

# ***NAVAL RESEARCH ADVISORY COMMITTEE***

Sea Basing

Presentation to

The Honorable John J. Young, Jr.

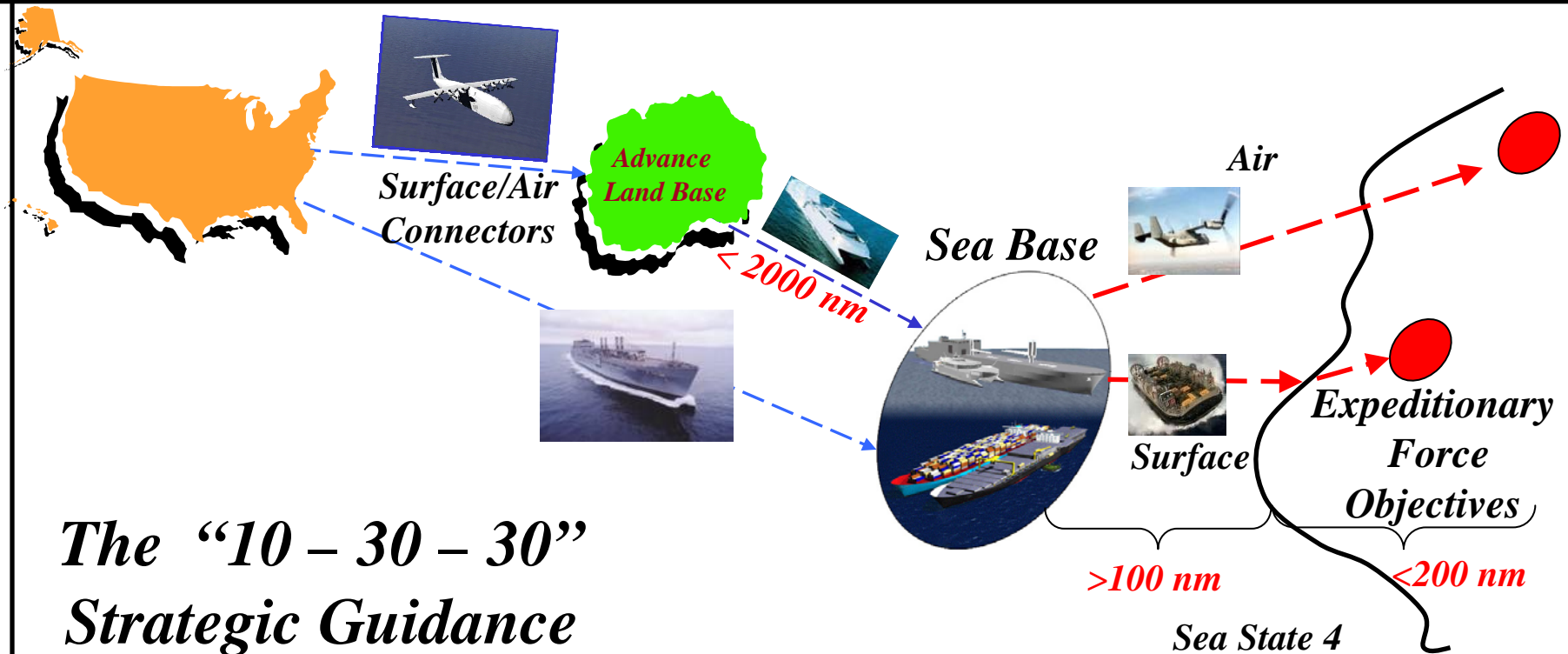
ASN (RD&A)

5 August 2004

## *Outline*

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

# Sea Base Operational Scenario



*The “10 – 30 – 30”  
Strategic Guidance*

*“To have Options, Maneuverability and Sanctuary”*

## *Study Terms of Reference*

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<sub>4</sub>



## *Study Panel and Sponsor*

Dr. George Webber—Chair

Prof. William Weldon—Vice-Chair

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*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

