Sea Basing

Presentation to
The Honorable John J. Young, Jr.
ASN (RD&A)
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Sea Basing

Naval Research Advisory Committee 800 North Quincy Street Arlington, VA 22217-5660

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The original document contains color images.
Outline

- Sea Base Operational Scenario
- Terms of Reference
- Takeaways
- Study Approach
- Observations
- Critical Obstacles
- Solution Concepts
- Conclusions and Recommendations
Naval Research Advisory Committee

Sea Base Operational Scenario

The “10 – 30 – 30” Strategic Guidance

“To have Options, Maneuverability and Sanctuary”
To close a Marine Expeditionary Brigade …
CONUS → Sea Base → Shore Objective

1) Identify and analyze:
   • High-speed / high-capacity connectors
     – CONUS / Advance Base to Sea Base
     – Sea Base to shore objectives
   • Connector-to-platform interfaces for operations through Sea State 4

2) Recommend:
   • Near-term and long-term technology developments to achieve desired capability
Study Panel and Sponsor

Dr. George Webber—Chair
Prof. William Weldon—Vice-Chair
LtCol Kent Hansen, USMC—Executive Secretary

MajGen (Ret.) Paul Fratarangelo, USMC
Mr. Peter Gale
VADM (Ret.) William Hancock, USN
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Mr. Norman Polmar
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Mr. Robert Ness
RADM (Ret.) John Tozzi, USCG
Dr. Patrick Winston

Study Sponsor: OPNAV N75 MajGen J.R. Battaglini
“What are the critical impacts on MPF(F) design?”
Takeaways

• End-to-end material transport—critical core function
  – High throughput and reliability
  – Standardized containers

• High-speed surface connector—critical enabler
  – HSC/LCAC synergies
  – Extended standoff
  – Reduced fuel consumption
  – Multi-use

• MPF(F)—new connector interface functions
  – High speed load/unload
  – Automated warehousing

• Implement an MPF(F) Spiral 0 program
  – Modified S-class container ship
  – System integration and at-sea demonstration
  – Current assets plus new technology

End-to-end systems engineering required
Study Approach

- Draw from stakeholders and guidance
- Frame the connector problem
  - Critical functions
  - Modeling and simulation (MCCDC)
  - Obstacles
- Review technology and practice
- Develop solutions

Assumptions: Sea Shield provides force protection
FORCEnet provides communications
Briefings and Visits

- OPNAV: N75, N42
- Marine Corps: HQMC, MCCDC
- ONR: CNR, EXLOG FNC
- Fleet Visits: FFC, Ship tours
- System Commands: PMS 325, NAVSEA 05D, NAVAIR
- Other Government: CNA, Army, DARPA
- Industry: Bell/Textron, Sikorsky, Maersk, Lockheed, UMOE, FEDEX, Navatek
What Critical Function Drives Connector Requirements?

End-to-end, high throughput material transport and handling
Observations

- CONOPS drives solutions
  - 100 nm standoff
  - 8 hr insertion
  - Sea State 4

- Modeling and simulation identify sensitivities
  - Air insertion: limited to 135 - 150 nm
  - Surface insertion: impossible in 8 hrs, limited to 50 nm
  - Airlift sustainment: limited to 135-150 nm

- Connector loading problematic (ILP)
- Packaging not standardized
- Medical requirements not addressed
Critical Obstacles

• Air connectors
  – *Operational Range*
  – *Heavy lift to/from Sea Base*

• Surface connectors
  – *Sea State 4 transfers*
  – *LCAC fuel consumption*
  – *Unimproved shore*

• MPF(F) functions
  – *Fast load/unload*
  – *Material breakout*
  – *Automated warehousing*
Overcoming Air Connector Obstacles

• Long-range heavy lift to/from Sea Base unavailable
  – CH-53X will help—deployment a problem
  – Range/Speed enhancements are most important
  – Other options are long-term - -i.e. Joint Heavy Lift
Overcoming Surface Connector Obstacles

• Transfer rate in Sea State 4
  – Eliminate relative motion
  – Load big—unload small
  – LCAC shuttle from MPF(F) to HSC

• LCAC fuel consumption
  – Use HSC as LCAC truck

• Unimproved shore
  – Deliver materiel over-the-beach
  – Use LCAC as pallet truck
Operational Concept

Multi-mode operation common HSC
High-rate LCAC Loading
Enabler #1

Transverse Tunnel (Drywell)  Stern Elevator

Intermediate Transfer Platform
High Speed Connector
Enabler #2

Threshold capabilities:

