VIII. OVERARCHING EXPEDITIONARY WARFARE REQUIREMENTS

A. INTRODUCTION

We determined capabilities required to conduct ExWar as a result of three separate analyses: a Top Down functional decomposition of ExWar, our integrated CONOPS, and our threat analysis. Our threat analysis and integrated CONOPS were discussed in Chapter IV and VII respectively. Our top-level functional decomposition was generated using a "clean sheet" approach starting with the definition of an expeditionary force contained in Marine Corp Doctrine Publication (MCDP)-3, *Expeditionary Operations*:

> "An expeditionary force is an armed force organized to accomplish a specific mission in foreign lands (far from a supportable home base), that is supported by a temporary established means, and being temporary will leave the foreign land when the mission is complete."(Headquarters, Marine Corps, 1998)

Building upon this definition, we started to define the capabilities required to conduct an expeditionary operation using the process described below.

B. REQUIREMENT GENERATION

A FFBD was used to iteratively break down the capabilities required across the mission areas that contribute to an expeditionary operation. These functions were decomposed to the level permitting allocation to specific hardware or platforms. In order to clarify the complex relationships between functions and across the various mission areas, IDEF was used to describe the various inputs, outputs, controls, and mechanism associated with each function. A representative decomposition is depicted in Figures VIII-1 through VIII-3, which follows the iterative decomposition of a particular portion of an expeditionary operation.

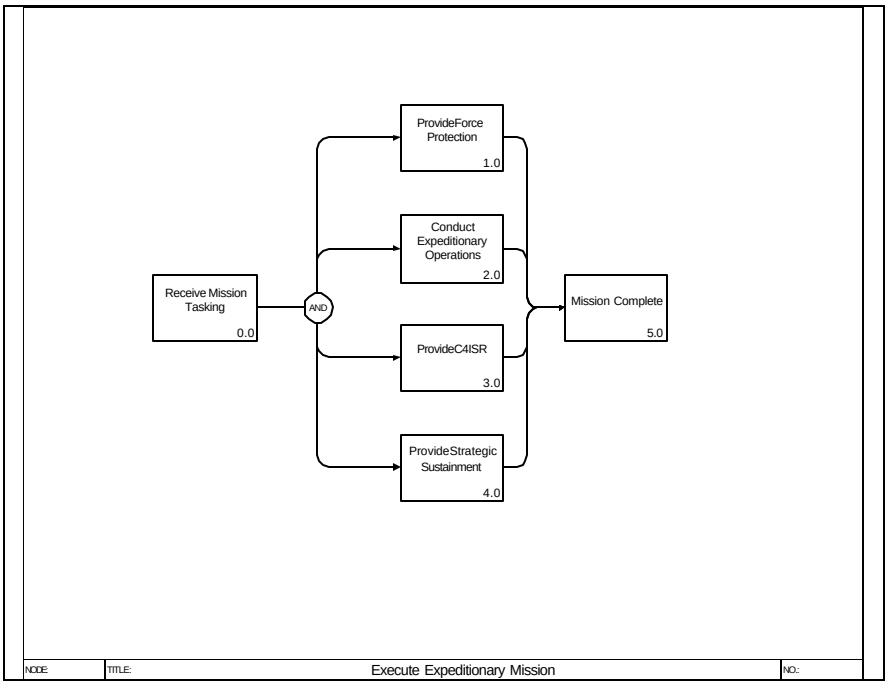

Figure VIII-1: The Four Major Mission Areas Required to Conduct an Expeditionary Operation.

