not let a lack of willingness to pay for national security be translated into a denial of the core requirements that must be built and maintained to defend our national security interests. More than ever, we must clearly articulate the importance of a modern Navy/Marine Corps team to our joint force posture as provided for in the white paper ". . . From the Sea" and discussed by Admiral Quast.

The Navy must pace the threat -- a threat reduced in quantity but not in quality. It makes little difference to a ship CO how many missiles a foe possesses when two ASCMS are inbound simultaneously -- a realistic threat in most littoral areas of the world. We have exchanged a high-low threat view of global warfighting, in which some lightly defended ships made sense, for a threat level in all regions that places a premium on unit self defense. As we "down-size" our Navy, we must maintain total capability through strengthened unit capability.

Joint coalition warfare places a premium on a strong Surface Navy that can be on-scene quickly to act as an enabling force, buying time for coalition building, movement of air and land forces to the scene and build-up ashore to repel aggression.

We can not afford to give a potential enemy a "cheap shot". Our naval forces must be able to dominate battle space. Further, that battle space involves littoral operations characterized by shallow, mineable waters with poor acoustics, high densities of friendly and neutral shipping and air traffic, and likely land clutter, an environment suited to the enemy's use of land weapons against maritime forces and employment of naval units with limited range capability such as missile boats and mini-submarines.

Most importantly, we must stress the contribution that the Navy/Marine Corps team makes in influencing and contributing to the battle ashore. Amphibious forces in the Persian Gulf engaged a sizeable portion of Iraq's defenses by forcing them to prepare for a "two front" war. The Iraqi troops guarding the beaches were not in position to confront our land forces sweeping north and east.

As these points indicate, we are now and will be fully engaged. The systems we have at sea today, the men and women and the ships they sail, are the envy of the world and the acknowledged masters of their profession. Even as we transition our thinking and our training to a "near land - over land" environment, we must not lose sight of the fact that our ability to strike at long range from the sea, to thoroughly understand and dominate a battlespace, to move powerfully from one crisis to another, is born of our open ocean heritage.

The Surface Navy provides an immediate, visible and flexible response to support diplomatic action and national security interests. A strong Surface Navy is crucial to sealift, providing the full range of land and air support that can accrue to a Navy shaped for joint operations. The Surface Navy provides a continuum of capability for projection of power across the shore from naval surface fire support, to air and missile strikes, opposed amphibious assault and sustainment of long-term operations.

In short, if we are to have more than a one dimensional Navy, credible surface forces are the crucial component of our overall naval capability.

The shift in national security strategy has provided the Surface Navy a superb opportunity. We can "leapfrog" in technology to pace the threat of the future by investing in technology today, refocusing our procurement to build for the future. In building for tomorrow, we must seize the opportunity to forge a Surface Navy fully consistent with joint warfare doctrine.

The 21st century destroyer study, ongoing under Admiral Quast's leadership, is charged with the responsibility to help us realize these opportunities by building a technology roadmap that affordably meets future warfighting requirements. Although the title focuses on a future destroyer, the resultant technology roadmaps will be important to all surface warfare forces. This study has involved over one hundred players from the operational, technical and laboratory communities. Input from industry was solicited; over three hundred white papers were received.

The study is a follow on to the DDV study that helped us rapidly respond to the new world environment with specifications for the FY-94 DDG 51 Flight IIA. In the 21st century destroyer study we are specifically focusing on technologies that offer the promise of meeting future requirements and reducing costs. Emphasis is placed on reducing manpower costs through automation. We are working to develop an understanding of which technologies and processes are mature enough on which to inform our decisions.

Let me quickly highlight some areas the study is currently reviewing.

We believe that advanced technology will have a fundamental impact on the way we conceive, design and build ships in the future. Scalable, massively parallel systems with few, if any, stand-alone systems, using common languages and operating systems are the wave of the future. These will require a 'top-down' systems engineering approach and present a challenge to our traditional ways of doing business. However, this would enable us to fully exploit advanced technology, to build in ruggedness and reliability, to lower crew size, and to capitalize on commercial off the shelf technology to maintain quality and reduce costs.

Many technologies are under review that offer improved capabilities to project power across the shore. Improved range, reaction time and lethality are all possible through advanced propulsion, imaging sensors, and multi-spectrum seekers, to cite only a few examples. The challenge in this area isn't one of finding new ideas, but rather one of finding affordable ideas.

Advances in solid state electronics, unlimited parallel processing power and "smart" algorithms offer opportunities to transition to active aperture radars that provide for non-cooperative target recognition and horizon search to defeat future sea skimmers. These technologies will be particularly important in the littoral environment where low cross section, high speed targets must be found in a cluttered, "dirty" environment.

Again, as a result of Desert Storm, we are reviewing our ability to respond to the proliferation of ballistic missile technology and weapon systems. The Navy is positioned to respond and pace this threat as it develops. Many of the advanced technologies applicable to future AAW in the littoral environment are also applicable here. The most important thing to keep in mind is that the Surface Navy is in the forefront of developments in this emerging area of tasking.

The shallow water of the littoral environment, coupled with the proximity of future fleet operations to enemy naval facilities, compounds ASW and mine countermeasures requirements. We long minimized Third World diesel threats because they were not well trained and did not stray far from home waters. That logic breaks down when our operating area is their home waters. The same applies to Third World mines. They weren't a big problem when we were focused on deep water engagements with Soviet naval forces. We paid a price for that in Desert Storm. One of our highest priorities must be to address and rectify our shallow water mine avoidance and countermeasures capabilities. Advanced technology offers future promise in this area through acoustic and non-acoustic detection and classification, data fusion and robust data processing architectures.

SEW/C4I2 is increasingly important for situational awareness at the unit level and battle space dominance at the force level. This area is the key to joint interoperability. The exploitation of parallel and distributed processing, mass storage devices and multimedia, multi window technology are all critical to satisfy SEW/C4I2 requirements in the future.

When we have been faced with fiscal austerity in the past we have focused too much on combat system trade-offs while other potential areas of cost-savings received little emphasis. We believe that there are other areas where costs can be lowered without impacting on warfighting capability. One area is advanced technologies for hull, mechanical and electrical systems. A version of integrated electric drive can be ready about the end of this century. Advanced RAM and ship shaping can compound an enemy's fire control problems. We also see cost savings in advanced hull coatings and greater commonality. Advanced monitoring and control systems are also considered to be critical to maintenance and manpower savings.

