A CONCEPT FOR
ADVANCED EXPEDITIONARY FIRE SUPPORT C THE SYSTEM AFTER NEXT

INTRODUCTION

The purpose of this paper is to describe a concept for an advanced expeditionary fire support system that will provide flexible and responsive support for maritime maneuver warfare. Designed to meet the demands of *Operational Maneuver from the Sea* (OMFTS) and its supporting concepts of *Ship-to-Objective Maneuver* (STOM) and *Future Military Operations on Urbanized Terrain* (MOUT), this concept addresses fire support requirements across the spectrum of conflict—from devastating, lethal fires in Sustained Operations Ashore (SOA) to tailored, non-lethal fires in support of Other Expeditionary Operations (OEO).

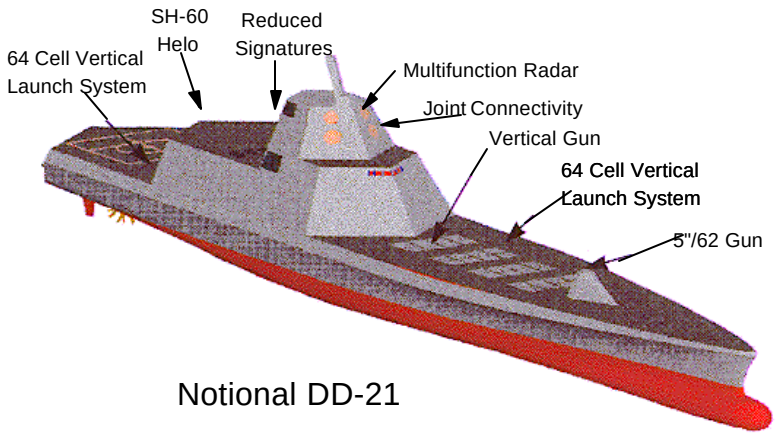
Forward-deployed naval expeditionary forces provide the means for the National Command Authorities to respond rapidly to crises across the full spectrum of military operations. They must be capable of operating effectively in any environment against a wide range of potential adversaries. Many such adversaries, even those who are relatively unsophisticated, will be capable of employing modern weapons systems that are more capable in terms of range, accuracy, and lethality than those available today. Our adversaries may have little concern for such protocols as the Hague Convention, which seek to limit collateral damage and noncombatant casualties. Such considerations will always be a factor in the planning and execution of US military operations. Finally, we can never discount the possibility that an adversary will resort to the use of weapons of mass destruction.

The Navy and Marine Corps are preparing to meet these challenges through implementation of our warfighting concepts. These concepts take full advantage of the maneuver space provided by the littoral environment by exploiting advances in operational and tactical mobility. The concept for expeditionary fire support addresses the system that will provide flexible and responsive fires in support of Marine forces.

OPERATIONAL CONCEPTS

Our warfighting concepts apply the tenets of maneuver warfare to maritime operations. They emphasize speed, mobility, firepower, and communications to rapidly and seamlessly identify and exploit enemy weaknesses to achieve decisive results. These concepts apply to the full range of military operations, from OEO to major theater war.

Expeditionary fire support assists maritime forces in delivering the decisive blow to an adversary. This may be achieved by coordinated aviation, naval surface[1] and ground-based fires directly attacking centers of gravity at a critical vulnerability or by a ground force—supported by such fires—maneuvering to attack an enemy center of gravity. The fire support system will seabase command and control and logistics to the maximum extent feasible. This will increase our freedom of maneuver ashore while improving force protection and facilitating redeployment.



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In OMFTS and STOM, the naval expeditionary force will use fires to surprise the enemy and create favorable conditions for employment of the landing force. This requires the integrated efforts of all elements of the naval expeditionary force and particularly depends on aviation and naval surface fires. Sustained operations ashore (SOA), in which the inherent flexibility of maritime forces enable those forces to function as a seabased operational maneuver element, will depend most heavily on aviation and ground-based fires. SOA also may require bringing limited command and control, logistics, and aviation systems ashore. OEO will be distinguished by diverse fire support requirements depending on the operation. Such operations will be conducted under restrictive rules of engagement and will often be conducted in urban environments, placing a premium on non-lethal and precision fires that limit collateral damage. Whatever the kind of operation, the application of fires is a key element of our integrated effort. We will use the effects of fires to facilitate maneuver just as we maneuver to exploit the effects of fires.