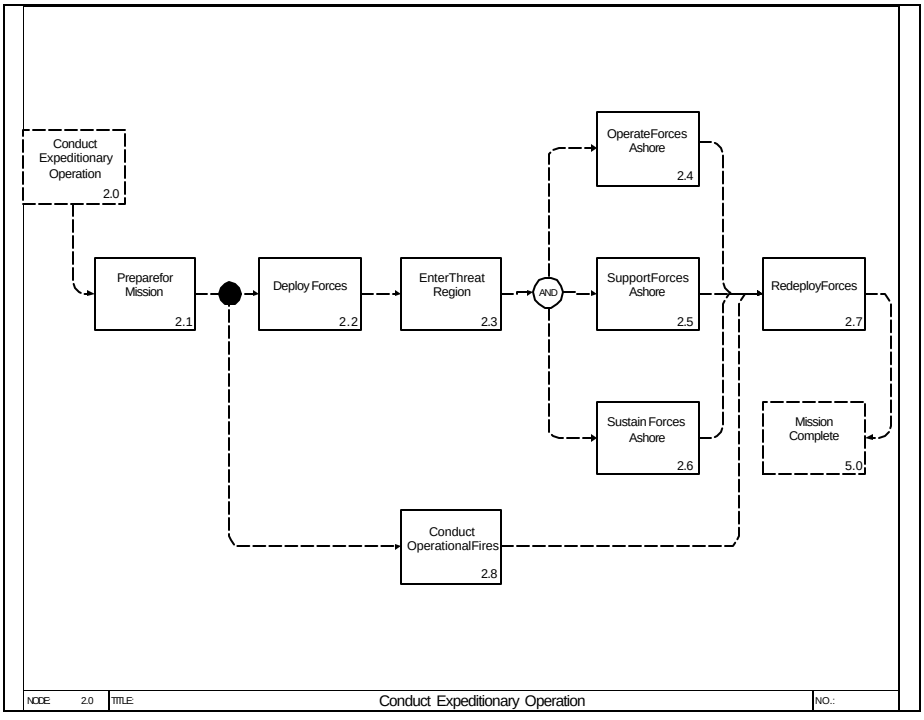

Figure VIII-2: A Second Level Decomposition of Block 2.0 "Conduct Expeditionary Operations."

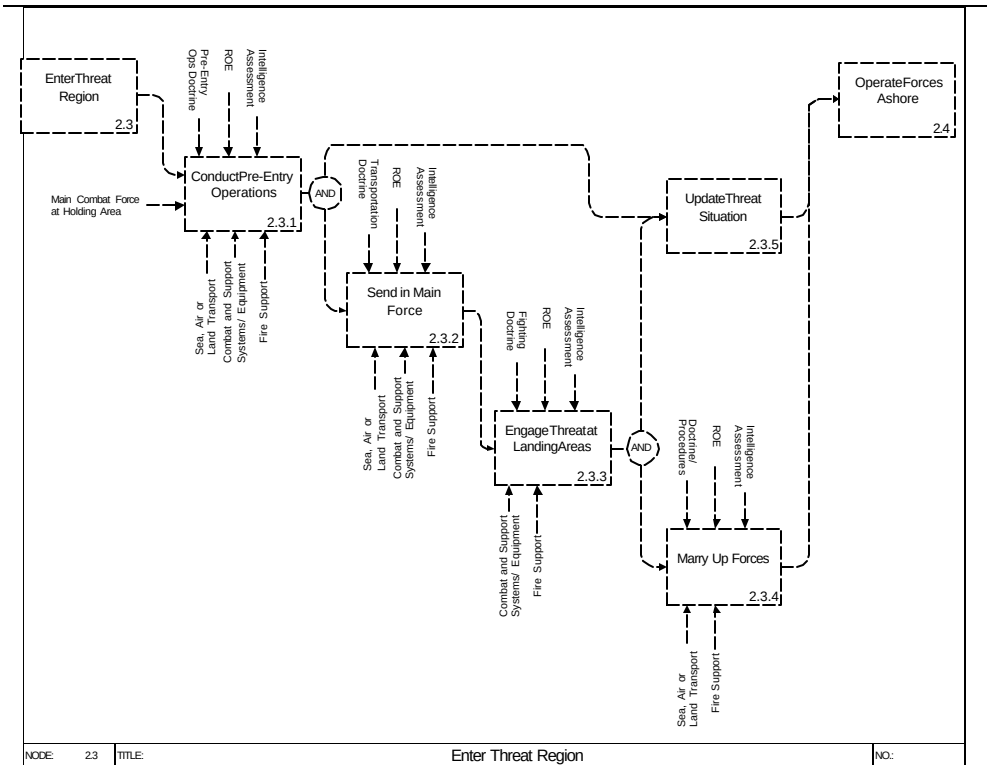

Figure VIII-3: A Third Level Decomposition of Block 2.3 "Enter the Threat Region."

The complete functional flow is enclosed in Appendix 8-1 and the accompany dictionary describing each function is contained in Appendix 8-2.

Once decomposition had proceeded to a level that allowed functional allocation to a specific platform solution, Functional Analysis Sheets (FAS) were generated. These sheets analyzed and extended the definition of each function in order to identify non-platform specific requirements encapsulated by that function. The decomposition and definition provided by the FFBD and FAS provide a complete picture of the task required to perform each function, or the "what." An example of a FAS describing a portion FFBD 1.1 Conduct Anti-Air Warfare is contained in Table VII-1. The complete set of Functional Analysis Sheets is contained in Appendix 8-3.

