Naval Transformation Roadmap

Power and Access…From the Sea

Sea Strike

Sea Shield

Sea Basing

Foreword

Naval forces are unique in their contribution to the nation's defense. Versatile naval expeditionary forces are the nation's first responders, relied upon to influence the course of a crisis, control the early phases of hostilities, and set the conditions for decisive resolution. America's ability to protect its homeland, assure our friends and allies, and deter potential adversaries depends on maritime supremacy and credible projection of combat power. The transformation of naval forces is dedicated to greatly expanding the sovereign options available worldwide to the President across the full spectrum of warfare. The result of our transformation will be a Navy -Marine Corps Team providing sustainable, immediately employable U.S. combat power, ready to meet any challenge.

As directed in the Secretary of Defense's Defense Planning Guidance for Fiscal Years 2003-2007, the Department of the Navy presents its Transformation Roadmap. The Roadmap describes the key naval concepts, capabilities, initiatives, processes and programs that will guide the transformation efforts of the Navy-Marine Corps Team in support of the critical operational goals of transformation described in the 2001 Quadrennial Defense Review Report. Detailed descriptions of the transformational programs described in the Roadmap including development and fielding timelines and required resources will be provided with the Fiscal Year 2004-2009 Program Objective Memorandum.

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Department of the Navy Transformation Roadmap
Power and Access…From the Sea

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I. Introduction

Naval transformation will support joint transformation by delivering new military capabilities that will greatly expand the sovereign options available to joint force commanders to project power, assure access, and protect and advance America's interests worldwide in the face of emergent threat technologies and strategies. It will usher in new ways of deterring conflict, new capabilities for waging war, and new technologies leading to major increases in operational effectiveness. Today's Navy and Marine Corps are a Total Force of Active Duty, Reserve and civilian personnel, transforming along a broad front exploiting the asymmetric advantages of the United States; including maritime dominance, mobility, decision superiority, stealth, precision, and persistence.

This Naval Transformation Roadmap describes how naval forces will achieve nine transformational warfighting capabilities, organized by a family of concepts that optimize and maximize advantages that are uniquely naval. Naval transformation will be captured by capitalizing on innovative concepts and technologies, and by employing processes to rapidly develop and integrate innovations into these forces. Inherent in every aspect of transformation is that naval forces will be, first and foremost, committed to and built upon the principles of jointness.

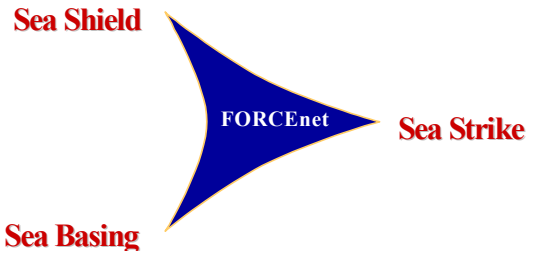
Tomorrow's Navy - Marine Corps Team

A Networked, Jointly Integrated, Sea-Based Power Projection Force, Assuring Coalition and Joint Force Access and Protecting America's Interests Anywhere in the World

Emerging operational concepts, technologies, processes, and organizations will transform the capability of America's naval services of the 21st century to conduct multi-dimensional joint, allied, and coalition warfare. The transforming U.S. Navy-Marine Corps Team will be fully integrated into the Joint Team across the full expanse of a unified battlespace. Naval forces will provide unique and complementary warfighting capabilities from the sea to joint force commanders to support their ability to enhance deterrence; secure swift, decisive military victory; and strengthen the peace that follows in support of the critical operational goals outlined in the 2001 Quadrennial Defense Review and the Secretary of Defense's Defense Planning Guidance.

The 21st century sets the stage for unprecedented increases in the precision, operational reach, connectivity, and speed of decision of sea-based forces and weapons. This expansion of effectiveness will realize the fullest integration of the Navy-Marine Corps Team into the joint force. These enhanced naval capabilities -- as developed through the interdependent and synergistic operational concepts of ***Sea Strike, Sea Shield,***

and Sea Basing -- will produce and exploit a dispersed battlespace within which sovereign and sustainable naval, air, ground and space elements form a unified force that projects offensive power and defensive capability. These concepts will come alive in the hands of state of the art 21st century warriors enabled by FORCEnet, an envisioned architecture of sensors, networks, decision aids, weapons and supporting systems integrated into a single comprehensive maritime network. When combined with the capabilities of the other Services, these concepts will result in an integrated, multi-dimensional operational maneuver space within which the joint force commander will project power and protect joint forces from the most independent, exploitable, and secure portion of the battlespace -- the sea.



Sea Strike

- **Project decisive and persistent offensive power anywhere in the world**
- **Launch immediate, agile, and sustainable operations from the sea**

Capitalizing on the strategic agility, operational maneuverability, precise weapons employment, and indefinite sustainment of naval forces, Sea Strike is a broadened naval concept for projecting dominant and decisive offensive power from the sea in support of joint objectives. Sea Strike incorporates and integrates multi-dimensional capabilities for power projection with new combinations of forces and platforms, such as the Expeditionary Strike Force.

Sea Strike Transformational Capabilities

- Persistent ISR
- Time Sensitive Strike
- Information Operations
- Ship-to-Objective Maneuver

Transformational capabilities within Sea Strike are being pursued in four areas: ***Persistent Intelligence, Surveillance, and Reconnaissance (ISR); Time Sensitive Strike***; ***Information Operations***; and ***Ship-to-Objective Maneuver***. Transformational improvements in ISR will come through connecting forward elements with timely intelligence collected by national, joint and naval sources, as well as significantly increasing the capabilities of those naval sources. In turn, this improved battlespace awareness will reduce the time needed to strike time sensitive targets by linking precision weapons with precise targeting information. Time sensitive strike will be further transformed by a dramatic increase in the precision and volume of sovereign firepower available to the joint force commander.

Included in the array of transformational offensive capabilities is the ability to conduct maritime effects-based information operations in coordination and synchronization with other joint force operations.

Finally, the transformation of Ship-to-Objective Maneuver will allow future Marine Air-Ground Task Forces (MAGTFs) to greatly increase operational tempo and flexibility by developing the ability to maneuver directly against objectives deep inland, without first establishing an initial beachhead or support bases ashore. In short, the transformational capabilities being pursued through Sea Strike integrate mobile, nodal forces and decision superiority to seize the initiative, disrupt enemy timelines, decisively defeat threats, and ensure the operational success of the joint force.

Concepts under development such as the Expeditionary Strike Force facilitate the broad application of Sea Strike capabilities by reallocating a portion of the rapidly growing Navy strike capability to complement and support the strike capability of Marines embarked on amphibious ships. These new packages of surface combatants, submarines and Marine forces, called Expeditionary Strike Groups, will complement Carrier Strike Groups and double the number of places where naval forces can deliver and sustain effective striking power.

Sea Shield

- **Assure access throughout the battlespace for the Joint Force**
- **Project a defense around friends, allies, coalition, and Joint Forces**
- **Provide a sea-based layer of Homeland Defense**

Sea Shield exploits control of the seas and forward-deployed defensive capabilities to defeat area-denial strategies, enabling joint forces to project and sustain power. The ability to extend a protective umbrella far forward will assure access, reassure allies, and protect our homeland while dissuading and deterring potential adversaries. The increasing ability of naval forces to project network centric defenses in support of the joint force generates operational freedom of action, provides full spectrum dominance, and enhances strategic stability.

Sea Shield Transformational Capabilities

- Theater Air and Missile Defense
- Littoral Sea Control
- Homeland Defense

Sea Shield transformational capabilities being pursued are ***Theater Air and Missile Defense (TAMD); Littoral Sea Control;*** and ***Homeland Defense***. Over the next decade, TAMD will employ transformational technologies and concepts enabling new naval capabilities to provide networked mobile protection of joint forces, friends and allies, and critical infrastructure ashore from

aircraft, cruise and ballistic missiles. To assure access of the joint forces to any objective from the sea, concepts and capabilities are being developed to counter the threats from quiet diesel submarines operating near the coast and mines in and beyond the surf zone. Finally, and most importantly, Sea Shield capabilities protect the U.S. homeland, and in combination with the U.S. Coast Guard and other civil agencies.

Sea Basing

- **Project responsive forces worldwide with the capability to fight and win**
- **Operate continuously from an expanded & secure maneuver area – the sea**
- **Minimize vulnerabilities tied to overseas land support**

Sea Basing will provide sustainable global projection of American power from the high seas at the operational level of war. Sea Basing transformational capabilities include the ***Accelerated Deployment and Employment Times*** of naval power projection capabilities and the ***Enhanced Sea-borne Positioning of Joint Assets***. Sea Basing offers the potential for secure, sovereign, and mobile assembly areas and sanctuaries for key elements of the joint force, allowing the United States and its allies to most effectively utilize the international domain of the sea as maneuver space. Sea Basing will allow positioning networked joint forces for immediate employability. It will enhance maneuver ashore by reducing the need to move in major command and control elements, heavy fire support systems, or logistical stockpiles. By locating these critical functions at sea to the greatest extent possible, Sea Basing will strengthen international stability by reducing force protection requirements and demands on allied and coalition partners' infrastructure, will enhance deterrence, and will provide the nation with unmatched operational freedom of action.

Sea Basing Transformational Capabilities

- Accelerated Deployment and Employment Time
- Enhanced Sea-borne Positioning of Joint Assets

FORCEnet

- **Connect sensors, networks, weapons, decision aids and warriors from seabed to space**
- **Accelerate speed and accuracy of decisions across spectrum of command**

FORCEnet is the architecture of warriors, weapons, sensors, networks, decision aids and supporting systems integrated into a highly adaptive, human-centric, comprehensive maritime system that operates from seabed to space, from sea to land. By exploiting

existing and emerging technologies, FORCEnet enables dispersed, human, decision-makers to leverage military capabilities to achieve dominance across the entire mission landscape with joint, allied and coalition partners. FORCEnet is the future implementation of Network Centric Warfare in the Naval Services.

As an adaptable, naval mission-tailorable system that delivers timely information to decision makers in any environment, FORCEnet will provide the means for an exponential increase in naval combat power. It will be built to conform to joint architectural frameworks, linking current and future sensors, command and control elements and weapons systems in a robust, secure, and scalable way. Information will be converted to actionable knowledge and disseminated to a dispersed naval combat force, enabling the rapid concentration of the full power of the Sea Strike, Sea Shield and Sea Basing concepts with far less concentration of forces.

Naval Transformation Processes

Military transformation is a process that depends on a culture in which innovation is encouraged, nurtured and rewarded. The Navy and Marine Corps are a total force, committed to transformation to meet tomorrow's challenges, and fostering the mental agility and institutional activities to sustain transformation. True transformation is about seizing opportunities to create transformational capabilities by radically changing organizational relationships, implementing different concepts of warfighting, and inserting new technology to carry out operations in ways that profoundly improve current capabilities and develop desired future capabilities.

At its core, transformation is based on a willingness to constantly challenge old thinking and introduce new concepts. That means continuing to place people first and encouraging and rewarding them for innovative thinking and action. Agile and adaptive by nature, the Navy and Marine Corps will each foster the cultures of innovation needed to develop transformational concepts and capabilities to cope with a dangerous and uncertain today and tomorrow.

II. Background

The naval services have a long and rich history of transformation in their operational concepts and weapons systems. Aircraft carriers, amphibious doctrine, nuclear-powered ships and submarines, vertical envelopment, sea-based nuclear deterrence, maritime pre-positioning, Tomahawk strike missiles, and the Aegis weapon system were each, at the time of their introduction, transformational changes that led to greatly enhanced or fundamentally new naval capabilities. These capabilities have put the U.S. Navy - Marine Corps Team at the pinnacle of global naval power. To retain our position of preeminence, it is imperative that we look ahead with a renewed spirit of innovation to the new transformational changes necessary to meet tomorrow's challenges.