Fire Support Requirements. The advanced expeditionary fire support system will be flexible, robust, and capable of providing responsive, all-weather fire support around the clock in all types of military operations and in a wide range of tactical situations. It will incorporate a wide array of precision and area weapons with improved range, accuracy, and lethality. A combination of precision guided munitions and accurately delivered non-precision munitions will provide an optimal mixture of engagement options. Precision, low-volume fires will be used against high-payoff or particularly dangerous point targets, especially those that are hardened and difficult to destroy with area fires. Similar consideration must be given to the engagement of targets in close proximity to noncombatants or in culturally and politically sensitive areas. Commanders understand that situations will exist on the future battlefield in which the employment of indirect fire may be severely restricted due to the possibility of unacceptable collateral damage. In less restrictive environments, the need for rapid response and effect on target will require reliable first-round fires for effect.

[1] "Naval surface" in this concept refers to all seabased non-aviation fire support, including subsurface delivered.

The system will possess both lethal and non-lethal munitions designed specifically for attacking varied targets such as hardened command and control centers, personnel, materiel, and sensor systems. Non-lethal fires will be used extensively for force protection and to limit noncombatant casualties, especially during military operations on urbanized terrain and in OEO. Accuracy and munitions with variable penetration and explosive characteristics are particularly critical during MOUT. Debris from incoming rounds must be minimal in order to protect the civilian population, minimize collateral damage, and prevent friendly casualties.

Fire support requirements change over the course of an operation. Early in the operation, the commander will seek to shape the battlespace to facilitate ship to objective maneuver, while not compromising tactical surprise. During battlespace shaping, the fire support system will need to provide long-range, precision fires capable of destroying or neutralizing key enemy capabilities. During ship to objective maneuver, high-volume suppressive and neutralizing fires may be necessary to support both surface and vertical assaults. Naval surface and aviation fires will provide the preponderance of fire support, but even during the initial stages, ground-based fire support elements will accompany both the vertical and surface assaults to provide responsive support to engaged ground forces. Precision fires will destroy selected high-payoff targets. Aviation fires will provide both close air support and deeper strikes, facilitating the Marine Air-Ground Task Force (MAGTF) commander's continuing efforts to shape the battlespace.

Properly executed, OMFTS seeks to maximize the use of seabasing. However, some situations may warrant limited basing ashore of combat service support and aviation assets. In such cases, the fire support system must be flexible enough to protect these vital elements with responsive, high-volume fires while concurrently providing fire support to maneuver forces.

Together, these capabilities will enable maneuver, provide protection for the force, and destroy, neutralize, or suppress enemy weapons systems, especially those capable of indirect fire. These capabilities will allow us to engage the enemy in an asymmetrical manner, make it difficult for him to counter our actions, place him in a tactical dilemma, and set him up for a decisive blow.

System Components. Fire support systems consist of three principal components: command and control, target acquisition, and weapons systems. Command and control provides the ability for commanders to influence the action. It provides the means for sharing information to create a common tactical picture; selecting weapons systems to engage targets; controlling fire support; and coordinating fires, air space, and sea space. Target acquisition encompasses identification, location, and analysis of targets. Fire support weapons systems provide the means for attacking specific targets. These weapons include naval surface, aviation, and ground fires—complementary sources of firepower that provide the flexibility necessary for expeditionary operations.

Command and Control. Command and control (C2) for expeditionary fire support demands a single system which encompasses all elements of the naval force and is compatible with on scene or arriving joint forces. Throughout the entire planning and execution process, all components of the expeditionary fire support system must be physically or virtually collocated and collaborative. Given the joint nature of

future operations, a reexamination of traditional command relationships is required to make these relationships more responsive and flexible. Consistent with the tenets of *Ship to Objective Maneuver*, operational command must rest with the landing force commander once the attack has commenced.

Maneuver elements, often operating deep inland, will require highly responsive fires that support maneuver and quickly attack the enemy's offensive capabilities, especially indirect fire systems. Integration of the C2, target acquisition, and weapons systems will provide the landing force commander with the ability to detect and track enemy actions, engage the enemy with fires, and protect friendly forces. The C2 system will permit commanders to direct fires on the basis of the tactical situation, firing system availability and response time, munitions availability, and commander's guidance for fire support. To do this, the system will provide integrated information, including both targets and engagement options, in near real time from strategic, operational, and tactical surveillance and reconnaissance systems. It will disseminate this information to all components of the naval expeditionary force and present leaders at all levels with a common and up-to-date picture of the battlespace, facilitating a shared situational awareness that permits commanders to effectively commit resources to influence the action and reduce incidents of fratricide. The system will allow the landing force to request and receive responsive fires at any time. Fire support coordination procedures will be streamlined to improve responsiveness by naval surface and aviation fires and by ground-based fires. It will provide necessary protection to friendly forces while deconflicting friendly fires with ground maneuver and sea and air traffic.