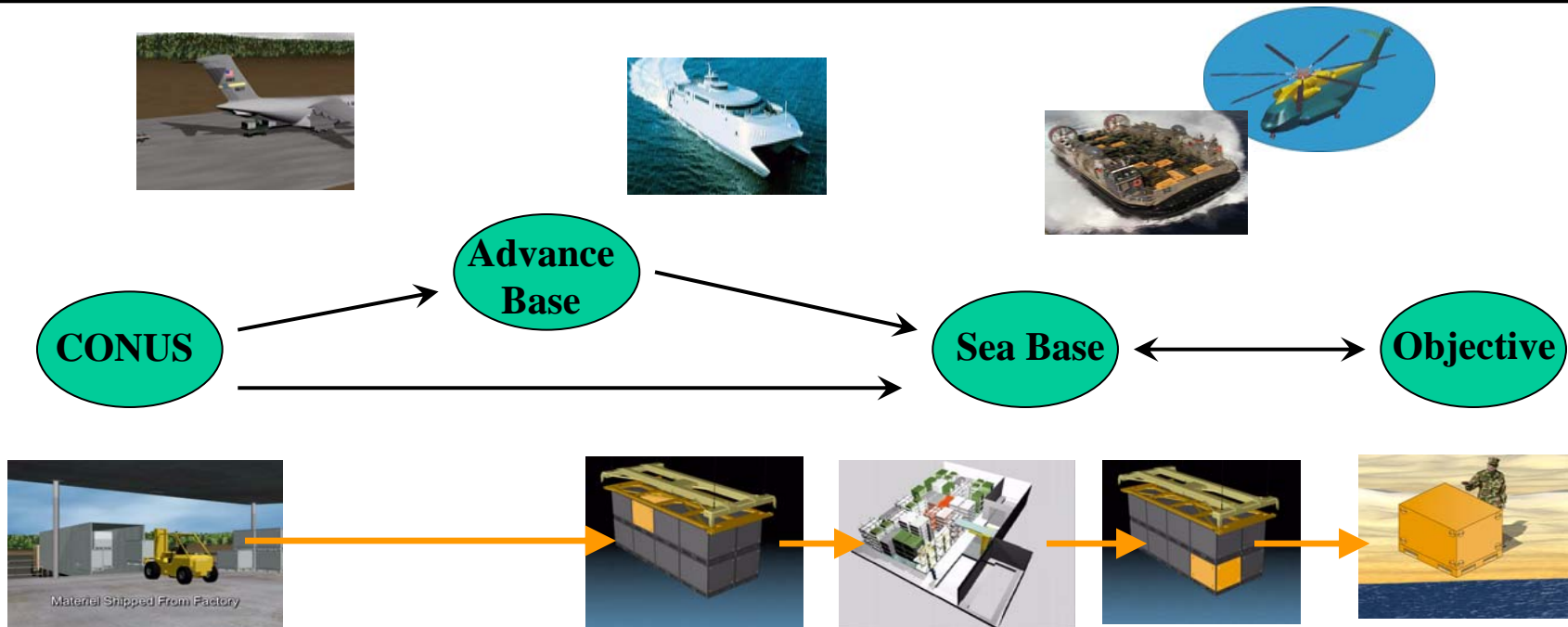
***Assumptions: Sea Shield provides force protection  
FORCEnet provides communications***

## *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*

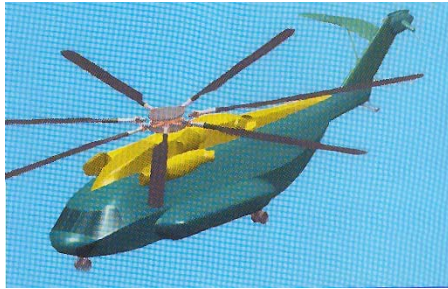
- CONOPS drives solutions
  - *100 nm standoff*
  - *8 hr insertion*
  - *Sea State 4*
- Modeling and simulation identify sensitivities
  - *Air insertion -- limited to 135 -150 nm*
  - *Surface insertion – impossible in 8 hrs, limited to 50 nm*
  - *Airlift sustainment -- limited to 135-150 nm*
- Connector loading problematic (ILP)
- Packaging not standardized
- Medical requirements not addressed

# *Critical Obstacles*

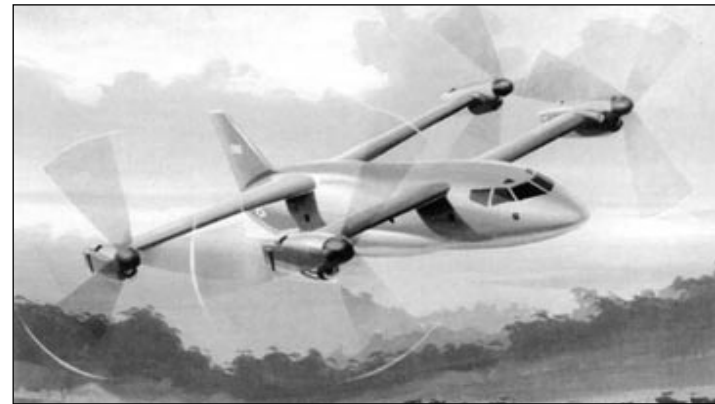
- Air connectors
  - *Operational Range*
  - *Heavy lift to/from Sea Base*
- Surface connectors
  - *Sea State 4 transfers*
  - *LCAC fuel consumption*
  - *Unimproved shore*
- MPF(F) functions
  - *Fast load/unload*
  - *Material breakout*
  - *Automated warehousing*