Naval transformation seeks to achieve a broad, sustained and decisive military competitive advantage over existing or potential adversaries. It comprises those continuing processes and activities that foster a climate of innovation in combining new and existing concepts, organizational arrangements and technologies to result in profound increases in military power. This is accomplished by substantially extending boundaries of necessary military competencies and by discovering fundamentally new approaches to military operations.

Naval transformation will deliver the increased military capabilities that will integrate into the future U.S. joint force in achieving the four main U.S. defense policy goals:

- Assure allies and friends;
- Dissuade future military competition;
- Deter threats and coercion against U.S. interests;
- If deterrence fails, decisively defeat any adversary.

Our Naval Transformation Roadmap describes the concepts, capabilities and processes for achieving transformational goals. It explains how naval transformation will contribute to joint warfighting capabilities of the future and what changes are being implemented to promote a culture of innovation. These innovations are aimed at supporting the six critical operational goals of the U.S. military as identified in the 2001 Quadrennial Defense Review and the Defense Planning Guidance. They are:

- Protecting critical bases of operations (U.S. homeland, forces abroad, allies, and friends) and defeating CBRNE weapons and their means of delivery;

- Assuring information systems in the face of attack and conducting effective information operations;

- Projecting and sustaining U.S. forces in distant anti-access or area-denial environments and defeating anti-access and area denial threats;

- Denying enemies sanctuary by providing persistent surveillance, tracking, and rapid engagement with high-volume precision strike, through a combination of complementary air and ground capabilities, against critical mobile and fixed targets at various ranges and in all weather and terrains;

- Enhancing the capability and survivability of space systems and supporting infrastructure; and

- Leveraging information technology and innovative concepts to develop an interoperable, joint C4ISR architecture and capability that includes a tailorable joint operational picture.

Enduring Roles of the Naval Services in the Nation's Defense

The Navy -Marine Corps Team will carry out the enduring roles that protect and advance U.S. interests. Transformational concepts and capabilities will profoundly enhance our ability to fulfill these roles and change the way in which we execute them:

Assurance and Deterrence

Assuring our allies and friends, as well as *deterring* threats and coercion against U.S. interests represent two key pillars of US defense policy, and are fundamental roles of naval forces. The continuous presence of American naval forces overseas, particularly in critical regions, is one of the most profound symbols of a firm US commitment to allies and friends. Persistent, sea-based forces deployed forward *assure* allies and friends that the Nation will honor its obligations as a reliable security partner. Potent, visible, and immediately employable expeditionary naval forces, deployed forward, also help to *deter* conventional conflicts by providing a wide range of military options to defeat aggression or counter any form of coercion. Finally, with their decisive-strike capability, stealthy, survivable nuclear-powered submarines, carrying nuclear or advanced conventional weapons, help underwrite effective strategic deterrence by holding potential enemies continually at risk.

Command of the Seas

Command of the seas contributes to assurance and deterrence, and provides the springboard for the decisive defeat of any adversary, if deterrence fails. Combat credible naval forces operate in a vast maneuver area to ensure friendly use of the world's oceans and seas while providing the capability to deny the same to adversaries. Netted naval battle forces can establish and maintain battlespace superiority in any maritime or littoral region, providing an asymmetric military advantage for the United States. Maintaining *command of the seas* is critical to the new defense strategy built around a "capabilities-based" approach to defense. Because the

United States cannot foresee all threats to our vital interests or those of our allies and friends, it is essential that we maintain freedom of action and maneuver through *command of the seas*.

Power Projection

The ability to project naval power over great distances helps to deter threats to the United States, our allies and friends and, when necessary, to disrupt or destroy hostile forces. To do this, future naval forces, operating from a networked and interoperable enhanced sea base, must be able to rapidly task-organize appropriate power projection forces to respond as part of the joint force. They must be able to counter undersea, surface, and air threats to U.S. access to critical littoral regions. They must be able to conduct multidimensional strike and defensive operations to gain and sustain access for the joint/coalition force. They must be able to integrate into the joint force to decisively defeat the enemy. They must be able to mount forcible entry operations and, without pausing, maneuver rapidly to seize key centers of gravity, often located deep in enemy territory. Power projection will be transformed by Sea Basing capabilities to better support expeditionary naval and joint forces. Mobility, flexibility, stealth, and sustained offensive firepower will be critical features of this transformation.

Homeland Security

A core tenet of the U.S. national security and military strategies is to defend the nation from an attack. Given the continuing proliferation of destructive technologies and technical expertise, naval forces will need to play a key homeland security role, both abroad and at home. Naval forces help defend America's homeland by operating forward, serving as a first line of defense against both traditional nation-state and emerging non-state actors. Forward-deployed naval forces operating from sovereign ships deter, detect, and interdict threats to the homeland through maritime surveillance and interdiction as well as conducting missions ranging from strategic nuclear deterrence to strikes against terrorists camps and terrorist activity. In addition, active and reserve naval forces contribute to homeland defense by countering immediate threats to our shores. Acting in conjunction with the U.S. Coast Guard and other Services and Agencies, naval forces defend the coastal and maritime approaches to the United States. Through the application of Network Centric Warfare capabilities, Navy and Marine Corps forces can achieve profound improvements in homeland defense.

III. Transformational Capabilities

The transformation of Naval forces seeks to dramatically expand the leverage that America's global maritime dominance offers our joint force commanders by assuring them theater access and a secure and sovereign base from which to mount devastatingly effective defensive and offensive operations. The emerging transformational capabilities described in this section reflect the creation of innovative operational concepts that will harness advanced technologies as well as changes across doctrine, organization, training, materiel, leader development, personnel, and facilities (DOTMLPF) to perform critical missions and tasks, but they do not represent an exhaustive list. Additional transformational capabilities will arise in the years ahead as new concepts and technologies are generated by service organizations that value innovation, promote change, and take advantage of opportunity. Often, these new ideas will depend, in part, on existing capabilities.

Service life extensions, product improvements and modifications to current equipment and processes may offer significant returns on investment. These modernization programs are not transformational by themselves, but are necessary to maintain current core competencies and provide the supporting structure to deliver new transformational initiatives. Many current concepts and technologies, when combined in new ways with appropriate changes in personnel, training and organization, provide transformational capabilities. This Naval Transformation Roadmap plots the course to achieve nine transformational capabilities organized by an integrated family of concepts that address the Department of Defense's critical operational goals, and to establish the environment necessary to capitalize on future innovation.

A. Sea Strike

Naval expeditionary forces, employing new combinations of forward-deployed, sovereign, mobile, and highly survivable aircraft Carrier Strike Groups, missile-firing surface and submarine Strike Groups, and Expeditionary Strike Groups, will exploit their positional advantage to project dominant offensive power from the sea. Sea Strike will also bring fully integrated naval aviation force packages that include Marine squadrons embarked on carriers and amphibious ships, and Navy squadrons operating from expeditionary shore bases. This integration will provide even more responsive and expeditionary forces, while achieving greater effectiveness and efficiencies. It will disperse sustainable naval combined-arms power far more broadly than today, providing joint combatant commanders with greatly increased operational flexibility to deliver lethal and non-lethal effects.

The Sea Strike capabilities that these new naval packages will project include long-range and precise aircraft and missile fires, large-volume covert strike capability, high-tempo decisive maneuver, and maritime special operations and information operations.

By providing full connectivity to, and the early in-theater backbone for a powerful grid of national, joint, and sea-based sensors, the immediately employable naval elements of the joint force will strike with speed measured in minutes, precision measured in meters, and volume measured in many hundreds of fixed or mobile aimpoints struck per day.

Sea Strike supports the offensive projection of power with reduced dependence on tactical landbases through the development and application of the following key transformational capabilities:

Persistent Intelligence, Surveillance, and Reconnaissance (ISR)

Persistent ISR provides, in conjunction with networked joint and national capabilities, prompt and precise battlespace awareness at any time and in any weather. This awareness provides commanders with a significant competitive advantage in the application of both lethal fires and decisive maneuver. Most critically, persistent ISR enables naval expeditionary forces to outmaneuver adversaries in the fourth dimension --- time. Persistent ISR capabilities for the Navy - Marine Corps Team are being transformed in two areas. First, the contributions of naval surveillance and reconnaissance assets to joint battlespace awareness will be significantly improved. Second, both services will dramatically enhance the links that enable forward-deployed forces to make use of timely intelligence information collected and, in many cases, assessed by national and joint collection systems; such as Space Based Radars, and intelligence analysis centers.

Transforming Persistent ISR

- Significantly improve naval contribution to joint battlespace awareness
- Seamlessly link sensors to warfighters

Combined with joint, and national ISR systems in the Expeditionary Sensor Grid (ESG), naval ISR capabilities will be significantly increased by the next generation of multi-mission maritime aircraft as well as naval Unmanned Aerial Vehicles (UAVs) with mission-reconfigurable advanced sensors; by continued development of Unmanned Ground Vehicles such as the Dragon Runner prototype; and by a family of Unmanned Underwater Vehicles and a program to develop new payloads and sensors that can exploit the large open-ocean interface provided by SSGN. Deployment of UUVs and SOF insertion from VIRGINIA-class submarines and SSGNs will also provide critical close-in ISR capabilities. The Expeditionary Sensor Grid, which will extend from subsurface to space, will provide pervasive, persistent battlespace sensing to create shared awareness throughout the theater and support agile, adaptive battleforce operations.

Persistent ISR will be supported by state of the art RF and cyber exploitation and other sensitive sources of information that contribute to an advantage in battlespace awareness and targeting. The deployment of a family of Navy and Marine Corps UAVs, equipped

with various sensors and networked via the Tactical Control System, will play a key role in extending the reach, coverage, and persistence of the naval ISR systems that provide information to the joint force.

Naval organic intelligence data will be fused with that from the broader national and joint intelligence activities within the Distributed Common Ground Station – Navy (DCGS-N) program, the Marine Air-Ground Intelligence System (MAGIS), and the Naval Fires Network. This fusion will vastly expand the accuracy and speed of actionable tactical intelligence. The new DCGS-N family of systems features common components, open architecture design, and adherence to interoperability standards as well as excellent "reach-back" connectivity. Key components of the DCGS-N networked environment include: the Tactical Exploitation System for ISR management efforts; the Common Imagery Processor; the high-bandwidth Common Data Links for airborne data downlink; the Joint Service Imagery Processing System; the Maritime Cryptologic System-21; and the Tactical Control System.

Marine Corps efforts such as MAGIS will dramatically improve the ground ISR tasking, processing, exploitation, and dissemination capabilities feeding its hub, the Intelligence Analysis System. The ability of maneuver commanders to access intelligence will be dramatically enhanced with the fielding of "Last Tactical Mile C4" capabilities, allowing wideband connectivity to battalion-sized units and increasing data connectivity to warfighters.

Time Sensitive Strike

Time sensitive strike brings precise, lethal effects to bear in decisive quantity on operationally significant targets within minutes, and ultimately within seconds of target detection. Transformational efforts will be largely focused in two areas. First, the time needed to strike targets will be reduced by more effectively utilizing improved ISR capabilities and by improving the self-targeting capabilities resident in attack platforms. Second, dramatic increases in the precision and volume of naval fires available to the joint force commander will give them decisive effect against a far broader range of threat capabilities.

Transforming Time Sensitive Strike

- Dramatically increased speed
- Decisively enhanced precision
- Significantly higher volume
- Greatly improved targeting

The rapidly increasing volume of precision-weapon firepower available from the new generations of sea-based strike aircraft as well as high-volume missile-firing ships and submarines and precision-gunfire ships will increasingly enable forward-deployed naval forces to have decisive impact. Transformational efforts will dramatically improve the ability of network centric naval forces to strike quickly against time sensitive targets such as mobile missile launchers,

indirect fire capabilities, modern Integrated Air Defense Systems (IADS), and a variety of hardened and deeply buried targets. Capabilities to execute time sensitive strike will also dramatically enhance the ability of ground commanders to integrate fires with maneuver.