Another area where we expect technology can help us hold the line on core capability as we reduce cost is in producibility and manufacturing. Increased emphasis will be placed on commonality, modularity, and computer aided design. Changes in the way we design and build ships in the 21st century will be revolutionary, not evolutionary.

As we look to the future, a future of new challenges, many uncertainties and significant changes in the way we do business, the Surface Navy must rely on its strengths. We have a proven record. We have clearly demonstrated our professionalism. Desert Shield and Desert Storm demonstrated our staying power and provided valuable joint force experience. These are our weather anchors of the past to see us confidently through the future.

Most of what I've said is upbeat -- and the Surface Navy's view should be upbeat. We are at a crossroads and, if we take the right path, have an unparalleled opportunity to serve our national security interests. That is not to say that there are not serious concerns to face.

Resources will be increasingly hard to come by. Even if we are again successful in selling the importance of force quality, as Admirals Doyle and Rowden did in similar times in the late 1970's, it will be hard to retain quality without breaking rice bowls and changing the way we do business.

One of our most serious concerns must be the quality of life of our surface warriors since OPTEMPO/PERSTEMPO is expected to stay high along with the ever increasing demands on the Surface Navy to provide a visible, forward presence in regional hot spots. We can not afford to repeat the post-Vietnam experience where we allowed quality of life to take a back seat and our experienced sailors "voted with their feet".

Training resources must be maximized. Our future ship architecture must stress embedded training support. Connectivity will also be a critical concern.

Our directions are clear.

We must prepare for littoral warfare - we must be continuously ready to fight and survive.

Our highest priorities must be to maintain the quality of life for our personnel and provision of equal opportunity for women at sea.

Even as we lower our force size, we must enhance force quality with particular emphasis on USN/USMC operational integrity.

We must stress joint operability and especially those Surface Navy characteristics which enable joint warfighting.

One of our greatest surface warriors, Admiral Arleigh Burke, gave us the keys to the Surface Navy of today. These keys -- speed, surprise, and hitting power -- remain critical to Surface Navy success in the future.

Thank you.

REMARKS BY CAPTAIN GEORGE KLEIN, USN

Office of the Commander, Naval Command, Control & Ocean Surveillance Center

before the Surface Navy Association Fifth National Symposium, October 1992

Before I get into the topic for this morning, I feel that I must take just a minute to tell you where I am coming from. I represent NCCOSC. That's not NOSC, not NIC-O-SIC, not N-COS-C, but NCCOSC - Naval Command, Control and Ocean Surveillance Center. We are a warfare center.

About this time last year, partially as a fall-out from BRAC 90 and partially from a need to restructure the Navy's lab and ISE activities, the four warfare centers were conceived: the Air Warfare Center under RADM Strohsahl, headquartered here in Washington; the Surface Warfare Center under RADM Meinig in Dahlgren; the Undersea Warfare Center headed by RADM Sears in Newport; and NCCOSC, with headquarters in San Diego.

Our mission is: To be the Navy's full spectrum research, development, test and evaluation, engineering and fleet support center for command, control and communications systems and ocean surveillance and the integration of those systems which overarch multiplatforms - whatever a multiplatform is.

In short, cradle-to-grave responsibilities for command, control and communications systems. We are an echelon three command under SPAWAR; our major sponsor is OP-94/N-06; our major customer the fleet. We provide world-wide fleet support both afloat and ashore.

It says on the program that I am going to talk about future technology projections with regard to C3I. Simultaneously to my left and right RADM George Meinig and RADM Scott Sears are discussing the same about surface warfare and undersea warfare respectively. These are not three separate topics. They are so intertwined that they almost cannot be discussed separately. Hopefully during this week we will all come together.

RADM Sears is talking about the future role of the submarine in littoral and strike operations and RADM Meinig is talking about the fact that the traditional way of describing surface warfare through the use of AAW, ASUW, ASW and SEW just may not be the optimum framework over the next several years to describe what we do and what we should build to do it. Some fundamental change about how we think about surface ships and submarines and the roles that they play and how we think about controlling them in a future world where being able to communicate and coordinate is going to be essential to our ability to put the right weapons on the right targets at the right time. Effective use of combined arms, as we saw in Desert Storm, requires C4I at all levels of the force.

You heard a lot about "From The Sea" yesterday. Based on that publicity, it may soon be a hotter item than Madonna's new book. To find out what it is that we are going to be doing in order to prepare the Naval Service for the 21st century, "From the Sea" defines a combined vision for the Navy and Marine Corps and outlines the new direction of the Navy and Marine Corps team, both active and reserve, in providing the nation with naval expeditionary forces shaped for joint operations, and operating forward from the sea. Seven of the fifteen objectives involve C4I. Once you know what we are going to do, you need to understand what will be the character of the systems we will do it with, and how we are going to acquire those systems. To understand that, you need to read the new policy on computers and computer standards that is out in draft from the DASN(C4I), Dr. Ed Whitman. This is the proposed SECNAV Instruction 5200.xx. It lays out the procedure for bringing the Navy Standard Hardware program to a close and moving our systems to increased reliance on commercial products and the adoption of engineering, common with the worldwide movement to open architectures in computing. Finally, you need to understand the concept of evolutionary acquisition as a mechanism to incrementally add to our systems in an environment that will not be permissive of large monolithic developments.

The traditional warfare areas need to adapt; let's examine what has changed to allow that to occur. VADM Tuttle in his last newsletter put his finger on one aspect of the change when he pointed out that the Composite Warfare Commander concept, adopted in the late 70's, was created partially in recognition of our limited C3 capabilities at sea. Using the CWC concept over the years, our Numbered Fleet Commanders and Group Commanders -- our Master Maritime Warfighters -- have been able to capably command maritime coalition forces. Recently, because of enhanced C4I suites, they have demonstrated in two major exercises the ability to move information and command joint forces in a way that leads us to believe that we really can engineer a major increase in command and control and weapon on target capability. I hope to convince you of that belief this morning. But first we need to shed a few comfortable old shoes. We need to move out smartly to embrace some significant changes or we will enter the 21st century with an aging fleet whose computer systems are maintenance intensive and a building program that uses variations on the same twenty year old theme that we have at sea today.