Target Acquisition. In planning before and during operations, the C2 system will draw on the target acquisition system for target identification, location, analysis, and selection. The target acquisition system must both track friendly maneuver elements and fire support systems, as well as detect those of the enemy. When friendly ground forces are engaged by enemy indirect fires, the target acquisition system will exploit aviation, ground and seabased radars to coordinate counterbattery fires. The redundancy of the target acquisition system will provide all elements of the naval force a robust capability under all conditions. Links to strategic assets will expand target acquisition support to the ground force and coordinate the joint targeting effort.

Battle Damage Assessment. Efficient engagement of targets and expenditure of limited ammunition stockpiles require accurate and timely battle damage assessment (BDA). The same sensors and communications links which provide the backbone of the target acquisition system must be equally adept in their BDA role. The criticality of this requirement far surpasses efficient ammunition expenditure. Directing friendly air crews and weapons systems against targets which have already been destroyed or neutralized not only squanders ammunition but could also result in unnecessary casualties. Battle damage assessment far transcends operational effectiveness and force sustainment; its most significant impact may well be on force protection.

Complementary Weapon Systems. Our operational concepts drive fire support requirements that can be met only by complementary, overlapping, and redundant fire support systems. The weapons systems component of the expeditionary fire support system consists of three complementary elements: aviation, naval surface, and ground-based fire support. This combination of fire support systems

provides tactical flexibility for the force commander by exploiting the unique capabilities of each weapons system. It also yields increased fire support effectiveness through the synergistic effect of aviation, naval surface, and ground-based fires—as, for example, when ground-based indirect fire weapons suppress enemy air defenses to permit the delivery of friendly aviation fires. Further, it precludes the commander from having to depend on any single type of weapons system, the loss of which—through enemy action, bad weather, or other causes—might degrade the entire fire support effort.

Naval surface weapons will provide long-range, accurate fires from over the horizon, supporting both vertical assault and surface assault forces with high-volume, suppressive, neutralizing, and destructive fires. Their long-range capabilities support operational surprise. To avoid the enemy's main forces during initial stages of forcible entry, the landing force requires supporting fires that fix the enemy, denying him freedom of maneuver and action. Seabased and possibly space-based assets will also provide fires in support of maneuver forces operating deep in a littoral region. The sea provides both security and maneuver space, giving naval surface fires a unique flexibility in influencing events ashore. The range and seabasing of these fires make them ideal for shaping the battlespace.

Aviation weapons systems will provide both close air support of ground forces and deep fires in support of the commander's efforts to shape the battlefield. By seabasing our aviation, naval forces take advantage of seabased logistical support facilities while reducing the requirement to establish and defend large aviation facilities ashore. However, aviation will retain the capability of operating from expeditionary, shore-based sites should it become advantageous to do so.

Ground-based fire support weapons systems provide a vital complement to naval surface and aviation fires. The amount of fire support brought ashore will be decided by the force commander based on the tactical situation, including distance to the objectives and potential impact of adverse weather on other available fire support systems. This particular dimension of fire support increases the firepower available to the maneuver force commander and ensures the availability of responsive, day-and-night, all-weather, suppressive, neutralizing, and destructive fires—especially if the fight moves deep inland. Envisioned is a ground-based fire support system that can cover the spectrum of fire support requirements of commanders at the platoon through Marine Expeditionary Force levels. Especially because of its

indirect-fire capabilities, ground-based fire support can engage targets that are not vulnerable to many naval fires and can suppress enemy air or antiship defenses without exposing friendly forces to enemy direct fire.