One approach being pursued focuses on improving battlespace awareness and reducing the time needed to carry out strikes against mobile targets by speeding the flow of information from intelligence and surveillance sensors to tactical controllers. These surveillance sensors include current theater standoff ISR platforms such as the EP-3, U-2, Joint Surveillance and Target Attack Radar System (JSTARS) and Global Hawk UAV, attack submarines on clandestine operations, or SEAL and reconnaissance teams inserted behind enemy lines. Future sensors will include systems such as the Space Based Radar, Broad Area Maritime Surveillance Unmanned Aerial Vehicles and penetrating "sensors" such as the Ground Weapons Locating Radars, Predator and Dragon Eye UAVs; and Navy Unmanned Combat Air Vehicles (UCAV-N), all interoperable with the Naval Fires Network (NFN) and joint fires network. Design improvements slated for the new generation aircraft carrier (CVN(X)) will facilitate the ability to introduce UAVs and UCAVs into the battleforce of the future.

The time needed to relay engagement assistance from controllers to appropriately positioned "shooters," including tactical aircraft, will be dramatically enhanced as units become equipped with the Multifunctional Information Distribution System. On the ground, the Marine Common Aviation Command and Control System will provide common platforms and software to allow operators to rapidly integrate Marine aviation and ground command and control assets, creating speed of decision and engagement.

Such rapid response execution concepts will benefit substantially from better intelligence preparation of the battlespace (IPB) that helps focus ISR collection efforts on the most likely enemy operating areas, provides dynamic cross-cueing of collection sensors, and performs timely fusion of the data collected by networked sensors. Speedy relay of this data into the NFN via systems such as the Navy Distributed Common Ground System (DCGS-N), the use of decision aids that will assist controllers in matching fleeting targets with on-call, quick response shooters, and rapid relay of engagement assistance via advanced data links will provide shooters the information they need to quickly locate and strike the target.

The kill-chain timeline will be accelerated by reducing the time from the decision to fire on a target until the target is destroyed. Surface combatants and submarines, including the new SSGN, will soon begin to carry the Tactical Tomahawk (TACTOM), the first over-the-horizon strike missile to be retargetable in flight. TACTOM will be capable of loitering in an area where targets are expected. When a target is detected and its precise location in Global Positioning System coordinates is relayed to the airborne missile, it will react with drastically shortened flight time. Missile firing submarines add a covert capability to Sea Strike, preventing potential adversaries from accurately gauging the posture and composition of the strike force. Also, the addition of the Extended Range Guided

Munition for shipboard guns including the Advanced Gun System on the new family of surface combatants, beginning with DD(X), will provide fire support capable of killing targets with single rounds rather than massive salvos, and at ranges 10 times greater than previously possible. An organic integrated, mobile, and lethal MAGTF fire support capability, including the High Mobility Artillery Rocket System, the Lightweight 155mm Howitzer, and the Expeditionary Fire Support System will also provide time sensitive strikes, just as they provide responsive fires in support of maneuver.

A second approach to compressing decision time involves steps to greatly enhance the capability of attack platforms to detect targets. For example, the Advanced Electronically Scanned Array radar will allow tactical aircraft to "hunt and kill" fleeting targets in areas identified in the IPB process with little or no assistance from off-board sensors and tactical controllers, thus avoiding the delay involved with detailed coordination among sensors, controllers and shooters. Similarly, next generation electro-optical systems will allow rotary winged aircraft to locate, recognize, and identify targets at the maximum range of their on-board weapons. The Airborne Electronic Attack aircraft, capable of covering the full spectrum of electronic threats and, unlike previous electronic warfare aircraft, capable of striking as well, will significantly improve the effectiveness of each strike sortie.

Naval forces are in the process of achieving a revolution in aggregate striking power against both fixed and mobile targets. This is the combined result of enhanced payload-carrying capacity and higher sortie rates from more reliable sea-based aircraft launched from more capable amphibious ships and carriers including CVN(X); substantially increased numbers of vertically launched missiles from surface combatants, attack submarines, and SSGNs; the increased mobility and effect of the MAGTFs' organic fire support; as well as larger inventories of precision air-launched weapons like the Joint Advanced Air-to-Surface Standoff Missile, Joint Standoff Weapons System, and Joint Direct Attack Munition.

The introduction of new aircraft, missile systems, and precision weapons across the naval services now permits the destruction of multiple targets per sortie rather than requiring multiple sorties per target. This capacity will grow from the current capability to attack a few hundred aim points a day with precision weapons from Carrier Strike Groups and Expeditionary Strike Groups to over five times that number within a decade. It will double again in the following decade as miniaturized munitions significantly expand the strike capacity of individual attack aircraft.

Additionally, in the rapid development of the Electric Warship begun with DD(X), the Navy is fielding the technologies to enable a transformation in ship design as dramatic as the development of the nuclear submarine. The Electric Warship will unlock excess propulsion power for electric weapons that will revolutionize capabilities for projecting power. Advanced sensor systems will also exploit the availability of significant pulsed electric power. The electric weapons and sensors integrated with the electric power

system of the ship will yield a warship with superior mission performance, enhanced survivability, and affordability.

Information Operations

Information Operations (IO) provide, in coordination and synchronization with other effects-based joint activities, an asymmetric advantage to shape the battlespace from forward-deployed maritime forces by employing capabilities including electronic warfare, computer network defense and attack (CND/CNA), psychological operations (PSYOP), military deception, and operational security. Forward deployed naval forces provide joint force commanders with persistent platforms from which to execute joint information operations using embedded capabilities. The Navy and Marine Corps are developing transformational concepts and capabilities that will be employed to influence, affect, or defend information, information systems and decision-making in support of joint effects-based operations.

Transforming IO

- Expand maritime offensive capability
- Layered defense of vital networks

The Navy has taken several steps to invigorate work in this area. Efforts are underway to create a top-down Concept of Operations for IO laying out organizational responsibilities and guidance regarding the conduct of Information Operations. A Capstone Requirements Document for Navy IO is also under development. In addition, Information Operations has been designated a primary warfare area and a new career force is being created to develop and sustain IO professionals. New IO billets have been created at many levels, including the designation of a three star operational commander for IO at the newly established Naval Network Warfare Command, the posting of IO specialists in OPNAV, and the inclusion of an IO Warfare Commander within each battle group.

The Marine Corps has initiated measures very similar to those in the Navy to transform IO into a core capability. The Marine Corps Concept for IO has been promulgated leading the way for IO policy and doctrine. A Universal Needs Statement is under development to provide a foundation for the Expeditionary Force Development System to develop enhancements across the DOTMLPF. A Military Occupational Specialty (MOS) for IO has been developed to provide structure for the Marine IO career force. These IO professionals will come from all primary MOSs in order to provide a wide range of warfighting and support perspectives to our IO force. Educational requirements are being developed to support this burgeoning career force. New IO billets have been created DoD wide to best leverage our developing cadre of IO professionals.

Ongoing transformational IO capability developments include concept refinement testing for sea-based CND/CNA and PSYOP during several recent and planned Fleet

Battle Experiments, and the development of more agile and highly adaptive techniques and "smart" systems for electronic reconnaissance and jamming. These electronic warfare systems that can rapidly exploit, deceive, and disrupt enemy emitters will be carried on various manned and unmanned aircraft and surface ships

The Marine Corps has developed a comprehensive list of Mission Performance Standards for IO that have been incorporated into Marine Expeditionary Unit (Special Operations Capable) (MEU(SOC)) training programs and will be incorporated in all MAGTF Marine Corps Combat Readiness Evaluations. In addition, MEU(SOC)s are experimenting with various developmental IO capabilities.

Ship-to-Objective Maneuver

Ship-to-Objective Maneuver (STOM) projects a combined arms force from ships at sea directly against operational objectives, some located far inland. STOM is a transformational application of enduring concepts for Operational Maneuver from the Sea, allowing future Marine forces to maneuver in tactical array from the moment they depart the enhanced sea base until they reach their key objectives. These maneuver operations, supported from stable in-theater staging bases located outside the joint operating area, will be largely supported from the sea base, eliminating the need for vulnerable beachhead support. STOM will greatly increase the tactical flexibility and operational tempo of naval expeditionary forces.

Transforming STOM

- Maneuver decisively from sovereign mobile sea bases directly against operational objectives
- Eliminate "iron mountain" ashore
- Project intense sea-based fires
- Enable joint sustainment, and C2

Transformed Ship-to-Objective Maneuver envisions expeditionary assaults in which both surface- and vertical-lift combined arms teams commence their attacks from over the horizon directly at their assigned objectives. Advanced Amphibious Assault Vehicles will provide armored, high-speed transport of Marine forces from ships over-the-horizon as well as tactical mobility and direct fire support once ashore. The MAGTF Expeditionary Family of Fighting Vehicles (MEFFVs) will provide a mobile, armored, direct fire, self-contained, combined-arms, multi-mission, and multi-role expeditionary family of fighting platforms capable of conducting rapid operational maneuver in varied terrain. Advanced Tilt-Rotor technology aircraft, such as MV-22, will accelerate the speed, survivability and range of delivery of troops, equipment, and supplies from the sea base.

Stealthy, capable platforms, such as DD(X) and SSGN, will mount persistent, high-volume fires at unprecedented ranges in support of ground maneuver. Once ashore, new and highly mobile systems, including the High Mobility Artillery Rocket System (HIMARS), lightweight 155mm howitzers, and developmental initiatives such as the

Expeditionary Fire Support System (EFSS) will provide organic fire support for the MAGTF. Additionally, stealthy tactical combat aircraft including naval variants of the Joint Strike Fighter (JSF) will provide a dramatically improved capability to operate from distributed, mobile bases at sea and ashore and to deliver increased numbers of weapons. This combination of lightweight, lethal, and expeditionary fire support capabilities will increasingly exploit digital connectivity, allowing commanders to rapidly integrate responsive fires with decisive maneuver and develop overwhelming combat power.

Sustainment of the Marine forces from over-the-horizon will be provided by advanced concepts and capabilities, such as the Integrated Logistics Capability and the Common Logistics Command and Control System (CLC2S). CLC2S will provide the MAGTF with automated logistics planning and execution tools that will complement and be interoperable with current and emerging C2 processes and systems. CLC2S will not be a separate C2 capability, but the logistics feeder to the MAGTF's Common Operating Picture. ILC and CLC2S will combine transformational processes and information technologies to provide seamless interaction and support between the shore-based logistics units, sea-based logistics functions, maritime ISBs, and the supporting establishment enabling unencumbered maneuver ashore while the majority of sustainment capabilities remain in the seaspace.

STOM calls for the exploitation of navigation and situational awareness capabilities provided by new technologies, allowing landing force tactical commanders to command and control the maneuver of their units beginning the moment they cross the line of departure at sea, not once they arrive at the beach. This aspect of command and control extends to the changing of littoral penetration points during the assault and use of supporting arms to facilitate the attack. Networked Unit Operations Centers (UOCs), the Marine Air Ground Intelligence System (MAGIS), and the Common Aviation Command and Control System (CAC2S) will support information exchange between ground and aviation units and provide the commander ashore with a Common Tactical Picture of combat operations.

SECDEF's Critical Operational Goals Addressed by SEA STRIKE

- ***Project and Sustain Forces in Anti-Access Environments***
- ***Deny Enemy Sanctuary by Providing Persistent Surveillance, Tracking and Rapid Engagement with High-Volume Precision Strike***
- ***Protect Critical Bases and Defeat CBRNE Weapons and Their Means of Delivery***
- ***Assure Information Systems and Conduct Effective Information Operations***
- ***Leverage IT to Develop a Joint C4ISR Architecture and Operational Picture***
- *Enhance capability and survivability of space systems and supporting infrastructure*

B. Sea Shield

Sea Shield permits the joint force to operate effectively despite adversary efforts to deny theater access to U.S. forces. It achieves these goals by exploiting global sea control to defeat area denial threats including aircraft, missiles, small littoral surface combatants, mines, and submarines. Sea Shield extends precise and persistent naval defensive capabilities deep overland to protect joint forces and allies ashore. It is also key to protecting our nation at home. Sea Shield helps assure allies, deter adversaries, and generate operational freedom of action for the projection of naval and joint power. Key transformational capabilities include:

Theater Air and Missile Defense

Theater Air and Missile Defense (TAMD) projects a protective and highly effective umbrella, over the horizon at sea or deep inland and from ground level to the exo-atmosphere, against all forms of aircraft and ballistic or cruise missile threats. Transformation of naval TAMD will protect joint forces, friends and allies, and critical infrastructure ashore from the sea. This new capability will provide tremendous flexibility to national and joint commanders.

