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The Expeditionary Warfare Integrated Project

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NAVAL POSTGRADUATE SCHOOL

Meyer Institute of Systems Engineering

The Expeditionary Warfare Integrated Project

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Board of Advisor Functions

- Guidance for direction/emphasis
- Yearly Project Subjects
- Funding
- Direct Interaction with Students and Faculty

Intent of Presentation

- To provide a glimpse, in a few minutes, of our results
  - This is a small fraction of the study
- To hint at methodology used
- To demonstrate the value of such student/faculty studies
  - For educational and “real-world” purposes

A copy of our Final Report is available at www.nps.navy.mil/sea/exwar/

Final Report – Table of Contents

Tasking
(From N7/N75)

- Review *design concepts* for future Expeditionary Warfare systems using a ‘top down” system of systems approach
- Focus on investigating system *capabilities for power projection and forcible entry*.
  - as broad a scope of systems as is feasible, starting with the current programs of record as a baseline.
- *Value added is expected to be a better understanding of interfaces and synergies*

Some excursions also tasked – not addressed here.

STOM; OMFTS; Expeditionary Maneuver Warfare

We tied this transformational thinking to a future system of systems capable of fully implementing these doctrines

- ***Sea Strike*—Projecting Precise and Persistent Offensive Power**
- ***Sea Basing*—Projecting Joint Operational Independence**
- ***Sea Shield*—Projecting Global Defensive Assurance**

How Did We Go About It?

<u>Top Down Analysis</u>
(Integral of Capabilities Required)

Functional Flow Analysis
Integrated Future CONOPS
Joint Campaign Analysis

<u>Integration</u>
(Identification of "gaps" and opportunities)

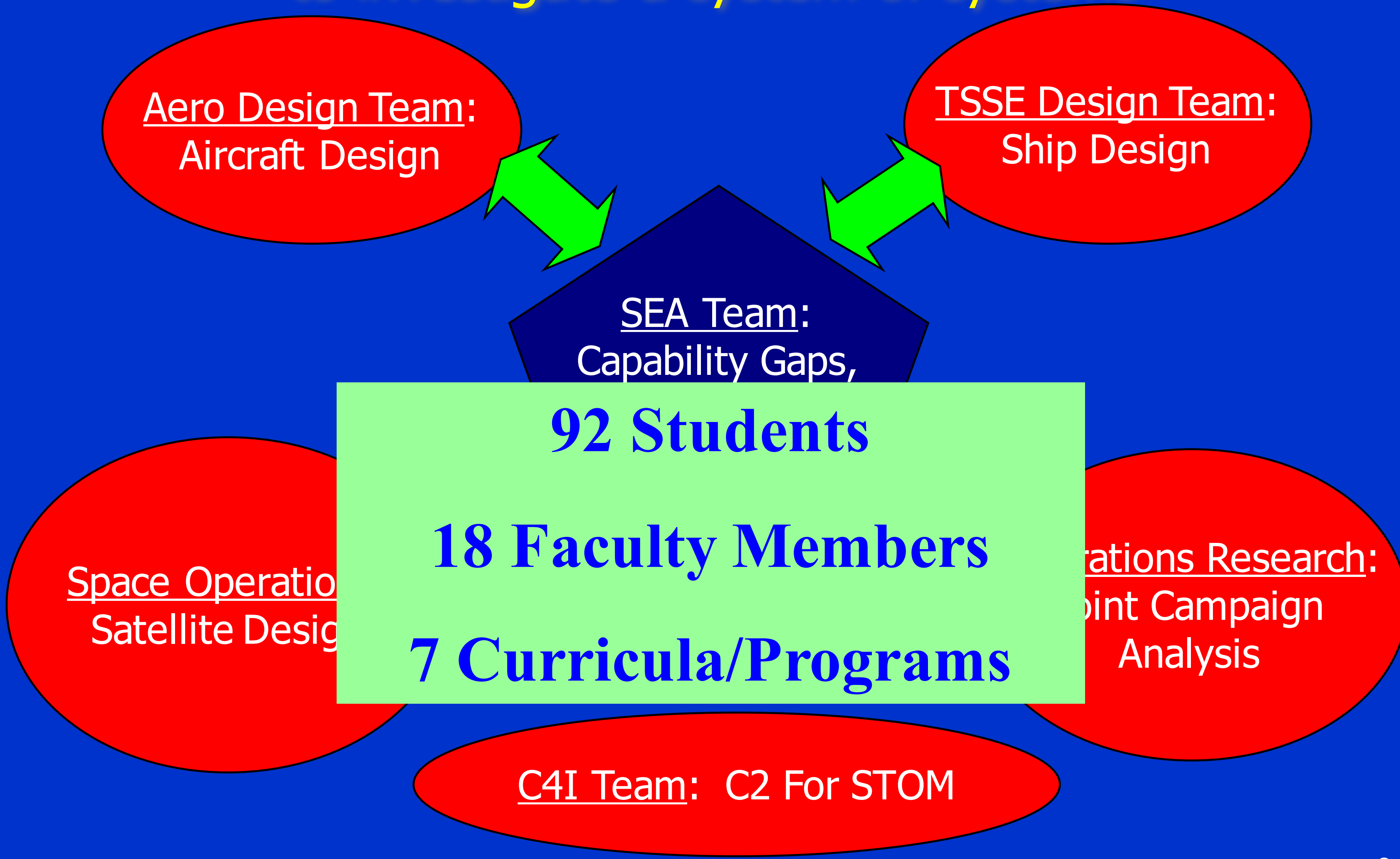
Conceptual Architecture
Dynamic System Model
Analytical Studies