Let me take a few minutes to draw a picture of the existing conditions or more accurately the conditions that will exist in the next few years. In the world of control, the evolution of combat system design has brought us to the point where we have three generic lines of command systems: NTDS or its most recent version ACDS, the Advanced Combat Direction System; the Command and Decision element of the AEGIS combat system; and the Navy Tactical Command System Afloat, NTCSA. The evolution of the ACDS and AEGIS systems is grounded in the Navy Standard hardware program. This highly successful program was the only way, twenty five years ago, to introduce high levels of computer performance into our ships and aircraft and still maintain a tolerable level of logistic stability and program cost. AEGIS was separated from the NTDS line in

about 1975. NTCSA is a result of the desire to embrace perceived advantages of commercial computers as they began to emerge ten or twelve years ago. The adoption of Unix workstation hardware and the merger with the Tactical Flag Command Center program had major influences on what we have at sea today. By 1995 these three programs will be the predominant tools used by decision makers at every level from the Commander of a Joint Task Force to an FFG CO on independent patrol. ACDS or NTDS will be on about 125 ships, AEGIS C&D on about 60 and about 75 NTCSA installations, afloat and ashore. For the math types in the audience, if that sounds like more than the base force, it is because many ships get two of the three. These three lines are not highly interdependent and present plans are to continue that way out to the next decade. Is that a wise thing to do? There are two revolutions at work today that, if we were to take advantage of them, would in my opinion lead us to a more efficient, more interoperable and less expensive set of command tools. Less expensive to maintain and less expensive to upgrade.

The first revolution is the emergence of systems that run orthogonal to our traditional detect, control, engage, warfare area designs. These are systems that take information from, and return information to, the traditional command and control levels represented by NTCSA and also are involved in weapon on target functions inside their own ship. Examples of these systems are Tomahawk, Tactical Ballistic Missile Defense, Cooperative Engagement and, in the future, Mine Warfare. These systems transcend the traditional, inside the lifelines, outside the lifelines definitions that we have used until now.

The second revolution is the one that is occurring in the field of computers and computer architecture. Well, just how fast is that revolution moving? Recently the Society of Naval Engineers commemorated the tenth anniversary of the AELEIGH BURKE design. What has changed in the last ten years? When the Navy baselined ARLEIGH BURKE in 1983, there were only a few hundred computers on the ARPANET and Internet was still several years in the future.

PC's had been around for about four or five years, but less than a million had been sold. The Macintosh was still two years away and our offices were running with dumb terminals tied to central "mainframes" to access proprietary data bases. (By the way, we didn't call the terminals dumb then.) We ran CAD on early workstations, but only about one person in a hundred could do it.

Only a few people noted that it was interesting for Digital Equipment Company to bring out the VAX 8600 about the same time as the UYK-43 and that the two were about the same level of performance. By comparison, the UYK-7 did not have a commercial counterpart when it was introduced ten years earlier. The Information Technology Revolution was starting, but of course we didn't call it that because military machines were obviously different than business machines and it would always be so.

On page two of the DoD Key Technologies Plan the paragraph on the Information Technology Explosion says: "The S&T strategy seeks to promote and leverage the information technology explosion, adapting and converting it into military technologies that will revolutionize military operations. This explosion has been fueled by the exponential increase in the speed and capacity of modern computers."

I wonder why this plan uses words like "explosion" and "revolution" and generally couples those words with the word technology. Well, it is important to understand that, compared to the two hundred subscribers to ARPANET 10 years ago, there are almost one million subscribers to its successor, the Internet, today and that next year we will produce the equivalent of 10 million transistors for every man, woman and child on the planet. There are now 45 million PC's in America and it is a routine operation to download documents from hundreds of Internet and Government Archives, each in a few minutes. We got one the other day that was 2600 pages. (We didn't bother to print it out!) So I guess that if you stand close it does look like a revolution.

It falls to you in the audience, as it does to our COPENNICUS engineers, to meet all the challenges of this revolution. In his Flag Officer Newsletter a few days ago VADM Jerry Tuttle says that COPENNICUS has gone purple. I can certainly attest to that. During PACCOM's Tandem Thrust 92 exercise this summer we demonstrated to ourselves and anybody else that wants to see that the concept of a CJTF conducting complex multiservice operations is a reality.

Tandem Thrust demonstrated for the first time that the Joint Task Force Commander can be embarked and conduct joint operations. A number of system upgrades resulted in a quantum increase in C4I capabilities. SHF terminals installed in all three flagships provided significantly increased capacity, improved flexibility, and for the first time, "user pull". That's where the user selects from an available menu and pulls only what he needs. Installation of SHF 1105 modems permitted limited dynamic reallocation capability of SHF bandwidth and provided a glimpse into the future of the Communications Support System (CSS).

The variety of services that SHF brings to the altar represents a new standard of excellence. Consider:

- WWMCCS connectivity at 9.6 KBS (four times the typical rate). Described as a "must" for effective joint command and control.

- The ability to "pull" the Air Tasking Order (ATO) direct from Air Force computers at Luke AFB, Arizona from afloat JOTS workstations with imbedded Contingency Tactical Air Control Automated Planning System (CTAPS) software that was developed by the Air Force. The CJTF could make modifications to the ATO on line and interact with its building and dissemination.

- Three STU-III telephones, with STEL interface, in each of the three flagships to permit secure voice connectivity with anyone in the world with a STU-III. There was a long line to use them.....HOW LONG WAS IT??? It was such a long line we are considering installing coin operated machines. The down side of that popularity turned out to be that whenever you tried to call Coronado, the phone was busy.

- A secondary imagery distribution circuit with the Joint Intelligence Center, Pacific. Image (512 x 512) transfer speed over FIST averaged about three minutes per image with good quality. A Prototype Imagery Exchange System (PIXS) was employed to permit the operator to review available imagery, determine what imagery he needed and request that only that imagery be transmitted (user pull).

- Voice, Video, Fax, and Data (VVFD) terminals providing a multi-media command coordination and conferencing capability.

In 1985, when USS KITTY HAWK deployed to the NAS, I was on board as Surface Ops for CARGRU 7. She had 4.8 KBS of data and two voice circuits on SATCOM (that's a small pipe). Each night we had to take down Battle Group Command for two hours just to copy a few FIST images. This summer during Tandem Thrust, USS KITTY HAWK had over 176 KBPS of SATCOM available (that's a big pipe) and those same two images can be copied in about six minutes without taking down BG command. The Tandem Thrust Battle Force C4I suite is now the standard for us to enhance for the next deploying carrier battle group.

In his exercise summary VADM Unruh laid out his view of future requirements. He indicated the architecture considered necessary to support an afloat (maritime) joint task force commander (CJTF) or a Navy component commander during joint operations should be structured to include forces seabased and land based from all services. The concept and scenario of Tandem Thrust was developed to explore the architecture and doctrine to support command and control, including exchange of vital intelligence information between an afloat CJTF staged forward in the area of operations and remotely located service component commanders.