Transforming TAMD

- Field new network centric capabilities against air, cruise missile and ballistic missile threats
- Provide sea-based defense for USA and allies

Theater Air and Missile Defense will employ transformational concepts for network-centric air defense. The Naval Integrated Fire Control – Counter Air (NIFC-CA) consisting of a "backbone" of the Cooperative Engagement Capability to network radar data throughout the battleforce, the new digital E-2C Radar Modernization Program, plus the world's first over-the-horizon surface-to-air missile, the SM-5; combined with the MAGTF capabilities including Tactical Aviation Operations Centers, Multi-Role Radar System and AN/TPS-59 radars, and the Complementary Low Altitude Weapons System, will within a decade form an integrated and seamless air defense capability that will permit lethal engagements of large numbers of cruise missiles and aircraft at hundreds of miles' range, over land or over water.

Combining naval track data with that from other services in a Single Integrated Air Picture will permit profound advances in tactical decision speed and accuracy at extended ranges and allow significantly improved engagement opportunities. It will also permit employment of transformational changes in force doctrine, including reallocation of manned aircraft from defensive air patrol duties to strike missions and reallocation of AEGIS surface combatants from close-in force defense to distant stationing for ballistic missile defense or precision naval surface fires strikes. Additionally, the centralized

coordination resulting from the development of a Distributed Weapons Control system could greatly multiply the effectiveness of a tactical commander's weapon inventory by allocating the optimum number of weapons force-wide to each target.

This extended range air defense capability will be further enhanced on the next generation of warships, including DD(X), CG(X) and CVN(X), by development of the Volume Search Radar, which adds affordable, solid-state radar highly capable in the high clutter environment of the littorals. When this is combined with the emerging generation of highly effective inner-layer defensive systems, U.S. warships will be able to operate with near-impunity in areas of Anti-Ship Cruise Missile threat.

Sea-based ballistic missile defense (BMD) systems will exploit the existing infrastructure of naval radars and missile launchers, while providing an unmatched sovereign flexibility for theater and homeland missile defense operations. Linked to a network of space and airborne sensors and directed by highly responsive command and control systems, a family of sea-based interceptor missiles will provide boost phase, mid-course, and, against theater-range missiles, terminal defense capability in close coordination with airborne, land-based, and space-based missile defense systems. The all-electric design of the next generation of surface warships will greatly enhance the fleet's ability to meet the power demands of future generations of radars and other sensors for missile defense.

Naval BMD efforts have historically focused on the development of a two-tiered defensive system for theater defense that uses upgraded variants of the AEGIS combat system and the STANDARD missile. Active defense capability against theater-range ballistic missiles is needed to provide initial protection of air and sea ports of debarkation and expeditionary force concentrations from attacks designed to impede the projection of U.S. forces. Although this assured access requirement clearly remains valid, the recent U.S. withdrawal from the ABM Treaty removes restrictions that previously prevented the Navy from optimizing its theater systems or participating in prospective plans to defend the American homeland from ICBM attack. Both of these opportunities are now being actively explored by the Missile Defense Agency (MDA).

The Navy had planned to deploy two systems, both of which are necessary to engage the full spectrum of threat TBMs. A lower tier, Navy Area Defense system was required to intercept shorter-range theater ballistic missiles within the atmosphere during their terminal phase of flight. That development, which would have provided improved air defense capabilities as well, was terminated in late 2001 due to schedule delays which resulted in cost growth.

MDA, which assumed responsibility for all ballistic missile defenses in January 2002, is currently planning a series of experiments, beginning this year, to assess alternative means of fulfilling the lower tier mission requirement. The sea-based upper tier system, which has recently been re-named the Seabased Midcourse Defense System, is designed to

employ a hit-to-kill warhead carried on the SM-3 missile to intercept longer-range missiles while they are in midcourse flight through space. The two most recent test flights, occurring in January and June of 2002, resulted in direct target hits by an operational cruiser at sea, building confidence in an early deployment of naval BMD capability.

Littoral Sea Control

Control of the seas near land assures the prompt access and freedom of maneuver of joint forces from the sea base. Transformation will be focused on defeating anti-access capabilities in the form of small, fast surface combatants, quiet diesel submarines and sea mines through the development of netted, distributed sensors and improving the command and control of these missions, primarily through linking sensors, decision aids and displays with attack forces. The Littoral Combat Ship (LCS), with its reconfigurable mission modules will figure prominently in the future control of the seas, especially near land.

Transforming Littoral Sea Control

- Assure freedom of operations for coalition and joint forces anywhere, anytime
- Assure access from the sea for joint forces in the face of surface threats, quiet submarines and mines

Small, fast surface combatants could present a challenge to ships operating near land. In the near term, CIWS 1B with a significant capability against them is being fielded on all ships to provide a credible capability against this threat. In the future, the Littoral Combat Ship, networked with distributed sensors and other platforms in the Strike Group, will use its speed, agility and ability to support manned and unmanned surface and air craft to contribute to the defense from small craft of all platforms in the network. The rapid response capability of the LCS will allow new concepts of operations in sea control ensuring continuous access by the Joint Force.

Anti-Submarine Warfare (ASW)

Naval forces operating forward must sustain maritime superiority, often in the face of vigorous area-denial efforts by the adversary. One of the most-favored area-denial systems is the modern, quiet diesel submarine. The objective of ASW is to gain maritime superiority by rapidly finding, destroying or, where necessary, avoiding enemy submarines.

Transformational efforts in anti-submarine warfare are focused on developing new operational concepts that leverage advanced technologies to improve wide-area surveillance, detection, localization, tracking and attack capabilities against quiet adversary submarines operating in a noisy and cluttered shallow water environment. ASW is an integrated, combined arms effort, and improved capabilities center upon

achieving greatly enhanced situational awareness as well as upon achieving high levels of operational proficiency through realistic simulators and training. Substantial efforts are being directed toward building a common undersea picture by networking widely distributed sensors, command elements, platforms and weapons to share information and to collaborate in near real-time mission planning and decision making.

The Navy's new operational concepts will take full advantage of the situational knowledge accumulated during peacetime surveillance missions. Preparation for ASW operations begins with covert surveillance of adversary submarine activities. Attack submarines equipped with next generation hull-mounted and towed sensor arrays, as well as mission re-configurable unmanned undersea vehicles and networked to fixed and mobile surveillance systems, will collect intelligence about the local undersea environment, technical characteristics of adversary submarine systems and where and how potential adversary submarine forces operate. Should regional tensions increase, these next generation systems will enable submarines to covertly monitor undersea activity for the theater commander. Should war break out or pre-emption be required, these surveillance missions can rapidly be converted into leading edge attacks.

The Navy is fielding several acoustic and non-acoustic localization systems explicitly designed for networked operations. These include the Advanced Deployable System, a series of tactically-deployable bottom-mounted, passive, battery-powered hydrophones connected to one another and linked to a processing site ashore or afloat by fiber optic cables. The Navy is also developing a next generation off-board distributed acoustic system with both active and passive capability. Finally, a very high powered, low frequency active (LFA) acoustic array that can provide dramatically increased detection ranges, designed to be towed by manned or unmanned surface vessels, is nearing operational status.

One of the primary, focused missions of the Littoral Combat Ship (LCS) will be littoral ASW. The LCS will be capable of carrying unmanned air, surface and undersea vehicles and other sensors that complement the substantial ASW capabilities planned for DD(X) and the follow on Advanced Cruiser (CG(X)). Revolutionary advances in propulsion, materials, and hull forms are being incorporated into transformational design concepts for the LCS. It will have superior speed, maneuverability, sea keeping, signature reduction and payload modularity to perform focused or special missions in the littorals.

By virtue of their speed, area of coverage, versatility and payload, manned and unmanned aircraft will continue to be indispensable against the submarine threat. The Advanced Low Frequency Sonar is being developed to dramatically increase the acoustic capability of ship-based MH-60R helicopters. In the near term, the Automatic Radar Periscope Detection system, which can be carried by aircraft as well as surface ships, could be deployed to detect exposed enemy periscopes. Over the longer term, S&T efforts are focused on the development of promising active and passive electro-optical techniques that could be integrated with systems carried on manned aircraft or UAVs.

Finally, as the Navy fields these transformational ASW capabilities, consideration is being given to initially concentrating the most advanced systems in a "vanguard" ASW force that would be deployed in the Asia-Pacific region. This transformational force would be used to refine operational concepts, tactics, techniques and procedures for employment of the new capabilities and would be available for routine surveillance activities and contingency operations throughout this critical area.

Mine Countermeasures

Mine countermeasures (MCM) ensure that U.S. joint and combined forces can negate the employment of mines to impede the free movement of U.S. forces or supplies by sea or from the sea base. Transformational efforts will focus on emerging generations of mine detection and clearance systems. This will include systems "organic" to forward-deployed combat ships. Both dedicated and organic MCM systems will employ sophisticated, networked unmanned surface, air, and underwater vehicles equipped with advanced technology systems to detect and neutralize mines in the shallow water and surf zones, will be used to quickly avoid or enter and safely clear dangerous mined areas

MCM operations will use networked sensors, command elements, and weapons that can be tailored to counter specific threats and to operate at particular water depths and within distinctive local environments. They will employ a "system of systems" approach to achieve success. This will involve innovative operational concepts that leverage commonality, modularity, and portability to integrate a variety of new technologies and systems

New technology MCM systems currently being developed for possible fielding to support transformational operational concepts include:

- In its dedicated MCM role, the Littoral Combat Ship will utilize the transformational multi-mission adaptability that will make it an exceptional ASW platform. Experimentation with a chartered High Speed Vessel is currently being planned to examine and accelerate new technologies in support of mine warfare. Lessons learned from these experiments will be applied to the LCS.
- A variety of unmanned underwater vehicles designed to conduct undetected, high confidence, and rapid underwater reconnaissance to precisely locate and neutralize mines.
- Advanced mine detection systems carried by patrol aircraft and UAVs that identify and locate sea and land mines with multi-spectral electro-optical imagery or laser detection systems.
- A computer-based system that assists operators in locating mines by comparing a common undersea picture developed in peacetime via clandestine, underwater reconnaissance with an updated picture of the underwater battlespace, based on reconnaissance operations during crisis or conflict.

- Next generation organic magnetic and acoustic mine sweeping systems, specially designed to operate in very shallow waters and the surf zone, that are carried by sea-based helicopters and UAVs as well as manned and unmanned surface vessels.
- More capable mine neutralization systems that employ enhanced underwater explosives, greatly improved directional explosive line charges, an airborne gun that fires supercavitating projectiles, and small, robotic vehicles, which would be released in large numbers to autonomously find and neutralize mines.

New MCM capabilities organic to deployed naval forces in combination with a balanced force of more capable, dedicated MCM assets will enable naval forces to maneuver in potentially mined areas while executing other combat missions. MCM will increasingly use off-board and standoff detection and neutralization systems to decrease the exposure of Sailors and Marines to mines, thus reducing the danger of mine countermeasures operations and increasing freedom of maneuver.

Homeland Defense

Effective Homeland Defense deters potential aggressors, detects threats and defends the U.S. homeland against asymmetric attacks. It requires effective forward presence, fully integrated intelligence, and seamless interagency cooperation. Forward deployed naval forces buy time and space for the detection, tracking, and interdiction of threats to our homeland. Transformational naval capabilities supporting homeland defense include networked anti-terrorism collaboration with civil and law enforcement agencies and, in the future, sea-based ballistic missile defense.