# 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*

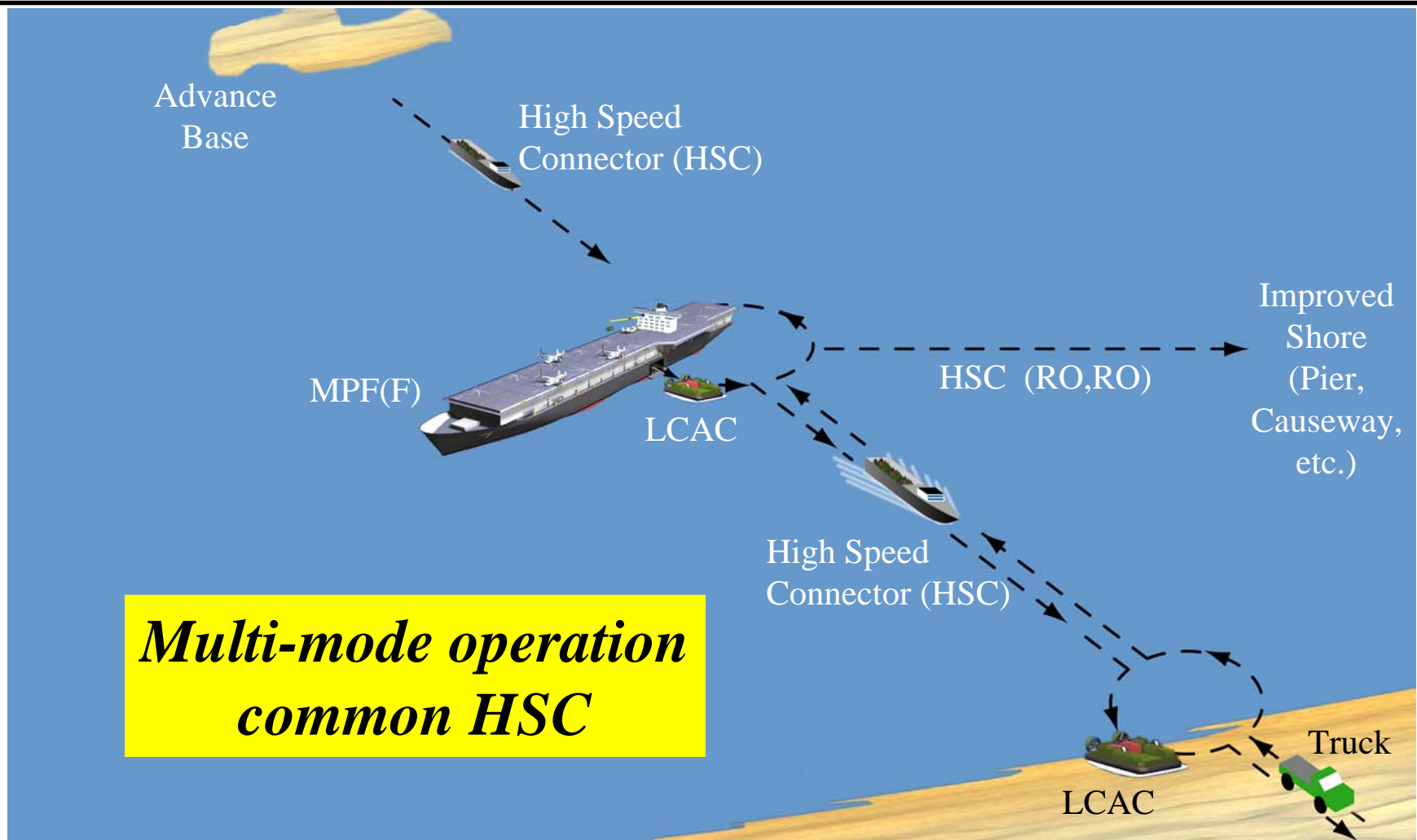




# Overcoming Surface Connector Obstacles

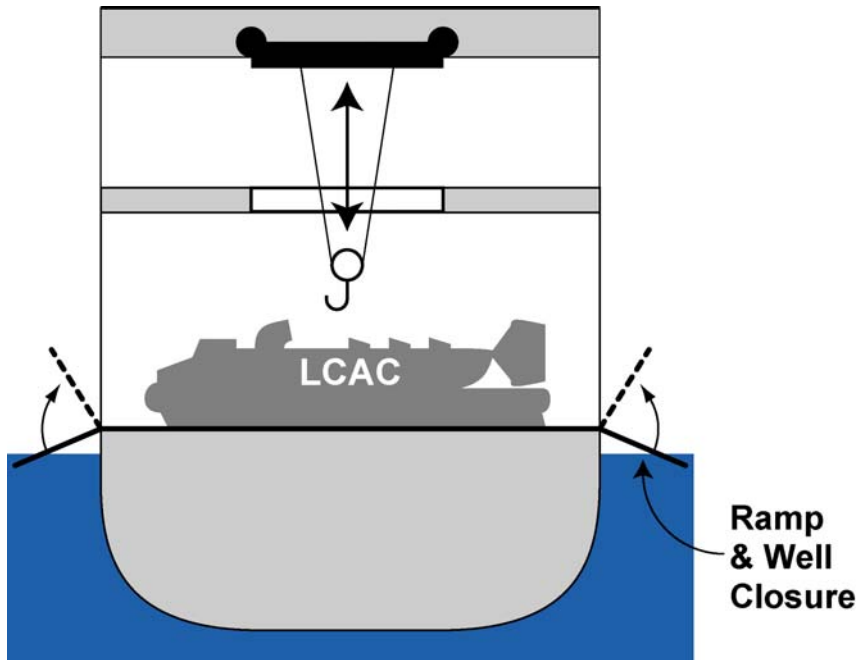
- Transfer rate in Sea State 4
  - *Eliminate relative motion*
  - *Load big—unload small*
  - *LCAC shuttle from MPF(F) to HSC*