VADM Unruh went on to lay out the top CJTF systems priorities and it is worth repeating here. WMCCS (SHF) responsiveness and reliability is an absolute necessity for warfighters. Component commanders can provide situational reporting of on-going warfighting events at near real time rates. CTAPS (SHF) is the principal path for "pull"/delivery of ATO to the CJTF and component commanders. ATO Express in DTC2's allows direct transfer and manipulation within NTCSA. Prototype Imagery Exchange System (PIXS) offers capability to receive improved imagery plus directory and OPNOTE functions which allow user "pull" of their desired images. SHF secure telephone and STEL modems are a vital means of connectivity with the afloat CJTF which allows access to autovon/commercial telephone systems ashore when connected with a STU III, and reduces reliance on expensive Inmarsat. SHF allows flagship high data rate message

transmission. This is a vital flagship circuit which significantly reduces UHF satcom Cudix loading. There was no MSG backlog in Tandem Thrust.

Tandem Thrust highlighted the necessity of fast reliable SHF connectivity as a preferred mode for all types of C3 information whether voice, data or imagery. Future efforts in C3 development should focus on bringing prototype SHF systems online and standardizing SHF architecture for flagships and among joint commanders.

On the East coast, during Ocean Venture, we deployed the FMOCC (Fleet Mobile Operations Command Center). Housed in a dozen vans, it provides a CJTF about two carriers worth of connectivity and support. It comes in three levels - small, medium and large. We have had part of it in Ryahd for the last several weeks as part of Southern Watch.

So where are we going with all this? The Navy currently has designs for the CVN 76 and the LHD underway. We are beginning to lay out the technologies that we want in the 21st Century destroyer. We will need a cruiser modernization to handle TBM and there will have to be a decision on a Command Ship follow on. So that gives us plenty of opportunities to go in and fundamentally restructure our designs and take a large step up in embracing the computer and computer network capabilities that are appearing in the commercial marketplace.

Let me try to wrap up what for many of you must be a long and complicated discussion full of acronyms. "From the Sea" lays out a direction that requires command and control as a major tenet. In spite of the fact that the Navy has chosen to divide its laboratory and engineering structure along traditional warfare area lines, the command and control function is increasingly cross cutting that structure. We should be able to take advantage of the revolution in computers, computer systems and new weapons systems. The tools are becoming available in the commercial marketplace to accomplish this and together with recent exercises we have reinforced our belief that this structure can be built. Finally, ship developments are coming available to test this structure and move to a process that is joint both inside and outside the Navy. We at NCCOSC look forward to a closer partnership with all of you in making this revolution another Naval success story.

Lastly, let me say I am proud to be here with you this week, and as always, but especially in these exciting times of change, proud to be a Surface Warrior. Thank you very much.

REMARKS BY REAR ADMIRAL SCOTT L. SEARS, USN
Commander, Naval Undersea Warfare Center

before the Surface Navy Association Fifth National Symposium, October 1992

Good morning. I am happy to be here and I appreciate the opportunity to address you today on this important topic.

First, I am going to speak briefly about the changing threat as I see it, and the future challenges of undersea warfare. Next, I'm going to discuss the Naval Undersea Warfare Center as it is today, and also a little about our predecessor organizations. The history of our involvement with ASW research and development is interesting, and one that has prepared us well to face the challenges of the 21st Century. Finally, I will touch briefly on some technical initiatives at our Center. Mr. Peter Herstein will follow me and will present in greater detail some examples of the technical work that NUWC is involved in.

I've chosen to show the German 209 submarine because it is representative of the challenge our Navy will face well into the next century. This sub is the most successful German export since the Volkswagen...slightly more expensive than the high-end BMW. The Federal Republic of Germany has delivered more than 20 units to nine Third World nations during the last decade. Many more have been ordered and many others are being built under license with German technical assistance.

The World War II treaty restrictions limited the displacement of German subs. The small size and good weapon load is, however, very attractive to Third World countries. The subs have eight swim-out torpedo tubes capable of firing any torpedo of twenty-one inches, as well as Harpoons and Exocet missiles. If you recall, it was an Exocet missile fired by the Iraqi Air force that put the USS STARK out of action in the Persian Gulf.

Any day now, the first of three Iranian submarines will arrive in the Gulf. These Kilo class subs, purchased from Russia, are armed with eighteen torpedoes and the capacity for laying up to twenty-four mines each with 1,000 pounds of explosives. Iran is trying to become a regional superpower in response to Iraq's weakness. These subs pose a serious problem to Western navies and our Arab allies.

South Korea is also in the sub business. They recently launched their first T-209 diesel powered submarine. Three others are being built in South Korea, and a fourth is being built in Germany. North Korea has twenty-five submarines. But these Soviet Whiskey and Romeo class subs, although problematic, are not as formidable as the new South Korean fleet.

In addition to the U.S. and the former Soviet Navies, forty-one other countries operate more than 400 submarines. Nearly half of these subs operate under the flags of Third World countries.

We have a job to do.

Detection and destruction of modern submarines, both nuclear and non-nuclear, is still one of the most challenging tasks in naval warfare today. Neutralizing even a single diesel submarine will prove difficult in view of its limited acoustic signature and the adverse acoustic environments often associated with Third World regions, especially in the littoral. During a 'show of force' operation, the price of losing a ship and even one crew member is just too high.

Although quiet submarines continue to represent a threat challenge, there is considerably more to the overall undersea challenge. During the five years from 1983 to 1987, developing countries bought 190 billion dollars worth of military hardware of all types. The Soviet Union provided more than 40% of this hardware, more than all the NATO allies combined.

Arms proliferation is at an all time high. Complicating the issue is the fact that many regional animosities are continuing. More countries will be searching for high technology weapons in the future. Successful undersea warfare requires advanced technology solutions. Equally important is the ability to adapt these solutions to solve the warfighting requirements of the changing world.

Another facet of our future challenge is the Iraqi "cheeseburger" mine. The Gulf War clearly demonstrated that such low-cost sea mines are a threat. The Mine Designation is a LUGM 145. The mine is a moored/drifting contact type and is an Iraqi copy of a "Soviet" design. The anti-surface ship mine has a 320 pound warhead. Its operating depth is 0-16 feet and it could be deployed in water as deep as 230 feet. Typically the mine is moored with a 6mm line. The unit is armed with an electrical contact separated by a spring. (The spring is compressed by water pressure to allow the electric contacts to meet only when the mine is at depth). If this spring is disabled, the mine remains a threat even when adrift.