Transforming Homeland Defense

- Provide first layer of defense at farthest reaches of the globe
- Develop Maritime Domain Awareness through networked interagency collaboration
- Field sea-based ballistic missile defense

Networked collaboration with the Coast Guard, civil and law enforcement agencies will provide enhanced protection from asymmetric attacks launched from the seas surrounding the United States, including our ports and harbors, and provide incident response capability should an attack occur within the country. Efforts are underway to explore ways to create automated information sharing systems that can assimilate, correlate and display the vast quantities of intelligence data needed to produce actionable Maritime Domain Awareness. Such information would be used to ensure that suspicious vessels and aircraft are interdicted in a timely fashion. Coastal surveillance could also be enhanced through the use of the Broad Area Maritime Surveillance UAV. Also, the Navy will continue to develop the Deepwater Combat System in coordination with the Coast Guard, with the goal of enabling maximum

interoperability between the two Services to maintain long-standing capabilities against more traditional threats.

The Anti-Terrorist capabilities of the Marine Corps' 4th MEB (Anti-Terrorism) will deter, detect, defend, and be able to support initial terrorist incident response throughout the homeland, as well as overseas. Combining existing capabilities of a Marine Security Guard Battalion; Marine Corps Security Force Battalion; and Chemical, Biological, Incident Response Force, with a specialized Anti-Terrorism Battalion under a brigade Command Element creates an immediately employable capability effective in training for, and employing against, terrorist threats.

Additional capabilities will be developed to support the naval role in homeland defense. The Center for Emerging Threats and Opportunities (CETO), a partnership between the Marine Corps and the Potomac Institute for Policy Studies, is conducting an assessment of USMC organization and training and is providing recommendations concerning capabilities that contribute to Anti-Terrorism and homeland security missions. Additionally, Reserve units, "forward-deployed" across America, will support federal response efforts as required.

Finally, as sea-based ballistic missile defense is developed, it will become a critical part of the defense of the homeland.

SECDEF's Critical Operational Goals Addressed by SEA SHIELD

- ***Protect Critical Bases and Defeat CBRNE Weapons and Their Means of Delivery***
- ***Project and Sustain Joint Forces in Anti-Access Environments***
- ***Leverage IT to Develop a Joint C4ISR Architecture and Operational Picture***
- *Enhance capability and survivability of space systems and supporting infrastructure*

C. Sea Basing

Sea Basing is a transformational concept that revolutionizes the projection, protection, and sustainment of sovereign warfighting capabilities around the world. The inherent mobility, security, and flexibility of naval forces provide an effective counter to emerging military and political limitations to overseas access. Sea Basing is also efficient, reducing the need to build up logistic stockpiles ashore that burden or endanger our allies and require force-protection measures, and reducing the early demands on the nation's lift capability. Sea Basing will maximize the ability of the naval services to conduct sustained, persistent combat operations from the maritime domain and minimize limitations imposed by reliance on overseas shore-based support.

Sea Basing enables the accelerated projection, protection, and sustainment of all dimensions of networked naval power, providing joint force commanders with unprecedented speed and flexibility of employment and expanded operational reach. As a primary enabling concept for Expeditionary Maneuver Warfare, Operational Maneuver From The Sea (OMFTS), Ship-To-Objective Maneuver (STOM), and other expeditionary concepts, Sea Basing supports the principles of:

- Pre-emption or striking with surprise from the vastness of the sea;
- Use of the sea as maneuver space for naval and joint forces;
- Creating and sustaining overwhelming operational tempo and momentum through maneuver;
- Enhancing strategic, operational, and tactical mobility;
- Rapid force closure and at-sea reconstitution;
- Capitalizing on the force protection inherent in the naval command of the sea.

Capabilities and concepts supporting Sea Basing and permitting accelerated deployment and employment times will be achieved by the combination of forward-deployed elements of the enhanced sea base, intra-theater high speed sealift, and rapidly deployable forces. These capabilities will leverage real time reachback for logistics support, enabled by integrated Navy and Marine Corps logistics systems and collaborative decision tools provided by FORCEnet.

<u>Accelerated Deployment and Employment Times</u>

One major objective of Sea Basing is to compress deployment and employment times to permit ground combat power projection within days rather than weeks or months, without reliance on ports or airfields ashore. Integrated combatant and auxiliary naval forces, including Maritime Prepositioning Force (Future) (MPF(F)), will become a single fully netted force to greatly enhance the speed and effectiveness of expeditionary warfare from the sea. New developments in high-speed vessels, high-speed lighterage, vertical lift assets, landing craft, and advanced amphibious assault vehicles will enable phased at-sea

arrival and assembly of a MEB-sized force. Other transformational attributes of the sea-based force include: high-speed vessels that will move personnel and selected equipment at dramatically higher closure speeds from distant and secure land bases and ports to the sea base to assemble with their equipment for subsequent operations; rapid, selective offload, enabling logistics sustainment from a secure sea base, providing tailored support packages for movement directly to dispersed forces ashore; in-theater reconstitution of Marine Air Ground Task Forces at sea, providing the joint force commander with an immediately available exploitation force and operational reserve; and en-route collaborative planning and rehearsal capabilities that will be enhanced by the distributed, networked tools provided by FORCEnet.

Transforming
Accelerated Deployment & Employment

- At-sea arrival and assembly
- Selective offload
- Reconstitution at sea

New-generation, higher-capacity combat logistic ships will sustain a secure, sovereign at-sea resupply pipeline from land depots and ports outside the area of operations to the sea-based forces within that area. They will also seek to provide improved fleet forward munitions reload capability through continued research into innovative reload systems and technologies.

Enhanced Sea-borne Positioning of Joint Assets

Sea Basing presents the joint force commander with the ability to expand the battlespace beyond enemy reach, moving critical command and control, fire support, logistics, and other assets to the most mobile and secure operational area – the sea. Capabilities protected at sea include robust, survivable, and flexible C2 with global connectivity; highly responsive, precise, and far-ranging fires from guns, missiles and aircraft; and vital logistical support to include supplies, medical and repair capabilities. The modular capability of MPF(F) may allow the flexibility to configure these ships to serve in a Joint Command and Control role utilizing the Deployable Joint Command and Control system, as a forward medical facility, or even as an Afloat Forward Staging Base for Special Operations Forces (SOF).

Transforming
Sea-borne Joint Assets

- Fires, connectivity, and sustainment from the sea
- Secure base for joint C2 and SOF springboard

SECDEF's Critical Operational Goals Addressed by Sea-Basing

- *Protect Critical Bases and Defeat CBRNE Weapons and Their Means of Delivery*
- *Project and Sustain Forces in Anti-Access Environments*
- *Deny Enemy Sanctuary by Providing Persistent Surveillance, Tracking and Rapid Engagement with High-Volume Precision Strike*

D. FORCEnet

FORCEnet will emerge as the next generation of Network Centric Warfare (NCW). It will provide the architecture and building blocks that integrate sensors, networks, decision aids, weapons, warriors, and supporting systems into a high adaptive human-centric, comprehensive system that operates from seabed to space and from sea to land. It will support well-informed, geographically dispersed forces in their execution of missions across the entire range of military operations. It is focused on accelerating the speed and accuracy of assessment, decision and action at every level of command. Leveraging profoundly improved situational awareness and understanding of the adversary, we will shape and control the information environment to dissuade, deter or decisively defeat any enemy.

FORCEnet will provide:

- The maritime component of the Family of Interoperable Pictures, fully interoperable with the Single Integrated Air Picture, Single Integrated Ground Picture, Single Integrated Space Picture, etc, and the Global Information Grid. It will create a new basis for network centric coalition and joint military operations. Interoperability and synchronicity require that all systems and the data that feed them adopt a common, standard geospatial and temporal reference frame -- a concept called the 4D Cube.
- Integration of all force elements throughout the battlespace , including: satellites, manned aircraft, ships, submarines, UCAVs, USVs, UUVs, unattended space, air, ground and sea sensors and most importantly the warfighters, afloat and ashore.
- The operational and logistics information that is critical to sustaining the warfighter and maintaining the required levels of logistics support in-theater.
- Synchronized evolution of battlespace ISR tasking, processing, exploitation, dissemination and multi-sensor fusion capabilities to support both targeting and maneuvering.
- An open architecture that provides the basis for interoperability with joint, allied and coalition forces.
- A state of the art naval enterprise data network – fully interoperable and seamlessly integrated – to provide information superiority in direct support of the warfighter.
- The "last tactical mile C4" capability to allow a substantive increase in wideband communications connectivity to maneuver battalion-sized units.
- Defense in depth protection to ensure that networks are available reliable, and resistant to disruption or corruption.

Major programs that will support FORCEnet, include:

- Expeditionary Command and Control, Communications, Computers, and Combat Systems Grid (EC5G) - the initial effort to transform the concepts for FORCEnet into operational practice. The EC5G will define and field the enabling technologies

required for Battle Force Command and Control through the deployment of an expeditionary-focused network backbone, integrated across all Naval missions and functional areas.

- Expeditionary Sensor Grid (key initiative for Persistent Organic ISR) -Pervasive, persistent battlespace sensing through the use of national, joint, and naval manned, unmanned and unattended multi-spectral active and passive sensors to build shared battlespace awareness and support responsive, effective battleforce operations.
- Sea-based joint command and control - The capability to support the initial in-theater operations of a JTF Commander from a mobile, self-deploying sovereign command center at sea, potentially exploiting the MPF(F) hull as a host.
- Real-time Meteorological and Oceanographic Battlespace Characterization for gaining asymmetric advantage by collecting, processing, and exploiting environmental data on-scene in synchronization with the battle forces. This will employ UUVs, UAVs, and USVs, satellite downlink, tactical radar, and high capacity computing capability.
- A web-enabled Navy allowing collaborative planning and execution, facilitated by the Navy Marine Corp Intranet (NMCI) ashore and IT-21 shipboard networks that provide satellite access for shipboard users to ashore classified and unclassified Wide Area Networks. This concept can be further expanded by integrating allies into the battleforce network with the Coalition Wide Area Network.
- Advanced EHF Satellite Terminals that dramatically increase the bandwidth available to and needed by mobile maritime forces.
- The Marine Corps Shared Data Environment incorporates the standards, models, and data warehousing technologies required to establish the "common language" that enables Marine Corps systems integration and interoperability. Within these SDE architectural constructs is the capability to achieve information superiority by accelerating the availability, accuracy, and timeliness of data existing in Marine Corps systems, needed by the decision making process at every level of command.
- The Joint Tactical Radio System will provide a wireless, self-organizing mobile network built on software programmable radios and will be a key component of the expeditionary maneuver communications architecture.

SECDEF's Critical Operational Goals Addressed by FORCEnet

- *Assure Information Systems and Conduct Effective Information Operations*
- *Deny Enemy Sanctuary by Providing Persistent Surveillance, Tracking and Rapid Engagement with High-Volume Precision Strike*
- *Leverage IT to Develop a Joint C4ISR Architecture and Operational Picture*

IV. Naval Transformation Processes

The Department of the Navy is committed to establishing the environment, culture and processes required to generate and sustain transformational thinking and action. Co-evolving the emerging technologies and innovative operational concepts, while aligning organizational relationships to exploit them, will allow us to develop new dimensions of military capability.

The Navy and Marine Corps are mutually supporting fighting forces. As such, they employ complementary organizations, structure, and warfighting methods. These complementary methods influence the transformational processes of each service, as they organize, train, and equip their total forces as part of their Title 10 responsibilities. In order to adequately capture these unique transformational processes, these efforts and methods are described separately below.

A. Navy Transformation Process

While the transformational capabilities of Sea Strike, Sea Shield, and Sea Basing supported by FORCEnet, comprise the focus of naval transformation, developing the culture of innovation requires putting in place processes that ensure continuous innovation. A supporting triad represents those processes: *Sea Warrior*, *Sea Trial*, and *Sea Enterprise*.