- LCAC fuel consumption
  - *Use HSC as LCAC truck*
- Unimproved shore
  - *Deliver materiel over-the-beach*
  - *Use LCAC as pallet truck*

# Operational Concept

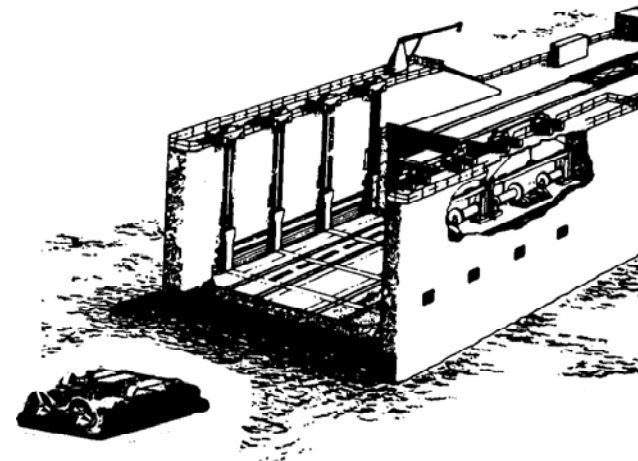


# High-rate LCAC Loading Enabler #1

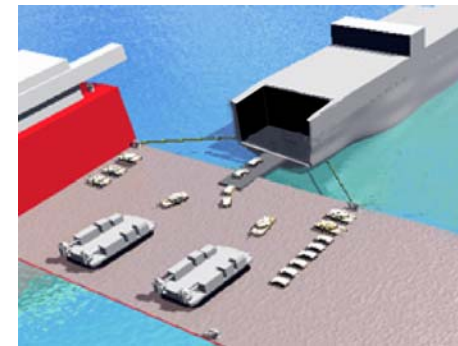
Transverse Tunnel (Drywell)