OMFTS From a Fire Support Perspective

- A single, integrated, seabased command and control system will provide a common, real-time battlefield picture to commanders and fire support elements, links to target acquisition and intelligence systems, and coordination and control for aviation, naval surface and ground-based fires.
- All fire support systems will be sustained primarily from the sea.
- Fires will both enable and exploit maneuver.
- Fire support will be capable of providing a range of effects appropriate to the situation, including non-lethal fires.
- Complementary aviation, naval surface, and ground-based fire support systems will provide flexible, reliable, and synergistic fire support.
- Naval surface fire support will provide long-range, accurate fires to shape the battlespace and support the maneuver force.
- Aviation fires will support both the close and the deep battle. Naval aviation will be capable of operating ashore from expeditionary airfields when advantageous.
- Ground-based fires will provide mobile, responsive, all-weather support. They will directly support ground operations and facilitate aviation and naval surface fires, for example, by suppressing enemy air or antiship defenses to

Ground-based fire support weapons systems will be self-contained and capable of operating with the most advanced elements of the ground force. In addition to improvements in range, accuracy, and reliability, the design of fire support systems will minimize logistical support requirements. These systems will have tactical mobility equal to that of the rest of the ground maneuver force. These features will maximize the responsiveness of fires and enable commanders to take full advantage of their range. Future ground systems must be capable of effective direct fire under all conditions. Direct fire is vital for survivability and also critical for employment in built up areas. Relevant design features will also include enhanced capabilities for ammunition handling and resupply. The resulting weapons systems will not require a large shore-based logistics tail to be effective. Tactical systems for resupply and maintenance must be compatible with the speed and mobility of maneuver forces.

While aviation and naval surface fires will provide substantial support to maneuver elements, the ability to provide fire support from ashore will remain essential to the overall fire support effort. This drives a requirement for a robust ground-based capability to ensure that the fire support system in its totality can provide continuous support to both the close and the deep battle.

ENHANCING OPERATIONAL CAPABILITIES

The true measure of effectiveness of any fire support system is its ability to deliver timely, accurate, and effective fires in support of the commander's scheme of maneuver. The challenge inherent in OMFTS and STOM is to provide continuous, responsive fire support to rapidly maneuvering forces throughout the range of naval expeditionary operations. Developmental efforts must focus on improving the command and control, responsiveness, flexibility, accuracy, lethality, mobility, range, and sustainability of the integrated fire support system. Some specific directions for system development are as follows:

Command and Control. The implementation of our warfighting concepts require a long-range, reliable, high-capacity communications architecture that supports fluid operations over great distances. Communications must be robust, flexible, and linked to the seabase to provide an efficient, effective, continuous flow of information. The C2 system must provide all commanders and firing agencies a shared tactical picture of maritime and land operations, the ability to continuously monitor the situation, and options to instantly influence events when necessary. This C2 architecture must be compatible and interoperable with naval, joint and combined agencies, as well as the entire spectrum of national power. Naval surface and aviation fires will be compatible with organic landing force fire support in both C2 and target acquisition procedures.

One of the cornerstones of the advanced expeditionary fire support C2 system is an integrated target acquisition capability able to support early battlespace shaping operations. Ground forces require assistance in locating targets both in the initial phases of amphibious operations and during subsequent operations ashore. The target acquisition system must be tied tightly into the C2 system. Command and control and target acquisition must be linked to national, theater, and tactical reconnaissance, surveillance, and intelligence systems. This link will provide fused, all-source intelligence information for use in fire support planning and execution. The link will enable the commander to focus on the threat and respond rapidly to changes in the enemy situation identified by reconnaissance and surveillance systems, to include space-based systems.

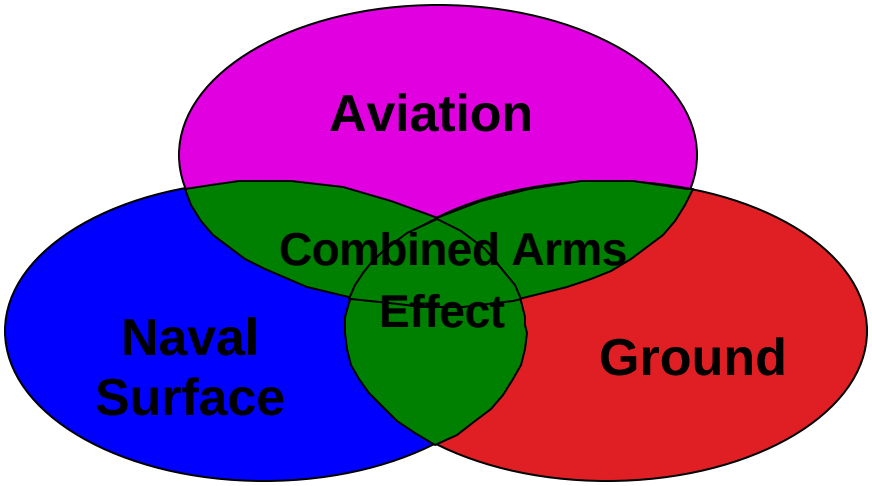
The ground-based component must include capabilities that allow for independent operations while maintaining the ability to mass aviation, naval surface, and ground fires. This includes the capability for self-location, self-orientation, and independent target acquisition and fire direction.