Sea Warrior: Maximizing Human Capital

The hallmark of the Navy has always been and will always be the professional men and women of its ships, squadrons, stations and staffs. But each successive family of ships, submarines and aircraft being built, designed and conceived today requires a higher degree of intellect and experience from these professionals. We face a continuing challenge of growing a more technical, educated and experienced force while still manning a legacy fleet that requires too much unskilled labor. In order to be competitive in retaining our highly skilled Total Force in this new century, we must place the Navy professional, active duty, reserve and civilian, at the center of all that we do in human resources.

Sea Warrior
Enhanced assessment, assignment, training and education of our most valuable asset – our people.

The Navy Sea Warrior process bridges this future where fewer Sailors, each of whom needs to be more capable and better trained, will need to perform more tasks and operate in more complex environments. It relies on human systems integration to enhance

productivity and effectiveness by equipping the man and not just manning the equipment. It focuses on Sailors' aptitude, skills and knowledge and couples them with their preferences, interests and personalities to enable an all-volunteer force to realize its full potential. It will develop naval professionals, including new naval space and information operations professionals, who are highly skilled, powerfully motivated, and optimally employed for mission success.

At the heart of Sea Warrior is "Sailor Advocacy," a fundamental change in the career management and detailing processes that gives each Sailor a stronger voice and greater control over their career decisions. It relies on command leadership and mentoring relationships as well as teaming between individual commands and the Navy Personnel Command (NPC). This works to develop a comprehensive picture of each Sailor's preference and capabilities and to shape realistic, career enhancing options. Enabling web-based technologies, including intelligent software agents and a single, integrated manpower and personnel relational database, will provide a leap-ahead capability to focus on the individual while improving the efficiency and effectiveness of the personnel system.

Today's Sailors entered the Navy with approaches to recruiting, training and job assignment best served in conscription or downsizing eras. Sea Warrior starts the individual Sailor's career management at the initial entry point and then follows a path of lifelong learning to maximize growth and development. Portability of skills across job assignments and geographic areas is central to the continuous personal and professional growth in the Sea Warrior Navy.

Recruiting Navy Personnel

While this is an all-volunteer Navy, we still must recruit our Sailors in an environment where increasing numbers of high school seniors surveyed indicate intentions to go directly to college. Incentives to join the Navy are mostly monetary, but offering job opportunities that align with an individual's desires is also essential. The Navy will increasingly use high-technology systems to match people to Navy jobs. We will utilize every technology to better fit the Navy's needs with the individual's abilities and interests, using a Whole Person Assessment (WPA) approach to guide the right individuals to the right jobs. This is expected to improve job satisfaction and reduce attrition, which can lead to reduced recruiting requirements. WPA allows us to know more about the Sailor's aptitude, their personality and their interests before making definitive skill classification decisions. The intent is to better enable career success and to bring more satisfied Sailors into a first term reenlistment window.

Web-based Marketplace for Sailors and Jobs

Project SAIL – Sailor Advocacy through Interactive Leadership – moves the Navy to a technology-enabled, web-based, incentive driven distribution system. This new approach

couples each command's retention team with the NPC headquarters in "Team Detailing." This will result in better pairing of every Sailor with the right job.

Web-based detailing, new technologies and comprehensive descriptions of each Sailor's knowledge, skills and abilities, are being combined to expand assignment options, improve the quality of job matches, and simplify the detailing processes for Sailors. A Sailor's agent will understand the desires of the Sailor and also know their professional requirements (resume), career needs and look for the best assignment option to satisfy these criteria. Likewise, a command's agent will be aware of the needs of the command and search for the optimal Sailor to fill its requirements. Both agents will exploit more detailed descriptions of Sailor's knowledge, skills, certifications, personal attributes and jobs, as well as career path descriptions.

The online marketplace will use dynamic, real-time incentives packages to encourage Sailors to take specific assignments. Incentives such as assignment pay, applied in response to dynamic needs of commands and claimants, will drive the web-based marketplace into conformity with fleet priorities.

Educating Navy Personnel

New approaches to professional education are being implemented to develop Sailors who can optimally adapt to new operational concepts. Such initiatives will develop Sailors who are better prepared to exploit the opportunities offered by "flattened" organizational structures and dramatically broadened access to information in netted battleforce operations.

Included in this effort are the expanded use of the Navy College Program, the Program for Afloat College Education, Joint Professional Military Education, the Naval War College, the Naval Postgraduate School, and assignment of selected officers to civilian graduate schools.

Training Navy Personnel

A "Revolution in Training" known as Task Force EXCEL (Excellence through our Commitment to Education and Learning) is underway to dramatically increase the use of onboard training/simulation packages and computer-based distance learning. This initiative will augment traditional schoolhouse training and reduce infrastructure costs and time to train. Task Force EXCEL is leading the way in designing a continuum of education that will enrich Sailors throughout their careers, helping them realize their full personal and professional potential.

Central to this effort is adopting civilian industry-accepted classification credentials. Such credentials increase the value of Navy experience by underlining the equivalency between military and private-sector technical skills training.

Additionally, regarding operational training in the fleet, we are aggressively investigating the latest simulation technologies, to more fully replicate tactical conditions, sharpen combat skills, and save wear and tear on expensive hardware.

Effectively Employing Navy Personnel

New methods for manning ships -- including rotational crewing -- are being explored to maintain ships on station for longer periods without overtaxing crews. The Navy will shift to manning its units using a dynamic scenario-based standard that is derived from rigorously analyzed fleet manning experiments and optimized workload measurement. Manpower considerations are also being emphasized in the acquisition of new weapon systems to reduce total ownership costs. For example, the new design aircraft carrier (CVNX) has targeted a 40 percent reduction in manning requirements, reducing total ownership costs by nearly $5 billion.

Finally, a Navy Space professional community is being identified, and an Information Professional Officer community has been established to support our evolution toward Network Centric Operations. The rapidly expanding scope and complexity of information management and technology emphasizes the importance of establishing a career path to ensure the development and retention of such technically skilled professionals.

Human Resources

In order to better meet the needs of our people across the human resource enterprises of the Navy, two important initiatives have taken place. First, is the creation of a new officer Human Resources (HR) community. This HR community will build a professional cadre of experts who will lead the policy and program development to ensure we recruit, train and retain the best and brightest. Second, is the Human Resources Board of Directors (HRBOD), chaired by the Chief of Naval Personnel and comprising representatives from Manpower and Personnel, Training, Medical, Shore Facilities, Resourcing and the Fleet, which works together to close any Human Resource gaps that exist across these organizations.

Sea Trial: Process for Innovation

Sea Trial is the Navy process of integrating emergent concepts and technologies, leading to continuous improvements in warfighting effectiveness and a sustained commitment to innovation. It is based on the mutually reinforcing mechanisms of technology push, concept pull, and spiral development, integrated into an enduring process for transformation. It puts the Fleet at the heart of innovation and provides a mechanism to more readily capture the fruits of their operational excellence and experimentation.

Technology Push

The rapid pace of advancement across the entire range of military technologies provides a continuous stream of innovative systems. Most of these systems provide the warfighter with improved capabilities to more readily fulfill traditional missions. At certain intervals, however, new technologies emerge that generate unforeseen mission opportunities. Sea Trial is designed to constantly survey the changing frontier of technological development, identifying those candidates with the greatest potential to provide dramatic increases in warfighting capability. These technologies are then incubated with targeted investment and guided through a rigorous process of modeling and simulation, rapid prototyping and fleet experimentation. The result is a process that discovers and aligns emergent technologies to deliver next-generation equipment into the hands of the warfighters with greater speed and efficiency.

Sea Trial

- Puts the Fleet at the heart of innovation
- Exploit innovation to capture operational excellence and experimentation
- Rapidly delivers technology, doctrine and capability

Under the Office of Naval Research (ONR) Science and Technology (S&T) programs focus on the complete time-spectrum of naval requirements ranging from issues relevant to our operating forces, developing technologies that address current acquisition programs, and long-term science and technology that will impact the naval forces of the future. The use of Science advisors assigned to fleet operating commands and programs such as TechSolutions, enable the S&T community to address near-term or operational issues that require S&T efforts. The Future Naval Capabilities S&T Program is being used to develop and demonstrate technology solutions for critical capabilities and transition those technologies into acquisition programs. ONR's newly established Naval Transformation Initiatives S&T program will be used to develop transformational technology and concepts that might not yet have an acquisition program for transition. It will enable leap-ahead capabilities and help open totally new concepts of operation

Concept Pull

Military leaders confront a dynamic set of challenges in their global operations. These challenges generate emergent mission requirements under constantly changing geo-political and politico-military conditions. The Sea Trial process responds to these demands with rapid action. Following the warfighter's lead, supporting centers for concept development propose innovative operational concepts to address emergent conditions. These concepts are then refined in Navy wargaming centers and, once mature, paired with state-of-the-art technologies to produce optimum operational systems. These systems are then pushed to the fleet for experimentation as quickly as possible, leading to rapid insertion into forward-deployed forces.

Spiral Development

A basic premise of the Sea Trial concept is that new capabilities must be delivered to the fleet quickly and efficiently. Global conditions are changing more quickly than our technology process cycle, threatening the warfighting effectiveness of fielded fleet systems.

To retain technological superiority, we are shifting to spiral development of systems. Spiral development employs evolutionary modular insertion techniques to ensure systems remain effective in the face of emergent threats. Under the spiral development philosophy, systems are designed to receive technological updates at regular intervals without disrupting production or performance. Spiral development controls costs while decreasing cycle times for technology insertion by using features such as open architecture, module interface standards, and commercial processors in conjunction with strict configuration control. Use of spiral development allows cutting-edge technologies to be fielded more swiftly via a phased-flight approach to engineering andproduction.

Institutionalizing Transformation

The Navy has tremendous intellectual capital resident in its many development, doctrine, and systems offices. These people and organizations are uniquely valuable catalysts for innovation. They have the skills and resources to achieve major advances in naval warfighting effectiveness. A primary goal of Sea Trial is to more fully integrate the technological and conceptual centers of excellence in the Systems Commands and elsewhere, along with testing and evaluation centers, so that their combined efforts result in significant advancements in deployed combat capability.

The Sea Trial process is fleet-led. Under the guidance of Commander, Fleet Forces Command (CFFC), the Navy Warfare Development Command will serve as Project

Coordinator for the Sea Trial process. Assigned responsibility for development of Sea Strike, Sea Shield, and Sea Basing, CFFC will reach throughout the military and beyond to coordinate technology and concept development in support of the future Navy vision.

This effort will result in a menu of technological and conceptual options to further development of the Sea Strike, Sea Shield, and Sea Basing concepts. NWDC will work closely with the Program Executive Offices, Systems Commands and designated units to integrate these options into practice, developing and testing the capabilities in Fleet Battle Experiments and joint exercises, culminating in operational deployments. Only by pushing new capabilities to the operational fleet will they be fully tested and their transformational implications completely understood. Thus the fleet commander, NWDC, and designated fleet units form an interactive team that carries innovation from the laboratory to deployment with focus, speed and efficiency.

Working closely with the fleet, technology development centers, systems commands, warfare centers and academic resources, NWDC will align wargaming, experimentation, and exercise events so that they optimally support the development of transformational concepts and technologies. As the operational concepts of Sea Strike, Sea Shield, and Sea Basing mature, NWDC will codify them as doctrine in the Naval Doctrine Publication (NDP) series, providing guidance for dissemination throughout the fleet.

Finally, Navy headquarters (OPNAV) will support Sea Strike, Sea Shield, and Sea Basing concept development by working directly with NWDC and fleet elements to ensure operational priorities and lessons learned are accurately reflected in budgetary resourcing. Specifically, Mission Capabilities Package (MCP) teams under the Deputy Chief of Naval Operations (Warfare Requirements and Programs) will assist in development, resourcing, and implementation of these concepts, and in making the linkages from concepts and technologies to acquisition programs and fleet forces.