At 0430 Saudi Arabian time on 18 February 1991 a mine of this type ripped a 20x30 hole ten feet below the waterline on the forward starboard quarter of the USS TRIPOLI. Three compartments on three decks were flooded with nearly 271,000 gallons of water; four crewmen were injured; and the 18,000 ton vessel lost one-third of her fuel capacity and went DIW. At this time, in support of Desert Storm, the TRIPOLI was carrying mine countermeasure helicopters and was directing a fleet of U.S. and British surface minehunters and sweepers. This effort was discontinued and the TRIPOLI was taken to dry dock.

The ship originally cost forty million dollars in 1966 and temporary repairs to restore operational capability cost five million. And all of this damage was caused by a mine costing less than three thousand dollars.

The mine that struck the TRIPOLI was part of a moored minefield in about 100 feet of water where at least twenty-two mines were found. About ten miles away and less than three hours later, the AEGIS missile cruiser USS PRINCETON was severely damaged by two other sea mines.

The experiences of the TRIPOLI and PRINCETON reconfirm the threat and the cost effectiveness of sea mines. Mine detection and avoidance for surface combatants and subs is a real and important requirement.

Though we are still in the midst of a period of dramatic change, there are aspects of future Undersea Warfare that we know with some certainty. Understanding these factors will enable us to more accurately target our technological efforts.

Addressing the shift to regional crisis response means optimizing platform capabilities, technology efforts and acquisition strategies accordingly. The shift in emphasis is the primary thrust of the new CNO and Marine Corps combined vision, "From The Sea." The new direction of the Navy and Marine Corps team, both active and reserve, is to provide the nation with:

- Naval Expeditionary Forces-Shaped for Joint Operations
- Operating Forward From the Sea-Tailored for National Needs.

Naval Expeditionary Forces provide unobtrusive forward presence which may be intensified or withdrawn as required on short notice. Support of joint operation is also a central theme in the strategy. Mission areas to support include: Strategy-strategic deterrence and defense; Forward presence; Crisis response; and Reconstitution.

As we discussed earlier, coastal, shallow water and sub near surface missions will play a major role. Here in littoral and shallow-water operations, there are a number of special challenges including the environment, mines, as well as land and air platforms. Self-defense becomes paramount.

With the fiscal realities of the '90s, leading to the reduction of the base force, we simply cannot afford any losses. Which brings me to perhaps the single most important factor, AFFORDABILITY. Performance at any price is no longer a viable strategy. NUWC has many initiatives to develop affordable systems, while still maintaining required capabilities.

I would like to address, more specifically, the challenges facing surface undersea warfare. The changing threat has changed the expected environments for combatant

operation. Nuclear submarines can roam the open oceans at will for extended periods, although diesels have limited operation time while submerged and limited total duty station time due to fuel constraints, and they are well suited to local coastal water operations. The diesel is eminently suited to very slow patrols, and can bottom in shallow water. Acoustically, shallow water is much more complex than deep water due to extensive interactions of sound with the sea surface and sea floor, as well as environmental variability. On average, detection ranges for a given tactical sonar will be less in shallow water than in deep, and performance overall will be more variable.

One of the tools used to address this challenge is active sonar. When operating active sonar, the problem, much akin to the radar clutter problem, is to identify a submarine detection in the midst of many other detections, which can include whales, fish schools, wrecks, bathymetric features, and surface ships. Unlike passive classification, where individual submarines can be identified through their unique narrowband signatures, the challenge in active detection is to simply identify what is a submarine contact from other contacts. Furthermore, this must be done in as few pings as possible.

Dealing with the difficult threat of a low target strength diesel submarine operating in shallow water will result in some situations where the submarine cannot be detected before a torpedo is launched. Therefore, the combatant will have to rely on its defense system to detect the incoming torpedo and neutralize it all with quick reaction time. Furthermore, the combatant will have to deal with the likelihood of not just a single incoming torpedo, but multiple torpedoes fired in salvos.

Denial of countermeasure tactics is also an important future requirement. Unless a sonar or torpedo is designed to be robust, there may be depths, speeds, and unique maneuvers that a threat submarine can undertake to prevent detection at ranges beyond the threat's weapon launch range. This is particularly true for shallow water. Thus, sonars must be improved so that the opponent cannot mitigate detection through clever tactics.

In the future, a declining number of available warships and declining acquisition budgets will require the development of resources that can act as force multipliers. The Cooperative Engagement Capability (CEC) applies the resources of multiple platforms to increase the effectiveness of each individual. Similarly, the concept of tactical multistatic sonar increases effectiveness and serves as a force multiplier by transmitting from a few active sources in a battle group and receiving with arrays on multiple platforms. Towing and handling of large sources is a significant technical challenge, as is the command and control of information provided from all of the platforms.

There will be situations where active sonars cannot be used for reasons of stealth, etc. Therefore, because the diesel will have few exploitable components in its signature, alternate passive processing must be developed to utilize all remaining passive signature information across the entire available 'full spectrum'.

The fiscal restrictions compound all future USW requirements. Affordability will most likely be the driving parameter in sonar development. The Navy is being asked to develop sonars that have superior detection, classification, and localization capabilities at less cost than sonars of the recent past. Quite a challenge!

Before continuing with more specifics of future USW threats and how we at NUWC are positioning ourselves to meet these threats, I would like to tell you a little about my organization, the Naval Undersea Warfare Center.

As part of the FY91 base realignment and closure process, laboratories and field activities were consolidated under four warfare centers:

- Naval Air Warfare Center (NAWC) reports to NAVAIR,
- Naval Command Control and Ocean Surveillance Warfare Center (NCCOSC) reports to SPAWAR,
- and, the two warfare centers, Naval Surface Warfare Center (NSWC), and Naval Undersea Warfare Center (NUWC) report to Commander, Naval Sea Systems Command.

Other changes may follow. We live in an age of redefinition.

The overall NUWC organization employs more than 8000 and comprises several distinct elements. The two major divisions comprise the former Naval Undersea Warfare Engineering Station in Keyport, Washington, and the former Naval Underwater Systems Center (NUSC) in Newport, Rhode Island. The New London Laboratory is now a detachment of the Newport Division. Norfolk's Naval Sea Combat Systems Engineering Stations was disestablished this summer, and its combat system in-service engineering function was formed as the NUWC detachment, Norfolk.