- > 30 kts, 2000 nm loaded
- 3 loaded LCACs + additional cargo/troops
- Rapid LCAC launch and recovery
- Three loading modes
  - LCAC
  - Vertical
  - RO/RO
Shipboard Automated Warehouse Enabler #3

Standardized containers

Asset tracking system (RFID/bar code)

Need time to integrate best commercial practices
Benefits of Candidate Solution

- Standoff range increased
- LCAC advantages retained
- HSC serves multiple purposes
- Rapid loading
  - LCAC on MPF(F)
  - HSC via LCACs
- Modular container breakout
  - Large for loading efficiency
  - Small for beach movement
  - No TEUs on shore

No technical breakthroughs needed
## Overcoming MPF(F) Platform Obstacles

- Spiral 0 system integration and sea-trial program
  - Commercial platform
  - Joint with JFCOM and TRANSCOM
- High Rate LCAC loading in Sea State 4
  - Demonstrate promising designs
- Automated warehousing
  - Demonstrate JMIC compatibility
  - Apply best commercial technology
  - Develop and test shipboard handling system
MPF(F) Vision Unclear

- All-purpose ship versus family of ships
- Command and control
- Manning (civilian, Navy, Marine)
- Maintenance/repair capability
- Troop accommodations
- Medical facilities
- Reconstitution requirements
  - Retrograde
  - Personnel
  - Equipment/supplies/vehicles
- Connector deployment

Too many unknowns; not ready to build
MPF(F) Spiral Development—New Initiatives

• Near term (12 to 18 months)
  – *S-Class container ship conversion*
    • LCAC transverse tunnel interface
    • Flight deck and hangar
    • Automated warehousing
    – *SeaBee stern elevator/LCAC interface demo*
    – *Intermediate transfer platform demo*

• Mid-Term (18 to 36 months)
  – *Initiate MPF(F) shipbuilding program*

*Cost effective and timely investment*
Maersk S-Class Conversion Concept

With flight deck, elevators, hangar, and transverse tunnel

- Two Flight deck elevators
- Deck spots for 15 V-22 equivalents
- Hangar stowage for 72 H-46 Equivalents
- Hangar environmentally controlled for Army SOF aircraft
Why an S-Class Conversion?

- Commercially operational
- Preliminary conversion design done for DoD
- Sea test in 12 to 18 months
- Provides deck spots and hangar
- Demonstrates critical MPF(F) enablers
  - Automated warehousing
  - Rapid LCAC loading
- Affordable

Deployable for near-term strategic missions
### Summary of Conclusions

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<th>Material Handling</th>
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<td>– JMIC essential for throughput</td>
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<td>– Automated warehousing</td>
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<td>– LCACs as pallet-trucks/lighters</td>
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<th>Connectors</th>
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<tr>
<td>– HSC efforts lack system focus</td>
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<td>– HSC and LCAC synergy possible</td>
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<td>– HSC needs multiple loading options</td>
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<td>– Fuel consumption limits operations</td>
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<td>– Heavy cargo is a problem</td>
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<td>– Airlift options limited</td>
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### Summary of Conclusions (continued)

- **MPF(F) Ships**
  - *Current interface concepts inadequate*
  - *Automated warehousing critical*
  - **Need:**
    - Total Sea Base systems engineering
    - Refined CONOPs and requirements
    - Connector interface system
    - Logistics C2 system
    - At-sea demonstrations
Recommendations

• Mandate standardized JMIC container program
• Develop HSC prototype to exploit synergies with LCAC
• Pursue S-class conversion as MPF(F) Spiral 0 capability
• Conduct MPF(F) defining demonstrations
  – Automated material handling system
  – Transverse LCAC loading tunnel
  – SeaBee-type stern elevator LCAC loading
  – FLO/FLO LCAC loading/cargo transfer
• Maintain CH-53X funding
• Support the Joint Heavy Lift Task Force
Recommendations (continued)

• S&T Investment
  – Pursue aggressive EXLOG FNC Program
  – Develop innovative HSC hull and propulsion technology
  – Invest in advanced air-cushion technology
  – Focus ONR Innovative Naval Prototyping on MPF(F)/HSC Spiral 0 initiative
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Takeaways

• End-to-end material transport—critical core function
• High speed surface connector—critical enabler
• MPF(F) facilitating functions—critical demos
• MPF(F) Spiral 0 program