Sea Trial will better align effort throughout the Navy, the implement an enduring process of transformation, and -- most importantly -- improve delivery of enhanced warfighting effectiveness to the fleet.

Sea Enterprise: Maximizing Business Efficiencies

Sea Enterprise is an initiative to improve organizational alignment, refine requirements, harvest efficiencies, and reinvest savings in targeted areas to enhance warfighting effectiveness. By doing so, it will reinforce the Department of Defenses' goal of instituting better business practices as part of the transformational process.

Sea Enterprise will employ process mapping techniques and other lessons from the business revolution to assess Navy organizations, target areas for improvement, prioritize investments, and fund them accordingly. Sea Enterprise will accelerate naval

transformation by strengthening a culture of productivity and balancing investments in the future with the demands of today's operations.

Sea Enterprise

- Sustain core capabilities
- Optimize investments
- Apply selected business reform to our organizations and processes

Our long-term shipbuilding and aircraft recapitalization plans require maximization of scarce resources through rapid implementation of DoD's Business Initiatives Council (BIC) and other DON business initiatives. These include the divestituture or disinvestment of legacy systems and expensive platforms that are no longer critical to our mission or to the success of our transformation plan. Also included is the development and implementation of new ship and aircraft designs, as well as changes in acquisition processes to enable more rapid employment of needed warfighting capabilities while generating the most efficient investment of our Nation's resources. *The top business priority is to identify and protect the required resources to sustain the core capabilities needed by our naval forces*. Improvement of business practices to achieve end-to-end capabilities in the most economical fashion possible will be central to effective transformation.

To accomplish the foregoing properly, we must harvest savings and reapply them where they will best support the warfighter. This means aggressively reducing overhead, streamlining processes, enhancing networking, scrutinizing procurement plans and contracting strategies (with an eye toward vertical cuts, where necessary and where it makes sense to do so), ending non-value added activity, and most importantly, creating meaningful incentives for our people to help us do this.

Examples of current and ongoing DoN initiatives to realize business efficiencies include; the DD (X) program, NMCI, LPD/DDG construction yard swap, and "self-help" savings thru divestitures and disinvestments to support new programs. Legacy platforms such as DD-963 class ships and F-14 aircraft are being retired earlier to free funds for reinvestment and recapitalization. Legacy computer applications are being retired as part of NMCI implementation. In DoN's Enterprise Resource Planning (ERP) Program initiatives, we are examining multiple pilot programs such as linking contracting and financial systems, new business management processes, supply chain management, regionalized maintenance, and eBusiness initiatives.

DoN will also continue USN/USMC integration where consolidation of common functions makes sense and can produce significant savings for reinvestment. The integration of Navy and Marine Corps strike fighter aviation assets will yield not only operational benefits, but significant resources for reinvestment and recapitalization of our total naval aviation force.

Considerable effort is expended in the development of our budget and fiscal plan for the future years. The same level of effort needs to be put forth examining current year operations in order to ensure the most effective expenditure of our resources. We need to identify and prevent hidden or additional costs before they occur by developing plans on how best to freeze current, and eliminate future, cost overruns on major acquisition programs. All aspects of the Department will be critically and continually examined to determine how we might reap economies across all acquisition, research and fleet/field support activities, including non-operational parts of the DON.

Additionally, the Secretary of the Navy is leading a DPG directed SEC effort to streamline the PPBS system, its connection with requirements determination and the acquisition process, and make PPBS more responsive to our needs.

B. U.S. Marine Corps Transformation Process

The Marine Corps has always been at the forefront of innovation. Throughout its history, the Marine Corps has changed and evolved – from ship security, to naval constabulary, to light infantry, to an amphibious assault force, to an air-ground expeditionary team. In the past, Marine development of close air support, amphibious warfare, vertical envelopment, Short Take-Off and Vertical Landing technology, and maritime prepositioning have benefited the nation's joint warfighting capability. Today, the total force Marine Corps remains true to its warrior culture and continues in a tradition of anticipatory change. Drawing on a history of innovation, Marine Corps transformation can be viewed as founded on four broad and interdependent pillars. First, opportunity can be created and exploited best by ***agile organizations***, ready to adapt institutions to maximize the potential of both Marines and their units. Second, ***operational changes***, first expressed as concepts, will alter the means by which the operating forces project power and influence. Third, ***leap-ahead technology*** will create new opportunities for warriors of tomorrow. Finally, the Marine Corps will promote changes in ***business and acquisition processes***, enabling the more rapid development of effective capabilities while generating the most efficient investment of the nations resources.

Four Pillars

- Organizational Agility
- New Operational Concepts
- Leap-ahead Technology
- Business Reform

These changes will take place within the framework established by the Marine Corps' capstone concept, *Expeditionary Maneuver Warfare* (EMW). EMW is a union of the Marine Corps' core competencies, maneuver warfare philosophy, expeditionary heritage, and concepts for organizing, deploying, and employing forces. The single process by which the Marine Corps develops, evaluates, and captures change to support EMW is the Expeditionary Force Development System (EFDS). While the focus of this Roadmap is the development of new capabilities, the fundamental Marine ethos will not change. Ultimately, it is people, not machines, who determine success in

peace and war. Therefore, every development will be evaluated based on its ability to maximize the potential of the Corps' most powerful resources: United States Marines.

Organizational Agility

The first fundamental transformation within Marine fighting forces begins with the individual Marine. The manner in which Marines are recruited, trained, and developed is an essential aspect of the Corps' organizational and institutional transformation. Today's force is an all-recruited force, comprised of some of the best and brightest young Americans. The transformation from civilian to Marine begins with the defining achievement of the "Crucible", and continues with the newly instituted Marine Martial Arts Program. The Corps continues to "Make Marines" through a constant effort across an individual's career. These programs are fundamentally focused on developing comprehensively educated, mentally astute, and physically tough Marines, ready to succeed in chaotic combat environments. The warrior ethos is instilled in individual Marines by rigorous and challenging training that transforms them into intelligent and disciplined warriors, and mirrors the Marine Corps' own institutional transformation in equipment, doctrine, and structure.

Recognizing and expeditiously adjusting organizational arrangements to take full advantage of transformational capabilities made possible by new technologies and the adoption of new operational concepts, is a key aspect of military transformation. Building on its institutional legacy of adapting to match the threats and missions of a given time and adversary, the Marine Corps can reorganize its structure to capitalize on the transformational concepts and technologies of tomorrow. Ongoing organizational and institutional initiatives include:

- Developing leaders and staffs who function in an environment of ambiguity and uncertainty and make timely and effective decisions under stress.
- Developing leaders by improving their capacity to recognize patterns, distinguish critical information, and make decisions quickly on an intuitive basis with less than perfect information.
- Enhancing leaders' decision-making skills with investments in education, wargaming, combat simulation activities, and battlespace visualization techniques within a joint or multinational framework.
- Developing manpower policies that devolve authority away from centralized staffs to promote rapid and effective decisions to lead today's all-volunteer force.
- Increasing the ability of the supporting establishment to serve as the fifth element of the MAGTF, as exemplified by the Marine Corps Intelligence Activity's reach-back support to the warfighting requirements of Task Force 58 during Operation Enduring Freedom.
- Developing the innovative logistics processes comprising the Integrated Logistics Capability (ILC) to increase support to the MAGTF and enhance both garrison and expeditionary operations.

- Generating opportunities to align Marine Corps Reserve units with Marine Expeditionary Forces in order to develop day-to-day working relationships between Active and Reserve forces, maximizing the diverse civilian-acquired expertise that enhances military capabilities.
- Integrating aviation capabilities across the Navy and Marine Corps to generate increased capabilities for projecting power from the sea.
- Developing the complementary and reinforcing capabilities of special operations forces (SOF) and forward-deployed MAGTFs, including assignment of Marine forces that broaden the capabilities available to both SOF and MAGTFs.
- Creating and institutionalizing innovative units dedicated for special missions or tasks such as the 4th MEB (Anti-Terrorism) by relying on the adaptive, decentralized organization of Marine Corps warfighting units.

The scalable, sustainable, interoperable, expeditionary, combined-arms Marine Air-Ground Task Force (MAGTF) -ready to fight and win America's battles- remains inherently flexible and uniquely suited for rapid organizational agility.

- The Marine Expeditionary Unit (MEU), capable of limited forcible entry operations, may be quickly combined and integrated with other MEUs or fighting units to create potent, capable warfighting forces, as exemplified by Task Force 58 in Afghanistan. The MEU and its partner Amphibious Ready Group (ARG) provide the nation with immediately employable forces, available either as an on-scene force of choice or to enable the introduction of other naval, joint, or combined forces.
- The Marine Expeditionary Brigade (MEB), scaled and task-organized to respond to a full range of crises, will be developed as the centerpiece of *sea-based* power projection. Able to deploy rapidly by a variety of means for employment "From The Sea", Naval Expeditionary Forces organized with a MEB will provide the nation a powerful capability to project and sustain forces with minimal dependence on immediate landbases.
- The Marine Expeditionary Force (MEF) with its inherent sustainability will remain capable of concurrent sea-based operations and sustained operations ashore, operating either independently or as part of a joint warfighting team and able to meet multiple joint requirements for Major Theater War.

New Operational Concepts

Our operational concepts stand at the core of the Expeditionary Force Development System process. These formal documents articulate a Marine Corps vision for future warfighting and the operational changes that will be required to execute them. They look forward in time – beyond the concerns of today's programming and budgeting – and provide the spark that initiates a focused process of proposal, debate, and experimentation. The Marine Corps uses this participatory dialogue as the means to shape the initial concepts, ultimately molding them into requirements that will provide the warfighting solutions needed. Tested and validated through rigorous joint and service

experimentation, new operational concepts will result in far-reaching changes to Marine capabilities that support joint warfighting.

Expeditionary Maneuver Warfare (EMW), as the Marine Corps' capstone concept, forms the basis for the development of Marine Corps concepts. Built on the twin pillars of the Marine philosophy of maneuver warfare and an expeditionary culture, *EMW* provides a framework for the development of transformational concepts to meet the requirements of today and tomorrow. In doing so, the Marine Corps' conceptual transformation focuses on warfighting changes to achieve the following enhanced capabilities identified in *EMW*:

- Strategic Agility to ensure rapid and fluid transition from a pre-crisis state to full operational capability in any distant theater.
- Operational Reach to rapidly project, support, and sustain relevant and effective power across the battlespace in conjunction with other forms of national influence.
- Tactical Flexibility to conduct multiple, concurrent, and overlapping missions, creating an overwhelming tempo of action through the coordinated application of combined-arms, and responsive and adaptive command and coordination that erodes an enemy's cohesion.
- Support and Sustainment to enable the enduring expeditionary logistics capabilities of naval forces in order to project influence.
- Joint/Multinational Enabling to enable joint, interagency, allied, and coalition operations by blending the unique combined-arms capabilities of Marine forces with the complementary capabilities of others.

Warfighting changes may necessitate changes in EMW's integrating concepts of organization, deployment and employment. The synergizing influence of these concepts ensures that transformational warfighting changes are balanced, supportable, and effective:

- Organizational structure must be mission oriented to ensure the effective deployment, employment, sustainment, reconstitution, and redeployment of forces. The Marine supporting establishment must be postured to facilitate situational awareness of worldwide operations, leverage information technologies, and exploit modern logistics concepts in order to anticipate and respond to MAGTF requirements. The adaptable, scalable, and tailorable to any mission MAGTF will remain our warfighting organization.
- Deployment of forces will involve any combination of enhanced amphibious platforms, strategic sealift and airlift, prepositioned assets, and self-deployment options to rapidly project forces throughout the world.
- Employment of Marine operating forces will be focused on the operational synergy created by fully integrated MAGTFs. Immediately employable naval forces, forward-deployed with flexible and powerful MAGTFs, will continue to be the JFC's optimal enabling force, prepared to open ports and airfields and to establish expeditionary airfields and intermediate staging bases in either benign or hostile environments. In addition, the Marine Corps can provide specific forces and capabilities according to the needs of the JFC.