We have a directorate dedicated to the research and development of Surface ASW, comprising over 480 people. Today, we conduct a full-spectrum program of research, development, test and evaluation, and provide operational support for all major surface ship sonar systems.

Major research initiatives are adaptive to the changing world situation and are presently focused on active sonar technology and shallow water environments. Major acquisition support programs include software-based sonar systems with hull mounted, towed and deployed sensing and transmitting arrays, and the integration of those systems into an overall antisubmarine warfare combat system.

TRICCSMA, the Trident Command and Control Systems Maintenance Activity at Newport, Rhode Island, was merged in its entirety into the Newport Division. Also, the Arctic Submarine Laboratory, which was formerly part of NOSC in San Diego, now is a detachment of the Keyport Division.

NUWC is a new organization which has as its mission: Operate the Navy's full spectrum research, development, test and evaluation, engineering and fleet support center for submarines, autonomous underwater systems, and offensive and defensive weapons systems associated with undersea warfare. In a nutshell, if it has anything to do with systems that conduct undersea warfare, it comes under our charter. Our leadership areas also include surface ship sonar systems, undersea ranges and autonomous underwater vehicles.

As part of the consolidation, some programs and technical areas, such as lightweight torpedoes and countermeasures, transferred to NUWC. We in the Navy could not continue to have inefficiencies by piecemeal and disparate activities working on the same technical areas with different directions. In particular, it is relevant to note that the torpedo, sonar and submarine countermeasure work is transitioning from NCSC to NUWC, and the MK46 and MK50 lightweight torpedo programs are transferring from NOSC also.

Finally, we have numerous detachments, field sites, and undersea test ranges at locations throughout the United States, as well as in Canada and the Bahamas. A recent change is the relocation of the Headquarters from Washington, D.C. to Newport, Rhode Island. As we face the challenge of becoming the most cost-effective organization possible to meet our customers' needs, the relocation of our center management staff to Newport was a natural step.

I am proud of the heritage of the entire Warfare Center, but I think it is important to mention the rich history of the New London Detachment, where all of our surface ship program efforts are conducted. The New London Laboratory traces its origin to 1941, when two labs were established to conduct research on the nature and behavior of underwater sound. The first lab, established on the current site of the New London Detachment, was the Columbia University Division of War Research. At the same time, a sister organization known as the Harvard Underwater Sound Laboratory was established in Cambridge, Massachusetts.

During World War II, Columbia's New London installation concerned itself with the development of passive detection devices, first used in the antisubmarine phase of the war in the Pacific. At New London, the highly successful sono radio buoy and submarine-installed listening sonars were developed. The Harvard Laboratory, on the other hand, directed its attention to active antisubmarine warfare sonar development of the scanning type. It was there the term "sonar" originated.

The efforts of these university laboratories brought forth many devices and equipment, often radically new in design and function. In 1945, the sonar portion of the Harvard Lab was transferred to New London and merged with the Columbia Lab, creating the Navy Underwater Sound Laboratory.

The foundation of knowledge and application laid down by the Harvard and Columbia scientists proved to be the crucial links in understanding the nature and behavior of underwater sound. Twenty-five years later, the "Sound Lab" became the NUSC New London Laboratory. And, as I mentioned before, became the NUWC Division Newport Detachment New London in January of 1992.

We are, I believe, postured to continue this tradition of excellence at the New London Detachment as well as at the entire Warfare Center. At NUWC, we employ rapid prototype methods to develop solutions to the emerging tactical problems and prepare training materials and operating guidelines for all surface ship sonars.

The Kingfisher Program is a good example of a rapid response to changing mission requirements. NUWC developed the Kingfisher system to help U.S. Navy destroyers survive in harm's way. In April 1988, during the Iraq/Iran War, the USS SAMUEL B. ROBERTS (FFG 58) struck a mine in the Persian Gulf and was heavily damaged. Suddenly, the U.S. Navy was reintroduced with the possibility that a state-of-the-art naval ship could be sunk by low tech pre-World War I technology.

NUWC responded to a request for a quick-reaction initiative with a plan to utilize off-the-shelf technology to improve the performance of Navy surface ship sonar systems. Working with Raytheon and General Electric, NUWC engineers developed modifications to sonar processing and display systems required to detect mine-like targets. The short pulse lengths used by Kingfisher separate the mine echo from the bottom reverberation. This reverberation is typical of the conditions due to the sound velocity profile in this mid-summer type water. An initial Kingfisher prototype kit was successfully tested on a frigate in the Persian Gulf barely four months after the ROBERTS incident.

Following up on the success of the prototype, the NUWC and industry team developed an enhanced second-generation prototype, six copies of which were built and deployed to the Persian Gulf aboard frigates. During Operation Desert Storm, Kingfisher-equipped frigates were extensively used for convoy and escort duties, as well as for combat missions deep into enemy territory. In twenty-one frigate deployments, Kingfisher systems were operated for more than 30,000 hours without failure.

One ship, the USS NICHOLAS (FFG 47), made approximately 1,000 avoidance maneuvers. While Kingfisher is primarily an object avoidance system, the locations of suspected mine-like objects were noted and reported. This resulted in a number of objects being relocated, confirmed as mines, and destroyed.

While this program was very successful in achieving surface contact mine avoidance, the need to avoid bottomed mines still exists. There are current efforts to develop a single system that can detect mines and submarines.

The Kingfisher represents a partial solution for certain platforms and certain mine types. Based on our experience with the TRIPOLI and other ships, additional solutions need to be developed for all surface combatants.

Another example is the Tactical Advanced Simulated Warfare Integrated Trainer (TASWIT), Device S14A13, which provides multi-tactical sensor simulation for multi-platforms. The trainer provides for coordinated platform tactical team and battle group staff supervisory-level training. The system was originally developed to provide a critical interim training capability to fleet team training needs through the use of rapid prototype techniques using commercial off-the-shelf (COTS) components.

The TASWIT instructor console was developed in 1964 and two new instructor consoles were developed with commercial hardware. The new hardware was purchased and a system was developed at a fraction of the cost of earlier systems and still provides increased capability. The TASWIT system was originally installed at the Fleet ASW Training Center, Atlantic in 1988. TASWIT is the first large scale Navy trainer to use COTS. Three large rooms of hardware were replaced by one six foot relay rack controlling the personal computer trainee stations through a local area network.