Responsiveness. Fire support systems must provide fires with sufficient responsiveness and accuracy to support and facilitate successful maneuver or destroy enemy forces when required. There is greater time sensitivity associated with fires in support of maneuver elements than there is with fires in support of battlespace shaping. In battlespace shaping, fires attack targets that do not pose an immediate danger to maneuver forces. The major considerations for battlespace shaping attacks are the range, accuracy, and lethality of weapons.

Fires in support of maneuver forces in contact with the enemy must be responsive. The ability to rapidly process fire requests, quickly engage targets, and deliver and sustain a high volume of fire is critical. Those fires delivered against enemy firing systems actively engaging maneuver forces are especially

time-sensitive. Reducing target engagement time, especially the time of flight for naval surface fires, is critical to supporting the landing force because seabased systems will provide the majority of fires during the initial phases of the operation.

Flexibility. In our warfighting concepts, the commander adjusts his scheme of maneuver to exploit the changing tactical situation ashore. Fire support systems must have the flexibility to adapt to this rapidly changing environment. Flexibility will be achieved by providing the commander with a balanced and complementary mix of aviation, naval surface, and ground-based fire support systems. By capitalizing on the inherent capabilities of each component, a synergistic effect will be realized. Furthermore, by avoiding overdependence on one system, potential critical vulnerabilities are eliminated. Naval surface and aviation fire support are critical elements of the fire support mix, but their availability and effectiveness may be reduced by threat capabilities, operational requirements, or severe weather.



COMPLEMENTARY EFFECT OF FIRES

Accuracy. Significant technological advances will support development of more accurate weapons systems. Such systems will contribute to the successful outcome of operations by allowing more efficient engagement of critical high-payoff targets and the reduction of ammunition consumption, thus easing sustainment requirements. Munitions that minimize collateral damage will be required, particularly for combat in built-up areas and in OEO. Precision fires represent the high end of the accuracy requirement. Provisions for precision fires must include inexpensive munitions that are capable of satisfying requirements for high-volume fire. Such fires will be accurate enough that commanders can count on first-round fires for effect—that is, without the need for preliminary adjusting rounds, which waste time, warn the enemy, and create collateral damage while increasing logistical requirements.

Lethality. The advanced expeditionary fire support system must provide the means to reduce or neutralize hard targets in urban areas with minimal collateral damage and noncombatant casualties. This may be accomplished through a combination of lethal and non-lethal munitions.

Lethal fires include massed fires for neutralization or suppression, as well as accurate or precision munitions to destroy high-payoff point targets. The landing force will require immediate, all-weather, high-volume area fires to suppress and defeat enemy forces throughout an operation. Fires must be available from all fire support systems to ensure mission success. Non-lethal fires offer increased fire support options, providing counterpersonnel and countermateriel capabilities against point and area targets.

Mobility. Our warfighting concepts are based on rapid movement and emphasize tempo and momentum. Mobility is therefore a major factor for the next ground-based fire support system. Naval surface and aviation systems may be the most mobile and least restricted of all means of fire support. Only the enemy threat (integrated air defenses or cruise missiles) or features of the operational environment (e.g., weather or hydrography) are likely to restrict their mobility.

Ground-based fire support systems must be readily deployable on amphibious shipping, maritime prepositioning force shipping, and strategic airlift. All required support must be self-deployable or capable of deployment ashore via the lift platforms available to the vertical assault and surface assault elements. Movement ashore must be accomplished in an efficient manner to create a combined arms team and provide a rapid buildup of forces without consuming a disproportionate share of available lift platforms.

The next generation of expeditionary ground-based fire support weapons will be self-contained and have the same degree of mobility as the maneuver forces they support. With increased mobility and improved protection, ground-based weapons can be positioned with maneuver elements, allowing them to provide fires at maximum range in all directions from the maneuver force and permitting maximum coverage to the maneuver unit. Quick emplacement and rapid displacement after firing will ensure survivability of the ground-based component of the system.