New operational concepts provide a roadmap for the transformation of the Marine Corps. These concepts ensure unity of effort within the service, articulate the vision of the Marine Corps leadership, and effectively guide progress toward that vision. Warfighting concepts for the future, supported by functional concepts, include:

- *Operational Maneuver From the Sea (OMFTS)* is an approach to expeditionary, littoral, and amphibious warfare that describes the maneuver of naval forces at the operational level, a bold bid for victory that aims at exploiting a significant enemy weakness in order to deal a decisive blow. What distinguishes Operational Maneuver from the Sea from all other species of operational maneuver is the extensive use of the sea as a means of gaining advantage, an avenue for friendly movement that is simultaneously a barrier to the enemy and a means of avoiding disadvantageous engagements. This aspect of Operational Maneuver from the Sea may make use of, but is not limited to, such techniques as sea-based logistics, sea-based fire support, and the use of the sea as a medium for tactical and operational movement.
- *Ship-to-Objective Maneuver (STOM)* employs the concepts of maneuver warfare to project a combined arms force by air and surface means against inland objectives. STOM takes advantage of emerging mobility, fires, sustainment, and command and control systems to maneuver landing forces in their tactical array from the moment they depart the ships, replacing the ponderous ship-to-shore *movement* of current amphibious warfare with true amphibious *maneuver*.
- *Enhanced Networked Seabasing* is a concept describing naval capabilities, based in a family of systems and platforms afloat, that maximize Naval Expeditionary Force combat power and influence, afloat and ashore, while facilitating the employment of that combat power by JFCs. Enhanced Networked Sea Basing constitutes the conceptual thread that ties current combat capabilities and future expeditionary warfighting concepts together and capitalizes on the maneuverability and protection afforded by the sea. Sea Basing maximizes naval capabilities for projecting power and assuring access.

Leap-Ahead Technology

With a foundation drawn from its innovative concepts and organizations, the Marine Corps is transforming its weapons systems and assets throughout the five elements of the Marine Air-Ground Task Forces – the ground, aviation, logistics, and command elements as well as the supporting establishment. This transformation seeks to exploit the potential of leap-ahead technology and institutes a robust program of experimentation with new concepts, capabilities, and operational prototypes while actively pursuing forward-looking science and technology efforts.

The Marine Corps Warfighting Laboratory (MCWL) conducts experimentation and prototyping of innovative concepts, tactics, techniques and promising technologies. Through a series of dedicated warfighting experiments, advancements are being made in

target selection and tracking, weapon selection and employment, friendly unit position identification, command and control, and staff planning. Military Operations in Urban Terrain, a vital, yet challenging, environment today and in the future, is one of the focus areas for the MCWL. This includes the aggressive development of tactics, techniques, and procedures for the employment of aviation capabilities in urban terrain. All system developments will be closely coupled with the co-evolution of needed doctrine, training, education, logistic support and organizational reconfiguration, in accordance with new acquisition initiatives set forth by OSD.

Marine Corps technology innovations will continue to focus on the expeditionary concepts and complementary nature of MAGTF capabilities by pursuing the following objectives:

- Procure realistic and easy to use information technology (minimum training, no specialized/unique equipment requirements) to support deployed and combat operations.
- Capitalize on the inherent maneuver space and protection of the sea through high-speed lighterage and amphibious fighting vehicles.
- Support vertical envelopment and access to distant objectives via advanced tilt-rotor aircraft.
- Decrease reliance on built-up and easily targetable airfields and facilities through Short Take-Off and Vertical Landing (STOVL) aircraft.
- Increase situational awareness, gain tactical information advantages, and support maneuver forces with the use of tactical unmanned aerial and ground vehicles.
- Forge the way ahead for the development of tactics, techniques and procedures for effectively employing new non-lethal technologies via the Marine Corps-led Joint Non-Lethal Weapons Directorate.
- Promote technology that simplifies operational sustainment including advanced C4 systems; intermodal and unitized containerization; advanced packaging and repackaging capabilities; and improved reliability, maintainability, and fuel efficiency.
- Develop systems that support enroute planning and rehearsal, permitting the immediate employment of forces upon arrival.
- Create training systems that provide a simultaneous link between live, virtual, and constructive training and more fully integrate the MAGTF's command and control systems in a joint context.

Business Reform

Just as it is transforming along conceptual, technological, and organizational lines, the Marine Corps is also transforming its business practices. The Marine Corps' warfighting readiness is a reflection of balancing the demands of current requirements around the globe with the imperative to invest and be prepared for the future. The programmatic and budget challenges faced today are greater than the past. Therefore, it is imperative that the Marine Corps continue to improve its business information through the application

and refinement of Activity-Based Cost/Management (ABC/M) models, and that this information be used to make fact-based decisions that continuously improve support to the operating forces while drastically reducing resources consumed to provide that support.

In the Marine Corps, "Business Reform" is the fundamental transformation of USMC Business Enterprise processes to create dramatic increases in effectiveness, efficiency, resilience to change, and the capacity and inclination to innovate. This transformation is accomplished by changing the Business Enterprise culture. The Marine Corps will contribute to cultural change through:

- Education and Communication. The development of effective and comprehensive strategic plans, training and education of the workforce, and improved management of organizational knowledge.
- Accountability. Improved management information systems associated with reform will provide commanders the information to make improved fact-based decisions and to hold their subordinate leaders accountable for expected goals and targets defined in strategic plans.
- Skill Development. A suite of business skills is required to equip the Marines and Civilian-Marines responsible for managing the Business Enterprise to achieve expected business outcomes. A primary tool in improving accountability at all levels is the scorecard. Use of the scorecards will provide an unprecedented ability for commanders to define and view progress towards accomplishment of strategic goals, to monitor progress against performance measures, to compare installation performance against strategic goals and baselines, to compare installation performance with other installations, and eventually to compare installation performance with other Department of Defense, public, and private entities.
- Incentives. Future Marine Corps plans will increase focus on incentives to change culture and positively drive reform.

The USMC is working to leverage its investment in ABC/M to strengthen installation resource management. The potential value of installation activity-based information for resource allocation will improve over the FYDP with the addition of performance measures and products and services into cost models. ABC/M has been used successfully in the private sector to determine and analyze capacity limits given set resource availability, and the Marine Corps expects the same. The Marine Corps ABC/M effort is a business management system using world-class commercial off-the-shelf technologies (COTS) to facilitate improved, fact-based decisions.

Perhaps the most important driver of performance/cost consistency and continuous improvement is the progressive development of installation benchmarks and clear definition of standards of excellence. The USMC will partner with other services to obtain comparable benchmark data. Benchmarks and best practice analysis will be shared in order to help installation commanders understand what others have done to improve performance and reduce costs. The Marine Corps will augment benchmark/best practice

analysis with a clear definition of performance excellence for its installations. This definition will most likely be based on existing criteria such as Baldrige, Six Sigma, ISO 9000, and the Maxwell School of Government.

The foundation of business reform is not addressed here, as it is inextricably linked to direction and processes outside the service. Instead, the focus of this Roadmap is on transformational efforts that directly affect the warfighting capabilities of the Naval force. Nevertheless, the savings gained from business transformation will support other aspects of military transformation. This Roadmap can serve as a catalyst for further change to this necessary element of transformation.

Expeditionary Force Development System

The Expeditionary Force Development System (EFDS) is the single integrated system of dynamic processes and functions that produces and sustains integrated capabilities that meet the needs of the Marine Corps and the combatant commanders. The Marine Corps Advocates for ground combat, aviation combat, command and control, and combat service support, as well as the Marine Requirements Oversight Council (MROC) are key participants in the process. EFDS continuously examines and evaluates current and emerging concepts and capabilities to improve and sustain a modern Marine Corps. EFDS is compatible with and supports the naval and joint transformation effort and integrates transformational, modernization, and legacy capabilities and processes.

The development of future Marine Corps capabilities in concert with naval capabilities requires a systematic, concept-based approach. EFDS provides the Marine Corps with a standardized methodology to translate future transformation goals into fielded integrated capabilities.

EFDS supports the requirement generation role of the Advocates by translating concept-based capabilities identified by the transformation effort into valid requirements and acquisition documentation. As transformation concepts are developed and integrated into the Marine Corps family of concepts, the capabilities identified can then be developed by the Marine Corps Advocates in an integrated fashion. EFDS ensures that these transformation capabilities are validated, prioritized, resourced, and integrated across the spectrum of Doctrine, Organization, Training, Materiel, Leader development and education, People and Facilities (DOTMLPF).

EFDS supports the requirements validation role of the MROC, thereby increasing the capability of the Marine Corps leadership to define, review, and validate the concepts, capabilities, and requirements associated with naval and joint transformation. The individual processes that comprise EFDS are grouped into four phases:

- The Force Capability Development Phase identifies desired capabilities.

- The Requirement Development Phase translates capabilities into validated DOTMLPF requirements.
- The Prioritization and Resourcing Phase supports the prioritization and funding of validated DOTMLPF requirements.
- The Capability Fielding and Transition Phase supports the integrated fielding of new capabilities.

The Force Capability Development Phase of EFDS incorporates the key processes that support the transformation effort such as Mission Area Analysis (MAA), Wargaming, Experimentation, emerging naval and Marine concept development, Joint Concept Development and Experimentation (JCDE), and Science and Technology (S&T) development. These processes support Advocate decision-making concerning the application of warfighting capabilities and allow focus on specific transformation goals and objectives.

As the objectives of the transformation effort become focused, the Force Capability Development Phase of EFDS supports the incorporation of specific transformation related capabilities into the comprehensive Expeditionary Maneuver Warfare (EMW) Capability List (ECL).

Through road mapping of the CMC Vision and Strategy, Marine Corps and Naval Transformation Vision Objectives are identified and linked to individual ECL capabilities. These near, mid, and long term individual capabilities are addressed in the Marine Corps and Advocate Campaign Plans. The Advocates will generate Universal Need Statements (UNSs) to develop the capabilities required to integrate the transformation effort. These UNSs are developed into fielded capabilities by being processed through the other three EFDS phases. In the Requirement Development Phase the UNSs are analyzed with respect to the pillars of DOTMLPF to determine specific solution sets. In the Prioritization and Resourcing Phase and in the Capability Fielding Transition Phase, capabilities are prioritized, resourced and fielded. EFDS is the single system for developing and integrating the Marine Corps' concept-based transformation.

V. Conclusion

The security environment of today and tomorrow will be characterized by uncertainty, chaos, surprise, and conflict. The nature of conflicts, and the requirements for naval forces, will be wide in scope and difficult to predict, but will undoubtedly involve action to deter or defeat asymmetric threats. Naval forces must exploit the power of information to seize the advantage over potential adversaries, and must be postured, through technological advances, changes in organizational structures of forces, and experimentation with innovative concepts of operation, to sustain and advance a broad competitive advantage.

Naval transformation will seek to take advantage of rapid advances in technology, but the real advantage will come from co-evolving concepts of operation, concurrent changes in organizational arrangements, and the conduct of warfare in innovative ways with both new and legacy systems. This Roadmap describes the particular focus for naval transformation: achieving the capabilities for a networked, sea-based power projection force which will enable joint force operations and assure access throughout the world.

Naval Transformation is a continuous process, tailored by each naval service to its particular missions and culture, culminating in a set of complementary total force capabilities in support of joint forces. In addition to seizing the opportunity to achieve transformational capabilities today, the processes required to establish and maintain a culture of innovation must be encouraged, nurtured and rewarded. The naval services are embarked today on a wide range of initiatives to radically change organizational arrangements, adopt fundamentally different concepts for military operations, and alter existing operational concepts with the incorporation of advanced technologies to achieve profound increases in military capabilities. Agile and adaptive by nature, the Navy and Marine Corps are fostering the culture of innovation required to achieve transformational operational concepts and capabilities.