The TASWIT system is normally run as a stand-alone multi-ship/multi-aircraft trainer, yet it can be interfaced to existing training devices to upgrade or enhance the training capabilities. The TASWIT program was recognized for its utility, flexibility, and cost advantage by OP 39 (N869) in 1990. This has led to the use of TASWIT by several Navy training activities. The TASWIT trainer has been installed at:

- the United States Naval Academy for use by midshipmen;
- the Naval Surface Reserve Force, (New Orleans, Louisiana, and Houston, Texas) to support the FFT program;
- at NRAD and Naval Training Systems Center, to support the Office of Naval Technology Tactical Decision-Making Under Stress Program (TADMUS);
- and a new trainer system at the Surface Warfare Officers School Command, Newport, Rhode Island.

The TASWIT system has proven very cost effective and continues to grow with additional sites and enhancements. Plans are to add ten more Naval Surface Reserve Force sites over the next two years, and for foreign military sales.

Another example of an important affordability initiative is the Interactive Video Delivery Systems (IVDS) Training Device. The NUWC SQQ-89 IVDS combines a mockup of a sonar operator console and its displays with interactive videodisc, multiple screen graphics, and control panels. The system has been developed for use at Fleet ASW Training Centers in the ASW evaluator, sonar supervisor, and sonar operator courses. The IVDS uses commercially available components at about 25% of the cost of the traditional training devices. It provides interactive tutorials and simulations using realistic scenarios.

Another initiative is the On-Board Trainer (OBT)/Interface Test Set (ITS), which provides high fidelity acoustic and ESM simulation and stimulation to SQQ-89/(V)/LAMPS MK III equipped ships, including CG-47, DDG-51, DD963, and FFG 7 classes. During the past year, engineering tests using the ITS were performed, consisting of ships involving single and multiple OBTs. The interface test set can control up to eight On-Board Trainers simultaneously to run a coordinated ASW training scenario. ITS testing will continue to determine its capabilities in supporting multiwarfare exercises. Additionally, testing of RF communications to support at-sea ITS utilization is planned.

The long term goal of the OBT ITS initiative is to provide the Navy with a multiship ASW/EW training capability that supports in-port training in each homeport, and at-sea battle group training. In addition, plans include potential use of the ITS by the Battle Force Tactical Training (BFTT) system to provide the ASW and EW portions of multiship, multi-warfare BFTT training scenarios. This system, as well as the IVDS, is being demonstrated at this symposium.

These are just a few examples of the work that we are doing. I would like to introduce Peter Herstein from the NUWC New London Detachment, who will address some other initiatives.

REMARKS BY ADMIRAL DAVID E. JEREMIAH, USN
Vice Chairman, Joint Chiefs of Staff

before the Surface Navy Association Fifth National Symposium, October 1992

Thank you for that introduction. It's great to get even this far away from the Pentagon for a little while to rub elbows with so many old friends and colleagues. As you all know, autumn in Washington always means the start of the Silly Season as we put together a new defense budget. And, of course, the process is complicated right now because we're down to the final days of the election campaign so that we have silly squared. I'm not concerned about the leadership so much as I am over the potential for a covey of old bad ideas from staffs fluttering up. A couple of weeks ago, I heard someone say that Americans really hate elections, because they hate to be held responsible for the result...Pat Butram guessed that makes Gerald Ford our greatest President, since no one elected him, no one had to take responsibility for him...

One thing the campaign has done is turn our attention to our nation's future. Most of that attention is focused on domestic issues. But we're also facing some fundamental decisions about the future of our armed forces. Now I don't have a public opinion on the election. But I do have strong ideas about the direction our armed forces need to take in the years ahead.

What I'd like to do today is share with you what we're doing and where we're going with our armed forces. Right now we're making decisions about roles and missions, about joint interoperability, and about procurement that will profoundly affect the way we do business in the future. And we should not ignore these issues simply because other concerns are temporarily dominating the political agenda.

I don't need to tell this audience why we're changing our armed forces. After all, the Cold War and the Soviet Union are history. As a result we're downsizing our forces and cutting procurement. But we didn't plunge into this without a plan. Every business school in America teaches that when you want to overhaul your organization, the first thing you better do is come up with a clear strategy. Many of you could probably write the textbook on that from your own experiences. We developed our plan a couple of years ago.

But I still occasionally read a newspaper story where someone is accusing the Department of Defense of living in the past, or of still having a Cold War mentality. That's baloney. I can't think of any other element of American society that has so thoroughly revolutionized its entire outlook in the past few years as have the armed forces. And people who say differently just haven't done their homework.

We began with a new strategy. Based on that we came up with a new structure--the Base Force. It slashes part of our force structure and realigns what's left to match new realities. We're closing bases and canceling or curtailing procurement programs. We're now a couple of years into this reduction. And yet I'm still amazed to find major

newspapers ignoring this and complaining that Congress has let Defense off easy because it's "only" been cut \$7.4 billion. They act as if only Congress cuts and ignore actions we have taken. Let me tell you: neither the White House nor Congress forced us to make our cuts. We did it. We -- the Department of Defense. These are cuts that we are making because we have a new strategy and because we understand the new realities. These cuts and closures are painful, but they are the price we have to pay to get our forces ready for the future -- and to control our own destiny.

All this is old news to the people in this room. So instead of dwelling on the past - or even on the present -- today I'm going to share with you what I think needs to be done to get ready for the future. I see us needing three separate qualities. These are: technological superiority; a superior ability to adapt our forces and resources to particular situations; and superior C4I. Let me talk about each of these in turn.

First, technological superiority. Superior weaponry has been a hallmark of American armed forces for a long time. We don't intend to give that up. But we do need to change the way we acquire new systems.

During the Cold War, our competition with the Soviets was so intense that we needed to develop -- and field -- large quantities of advanced systems as rapidly as possible. This process was enormously costly. We spent great sums just to get marginal improvements in performance, and we were obliged to field new systems in large numbers to ensure our outnumbered forces had every possible advantage.

Today we are no longer driven by the Cold War. We can now be both more patient and more daring in our development programs, ensuring that the weapons we finally field are proven designs that we absolutely need and that give us greatly enhanced capability. As I said we would do last year, we will continue to invest heavily in R&D, since that is the seed corn of future technology. But we will also emphasize simulation, prototyping, limited fielding, and other measures to separate technological progress from costly full-scale deployment. To keep our forces up-to-date we may see force structure elements more like the F117 than the F/A18: a structure made up of a succession of highly advanced systems deployed in only a few selected units. On the surface a logistician's nightmare. But we can accept such small numbers because our future adversaries will be either much smaller or less technologically-developed than the Soviets were. And while we cannot ignore mass as a Principle of War, we recognize that superior technology is such an advantage that it wipes out simple numerical comparisons in modern war.