Stern Elevator



Intermediate  
Transfer Platform



## *High Speed Connector Enabler #2*

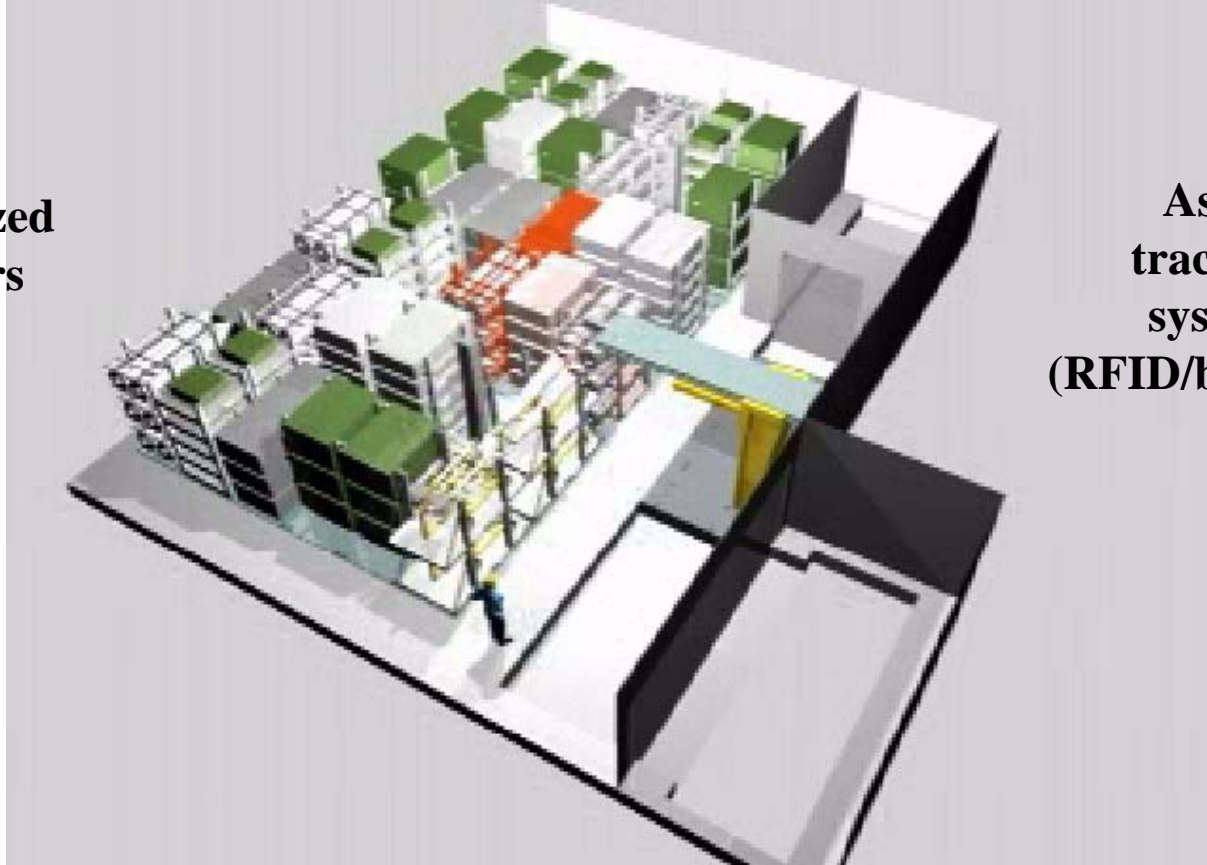
### Threshold capabilities:

- *> 32 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**



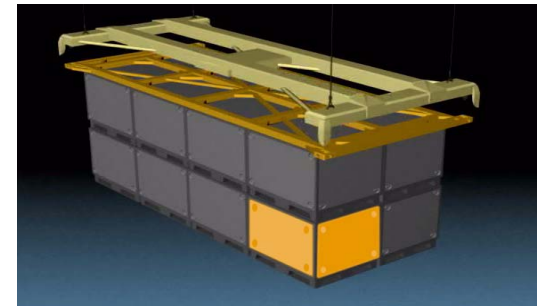
**Asset  
tracking  
system  
(RFID/bar code)**

*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*

LCAC offers over-the-beach capability



16 JMIC containers  
equal 1 TEU

***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*

- Material Handling
  - *JMIC essential for throughput*
  - *Automated warehousing*
  - *LCACs as pallet-trucks/lighters*
- Connectors
  - *HSC efforts lack system focus*
  - *HSC and LCAC synergy possible*
  - *HSC needs multiple loading options*
  - *Fuel consumption limits operations*
  - *Heavy cargo is a problem*
  - *Airlift options limited*

## *Summary of Conclusions (continued)*

- MPF(F) Ships
  - *Current interface concepts inadequate*
  - *Automated warehousing critical*
  - *Need:*
    - Refined CONOPs and requirements
    - Total Sea Base systems engineering
    - 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*
  - *Focus ONR Innovative Naval Prototyping on MPF(F)/HSC Spiral 0 initiative*
  - *Develop innovative HSC hull and propulsion technology*
  - *Invest in advanced air-cushion technology*

# Sea Basing

## 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**