Range. The fire support components must complement and support each other. With the littoral battlespace extending far inland and its width determined by the scheme of maneuver, commanders must capitalize on the range of each fire support weapon to shape and fight throughout the battlespace. Each component of the system must also be capable of providing close support to MAGTF elements anywhere in the operational area. While aircraft ranges are generally adequate to meet fire support requirements, longer ranges are needed for both naval surface and ground-based fire support. As the mobility of maneuver forces continues to improve, the close battle will occur further inland. Consequently, all future fire support systems must be able to provide effective fires at greater ranges than are currently possible.

The availability and range of naval surface and aviation assets may at times be limited by the operational environment or diverted to higher-priority missions. For these reasons, it is imperative that ground-based fire support systems have the range and mobility to support the close battle and provide the landing force commander with a battlespace shaping capability.

Sustainability. An essential part of the concept for advanced expeditionary fire support is the seabasing of logistics. The goal is to move forward from a materiel-intensive "logistics push" system, which requires the establishment of supply facilities ashore, to a more flexible and responsive "logistics pull" system. Logistics pull will greatly reduce lift requirements during the STOM phases of the amphibious operation. Implementation of logistics pull depends on a command and control system that provides total asset visibility. This will enable maneuver forces to communicate "real-time" requirements and for combat service support elements to efficiently manage the delivery of logistics support.

Sustainability has an impact on all fire support systems. There must be a focused effort on reducing the logistical support requirements associated with the delivery of effective fire support. Ground-based fire support systems are vulnerable to logistical bottlenecks because of their high-volume resupply requirements. Improvements in reliability, increased component modularity, more compact packaging of propellants, and system commonality should reduce sustainment requirements while increasing system availability. Further advantages can be gained through munitions commonality between naval surface and ground-based systems, and even among ground systems themselves. Increased accuracy and lethality of future systems will reduce ammunition consumption, thus easing sustainment requirements. Timely and accurate BDA is also essential in reducing ammunition consumption. Improvements in asset visibility and tracking, distribution systems and materiel handling will enable resupply at the right time and place.

As stated earlier, instances will arise where shore basing of aviation assets may be required to increase responsiveness and efficiency. In order to preclude concomitant rear area security requirements, advanced techniques for establishing forward arming and refueling points (FARP) must be explored. The development of such techniques and procedures will likely spawn equally effective techniques for refueling and arming ground combat and combat support platforms.

Key Capabilities

The advanced expeditionary fire support system must be able to provide:

- A single, integrated command and control system
- Flexibility through aviation, naval surface, and ground-based fire support
- Precision point fires
- Accurate, high-volume fire
- Lethal and non-lethal munitions
- Mobility equal to that of the ground maneuver element
- Sufficient range to protect the force and shape the battlespace
- Responsive support for maneuver and force protection
- Maximum use of seabasing
- Minimization of logistics support requirements

FUTURE DIRECTIONS

The MAGTF command and control system will provide shared situational awareness to all MAGTF elements through a common picture of the battlefield. Links to national, theater, and tactical reconnaissance, surveillance, and intelligence systems will continuously update this tactical picture and provide target acquisition support. Streamlined fire support procedures will aid responsiveness. Automation will support all aspects of fire support planning and execution.

The fire support element will have the responsiveness, accuracy, lethality, range, and flexibility in terms of effects on targets to support the landing force throughout the range of military operations. A balance of aviation, naval surface, and ground-based fires will ensure that the force commander has sufficient fire support available at all times and under all conditions. The ground-based element will have the full capabilities required to protect the landing force and to support its maneuvers should naval surface fires and aviation support be unavailable. These capabilities include sufficient mobility to deploy ashore as part of both surface and vertical assault elements, as well as the ability to keep up with maneuver forces ashore as they generate tempo and momentum and take maximum advantage of weapon systems' range capabilities. Ground-based weapons systems will be designed to minimize logistical support requirements and to take maximum advantage of seabased logistics support.

These improvements in expeditionary fire support capabilities, in concert with dramatic improvements in the operational and tactical mobility of the landing force, will enable the MAGTF commander to generate overwhelming combat power, tempo, and momentum. Whether in ship to objective maneuver , sustained operations ashore or other expeditionary operations, this evolution in naval expeditionary capabilities will permit the MAGTF to shape the battle, and exploit enemy critical vulnerabilities to achieve the decisive action envisioned in *Operational Maneuver from the Sea*.