Function Higher level name	Function Name and Number	Function Performance and Requirements	Assignments
1.1 AAW			
1.1.1 Hostile aircraft			
	1.1.1.1 Detect	1. Utilizes Off board Cuing 2. Utilizes Onboard Sensors 3. Coordinate ISR Systems 4. Fire Control systems	1. Radar systems 2. Infrared systems 3. Visual enhancement systems 4. Laser systems
	1.1.1.2 Report	1. C4 Systems	1. Communication gear 2. Data gear
	1.1.1.3 Identify	1. Utilizes off board cuing 2. Utilizes Onboard Sensors 3. ISR systems	1. Recognition systems 2. Intelligence 3. IFF systems
	1.1.1.4 Track	1. Utilizes off board cuing 2. Utilizes onboard Sensors 3. Fire Control systems	1. Radar systems 2. Infrared systems 3. Visual enhancement systems 4. laser systems
	1.1.1.5 Report Identification	1. C4 systems	1. Communications
	1.1.1.6 Engage	1. weapon systems 2. Fire control systems 3. Rule of Engagement 4. Tactics	1. Projectile Systems 2. EM Systems 3. Laser systems
	1.1.1.7 BDA	1. Onboard sensors 2. Off board cuing	1. Recognition systems 2. Intelligence 3. IFF systems
	1.1.1.8 Reengage	1. weapon systems 2. Fire control systems 3. Rule of Engagement 4. Tactics	1. Projectile Systems 2. EM Systems 3. Laser systems
	1.1.1.9 Report	1. C4 Systems	1. Communications

Table VIII-1: FAS for AAW Force Protection 1.1.

The integrated CONOPS and threat analysis were then used to define the level of effectiveness or the "how much," "how far," "how fast," and "how long" required to perform each function. This effectiveness analysis was primarily qualitative and did not identify or use quantitative metrics to analyze effectiveness of performing a function. With each function fully characterized, we were now ready to generate a set of requirements for all the high level function defined in our functional analysis.

C. OVERARCHING REQUIRMENTS

The requirements generated are for the high level functions in the FFBD and FAS. The high level functions are C4ISR (1.0), Force Protection (2.0), Conduct Expeditionary

Operation (3.0), and Strategic Sustainment (4.0). The requirements for these functions are listed below. These requirements are based upon a system of systems solution.

1. **Command, Control, Communication, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR)**

   a. The C4ISR must possess the organic capability to coordinate tactical surveillance and reconnaissance throughout the area of operations.

   b. C4ISR assets must include the ability to exploit, national, theater, and allied assets, and provide intelligence to all levels of command in contribution to a common tactical and a common operational picture.

   c. The Command and Control (C2) systems must be interoperable and at a minimum exchange information seamlessly between service components. As much as possible, the C2 system must be compatible with combined and interagency assets.

   d. The major C2 functions must remain at sea.

   e. The C4ISR system must have the ability to support a Joint Task Force staff (JTF).

   f. The system components must support secure, reliable, network-centric communications and data exchange, not only with the warfare mission commanders, but also with other surface ships, and manned and unmanned aircraft.

   g. The system must have the ability to rapidly redirect transporters caring Marines, equipment, and supplies to alternate sites

throughout the area of operation both in the assault and offload phases of the operation.

h. During STOM operations the C2 requirements between various mission areas such as logistics, maneuver, and fires will offer conflict. Future C2 systems must be capable of deconflicting these requests in a timely and coherent manner.

i. C2 in logistic operations must extend from Sea Base to CONUS.

2. Force Protection

a. The Sea Base must address the cruise missile threat. Tactical ballistic missile defense is important for Allied nations and forces ashore, but not against the mobile Sea Base, which is impractical to target.

b. The Sea Base requires a counter-mine capability.

c. The Sea Base requires the ability to defeat small-boat attack.

d. The Sea Base formed between 50-250 nautical miles offshore must provide force protection for logistic transports from the Sea Base to the objectives.

3. Expeditionary Operations

a. The system must be capable of projecting and sustaining a Brigade size Ground Combat Element (GCE) and minimum Combat Service Support personnel in a STOM operation from the Sea Base.

b. Since future concepts of operation emphasize addressed shortened deployment timelines, the system must be capable of using ISR data to support in stream mission planning and rehearsal.

c. Forces must be able to reconstitute and redeploy through the Sea Base.

d. The Sea Base must have the ability to perform I-level maintenance for all major platforms.

e. Future Sea Base platforms must be compatible with legacy platforms to the maximum extent possible.

f. The forces must have the ability to conduct a range of taskings, from small-scale, low intensity missions, through a Major Regional Conflict.

g. The system must have the ability to coordinate fire support for forces ashore as well as deconflict requests for fire support with demands for force protection.