But to stay on the leading edge we must streamline our acquisition system. We need to compress the time from concept to final product if we want true state-of-the-art technology. The Patriot missile performed well in the Persian Gulf in 1991 -- but its technology was at least a decade old by the time it was finally fielded. As it is now, it takes us far too long to go from concept to fielded system. And unless we change this, we will always be fighting tomorrow's wars with yesterday's technology. And it is a problem unique to defense acquisition, which means it is a process problem for which both Congress and the Department share responsibility.

The process as it exists today is also far too costly for what we get. For example, a recent study calculated that a specialized military computer is roughly 100 times more expensive than an off-the-shelf system of similar capacity and capability. With constrained budgets in the future, we've got to be a lot smarter in our procurement policies, and we need to rely more on commercial technologies. We're already looking very closely at the way we write military specifications for new systems. For example, with nuclear war an increasingly remote possibility, why is it necessary to build EMP hardening into everything we buy? There's an old joke that says an elephant is a mouse built to military specifications. We will always need good, useful, state-of-the-art technology; but more than ever we need to procure it at minimum cost, and we need to make sure that the capabilities we pay for are capabilities we really need.

I see exciting prospects for several technological breakthroughs in the next few years. I don't know which of those will pan out, or what their full effect will be on our future forces. But I can sketch out what our technology will move away from. We will probably move away from systems and platforms that are so highly specialized they can only be used against a narrow threat or in a unique environment. We will move away from systems that are so inflexible they cannot be easily adapted to exploit new technologies. We will move away from systems that lack a high degree of strategic and tactical mobility. We will move away from systems that lack low-observable or stealth technologies. And we will move away from systems that require large, vulnerable logistical tails, and which can therefore be neutralized by attacks on their support systems. In short, we will move away from dependent systems to independent systems.

Now I don't mean to suggest by this that we're about to sound the death knell for the major capital systems of our services -- the main battle tank, the manned aircraft, and the large surface combatant. These will almost certainly have their place in the armed forces of the near future, although -- and this is important -- that place may not be the central position they've held for the past half century or more.

After technological superiority, the second thing we need in future conflicts is superior adaptability. Technology is changing. The international environment is changing. And the demands placed on our forces are changing. We need to adapt ourselves quickly and effectively to changes as they occur.

One part of this might be called "learning curve dominance." It refers to the ability to develop the tactics, organizations, training programs, and warfighting doctrines to exploit technology effectively. It's always good to have the best weapons available. But there is often a tendency to ignore technological changes and stick to old familiar methods.

We can't afford to have American servicemen and women detailed to hold horses just because we want to stick with the old, comfortable ways of doing things. We can already see some things our future weapons will allow. With longer range, greater precision and real-time intelligence and targeting, future weapons will be able to reach out and strike enemy forces at great distances. It may no longer be necessary to "close with" the enemy in order to destroy him. Traditional modes of thinking, and even

traditional unit organizations, may not be appropriate to such a future. We need to find out what is, and we need to get it first.

But I'm afraid we're still underreaching. Our thinking still hasn't caught up to our future technological grasp. We've got a good start. We're looking at things like using AEGIS to provide battlefield air defense for ground units ashore. We're finally looking seriously at surface ships as GPALS systems. We're looking at entirely new ways of packaging naval forces for crisis response missions -- ways that depart from our traditional battle and amphibious groups to task forces more closely tailored to deployed requirements, more truly a joint warfare package of sea, land and air elements, and with a seamless surge capacity to quickly grow as necessary to meet a challenge. There are already some good ideas out there -- but not nearly as many as we need.

The final ingredient of future military success is C4I superiority. Good weapons, good doctrine and tactics, and effective organizations will give us a superb military instrument. But we've got to know where to point that instrument, and we need to know how to control it. And this is where C4I comes in.

I'm always impressed by the Battle of Britain, in which the outnumbered RAF fought off German air attacks. What really tipped the scales in favor of the British was command control and intelligence. Before the war, they built a highly integrated command and control system to direct their fighters. And that was fed by an excellent intelligence network. The British had good air defense radars. They monitored the radio traffic of German aircraft as they formed up over France. They had ground observers who phoned in information as the enemy crossed the English coast. And they could deduce from these clues the enemy's daily strength and direction, and so could allocate their few interceptors with great precision and effectiveness. By the standards of the time, the RAF system in the Battle of Britain was state-of-the-art, and it made the difference.

We've already come a long way in this realm, but we still have plenty to do. The area that still needs the greatest work is probably end-to-end integration. It's not enough to assemble intelligence, or even to make informed decisions. We need to be able to know, decide and act...faster than our enemy at every turn. The data our reconnaissance systems gather need to be transmitted in real time to command centers, where targeting decisions can be made in a matter of moments. Then we need to send targeting instructions to loitering cruise missiles or other weapons, which then hit the target -- possibly with terminal guidance from overhead systems. And all this needs to happen rapidly, since future combat may increasingly resemble a game of electronic cat and mouse between the enemy's "hidere" and our "findere."

Those then are the three essential elements of future battlefield success: technological superiority; an ability to adapt swiftly and effectively to changes in technology and mission needs; and superior C4I. Today the United States surpasses any possible adversary in each of these areas. But we live in changing times. Right now we're surfing along just ahead of the crest of a military-technical revolution dominated by advances in information technology, but that crest will soon come pounding down upon us. We need to ensure that we will remain dominant in these areas in the years to come.

Let me close with this thought. It won't be easy for us in the years ahead. Many people despair at our declining defense budget and the budgets they foresee. I don't see this as a major impediment. Historically, some of our most important transformations have come during periods of constrained spending. In the 1930's, we developed a modern carrier force that became the backbone of our later success in the Pacific. In 1945, General Hap Arnold made a controversial decision to push research and development of guided missiles -- a decision that met tremendous resistance in the Air Force from people who feared this would make manned aircraft obsolete. Despite this resistance, and despite the severe budget constraints, Arnold's vision eventually produced our ICBM forces. Visionaries like Arleigh Burke gave us guided missile destroyers. Rayborn and Rickover married the ideas of nuclear propulsion and ballistic missiles to give us the SLBM force --probably the most important element of our future strategic deterrent. Wayne Meyer gave us AEGIS and Walt Locke gave us Tomahawk.

We will need similar vision, and a similar commitment to innovation, to enable us to protect our nation in the decades ahead. And we need it from people like you.

Thank you for giving me this opportunity to speak to you today. I'll now be happy to answer your questions.

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