4. Strategic Sustainment

a. The Sea Base must bring enough supplies to sustain an operation until strategic resupply assets reach the Sea Base.

b. Strategic Sustainment assets must posses a selective offload capability to improve efficiency of resupply.

c. The Sea Base must be compatible with current and future military and commercial shipping and prepositioned assets.

d. Critical Strategic Sustainment must possess a limited self-defense capability.

D. IDENTIFICATION OF CAPABILITY GAPS

After all the functions had been fully characterized, they were allocated to platform solutions for comparison against the capabilities contained in the Planned Architecture. For example, the range and speed required to move personnel and vehicles from the Sea Base to an objective up to 200 miles inland dictates a heavy lift mission, which should be filled by an aircraft. The aircraft should be capable of delivering payloads like the light armored vehicle (LAV) and the medium tactical vehicle replacement (MTVR) up to 300 miles from the Sea Base.

These capabilities were compared against the available capabilities as part of the Top Down, Bottom Up approach. The platforms that make up each of the architecture are depicted in Table VIII-2. A complete description of each architecture is found in Chapters IX, X, and XI. Wherever the Planned Architecture lacked a platform similar capability to one resulting from our functional decomposition, definition, and allocation process, we identified a capability gap.

Platforms	**Year 2002 (Legacy)**	**Year 2015~2020 (Future)**	**Remarks**
Air	CH-46 CH-53E UH-1N AH-1W AV-8B EA-6B F/A-18 C/D CVW	-- CH-53E UH-1T** AH-1Z** JSF*** E/F-18*** F/A-18D** CVW MV-22A*	*New Concept ** Upgrade *** Replacement -- Retirement
Sea	LPD-4	--	*New Concept

	LSD-36 LSD-41 LSD-49 LHA LHD LCAC LCU MPF	-- LSD-41 LSD-49 LPD-17*** LHA(R)*** LHD LCAC LCU(R)*** MPF(F)*** H-LCAC* HSV*	*** Replacement -- Retirement
Land	M1A1 LAV AAV HMMWV M88A1-E1 M-60A1 M101A1 M188 Mk-48 Truck	M1A1 LAV AAAV*** HMMWV	*** Replacement *To be updated with 'USMC 2015' paper.*
Escort	CV/CVN CG DDG DD FFG SH-60B CH-60S	CVN CG DDG -- -- SH-60B CH-60S	-- Retirement

Table VIII-2: The Architectures Used to Identify Capability Gaps

The resulting major capability gaps are presented in Table VIII-3. These gaps determined where we would focus our inquiries as we pursued our study. Since a large number of the gaps involved the ability to mount and sustain an operation through a Sea Base, and since this capability appeared to be the fundamental building block for other concepts of operation, the major thrust of our project was an examination of the Sea Base and associated platform's capability to project and sustain Marine combat power ashore.

In order to determine which capability gaps described Table VIII-3 would be selected for conceptual solutions by NPS design teams, we first excluded gaps for which we had no design capability. We then prioritized the remaining designs looking for "off the shelf" solutions which might completely or partially fill one or more of the gaps.

Capability Gap	**Addressed in Conceptual Architecture**
Surface Platforms Capable of Forming and Sustaining a Sea Base	YES
Shipboard Aircraft Capable of Transporting Large Loads Over Long Distances	YES
Ability to Rapidly Deliver Combat Force to Theater	YES
Highly Survivable Air Transport Platforms To Sustain STOM Operations	YES
Organic Capability to Collect ISR Data Throughout Area of Operations	YES
The Ability to Support Marines Ashore with Both Precision and Volume Fires From The Sea Base	
The Ability To Provide Sufficient C4 Support To Fully Implement STOM	
Providing Force Protection For Surface Craft Transiting to Shore	

Table VIII-3: Major Capabilities Gaps Identified by Combination of the Top-level Look and Systems of Record in the 2020 Timeframe

The capability gaps with conceptual design solutions where:

- Long range, heavy lift aircraft
- Family of ExWar ships
- Family of ISR systems
- The Viper Tilt Rotor Escort Aircraft
- The Sea Spectrum Surveillance Unmanned Aerial Vehicle
- The Sea Arrow Armed Reconnaissance Unmanned Aerial Vehicle

- Maritime Prepositioning Force Ship 2010
- The Sea Lance Littoral Warfare Small Combatant System

The requirements analysis and conceptual design detail for the designs are discussed in Chapters XIV – XVI and Chapter XVIII.

E. CONCLUSIONS

The functional decomposition of expeditionary warfare creates the backbone on which to hang the CONOPS and the threat analysis. While the CONOPS and threat analysis may change over time as the result of influences from many factors, the functional decomposition should remain relatively unchanged. As a result, this functional decomposition should remain a viable basis for future analysis efforts.