<u>Bottom Up Analysis</u>
(Integral of Capabilities which will be Available)

Current and Planned Architectures
Current and Planned CONOPS

Our Team of Teams

to investigate a system of systems



Significant Capability Gaps Identified For Resolution In The Conceptual Architecture

Identified by Top-down analysis

- Rapidly deployable surface ships with sufficient throughput to form and sustain Sea Base → Sea Base Ship
- Shipboard A/C capable of delivering large loads over long distances → Heavy Lift A/C
- Organic ISR capability through entire OpArea → Organic ISR Systems

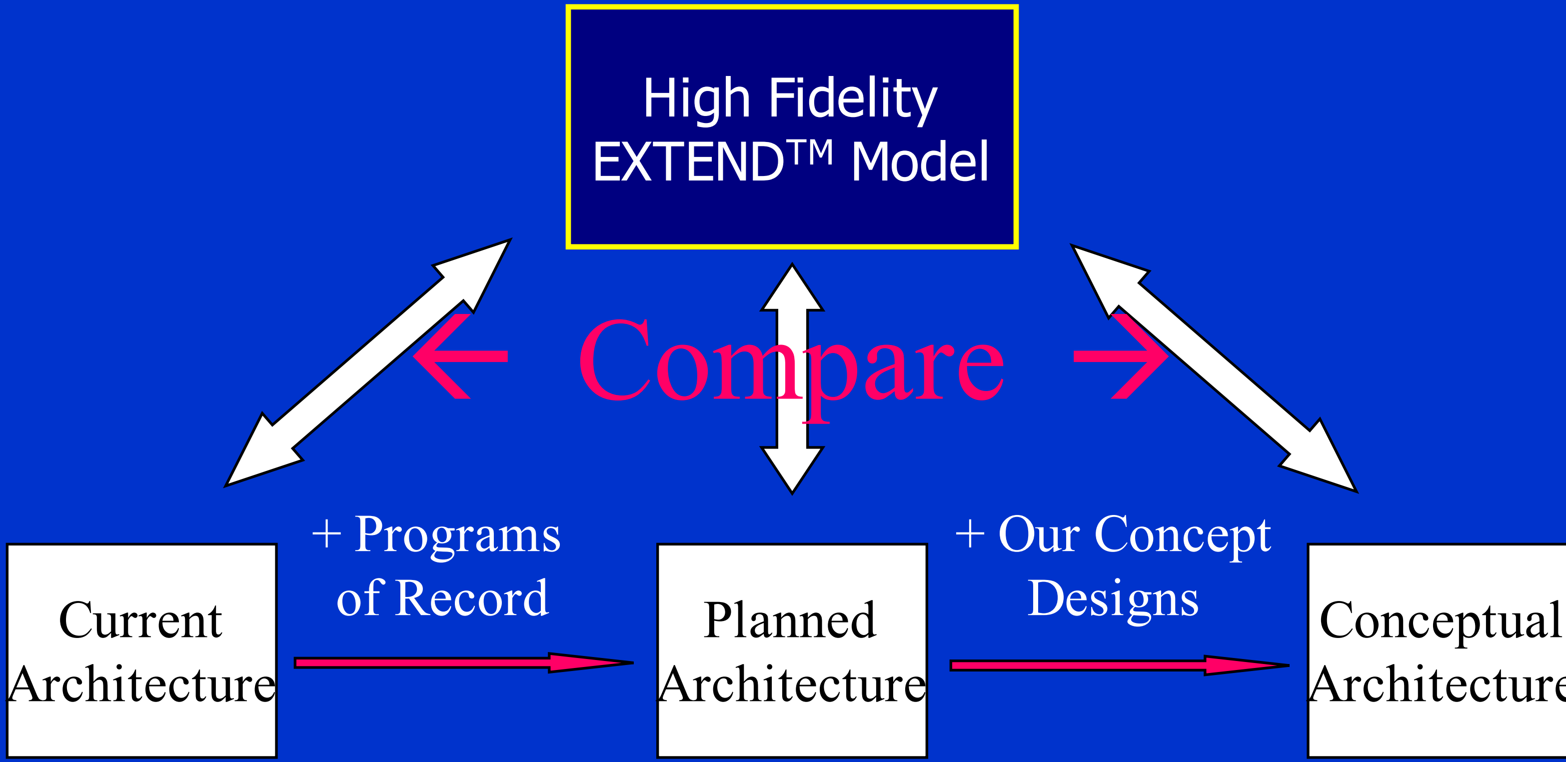
Gaps identified for future study:

Ability to provide sufficient C^4 to support STOM

Force Protection of Sea Base and transport assets

Robust organic mine countermeasures capability

Measure and Compare Capability to Project and Sustain Power Ashore



SEABASE Ship and Heavy Lift A/C Concept Design Rationale

- Large benefit in system availability if ship-to-ship transfer of USMC cargo can be made unnecessary
  - Sea state makes challenging
- Can LHA(R), MPF(F) and LMSR roles be played by same ship?
  - Allow variants which may emphasize LHA-type military systems in some of the ships
  - Essential that all variants can interact fully with "transfer assets" – aircraft, LCACs, LCUs, etc.
  - All variants have significant aviation (JSF included)

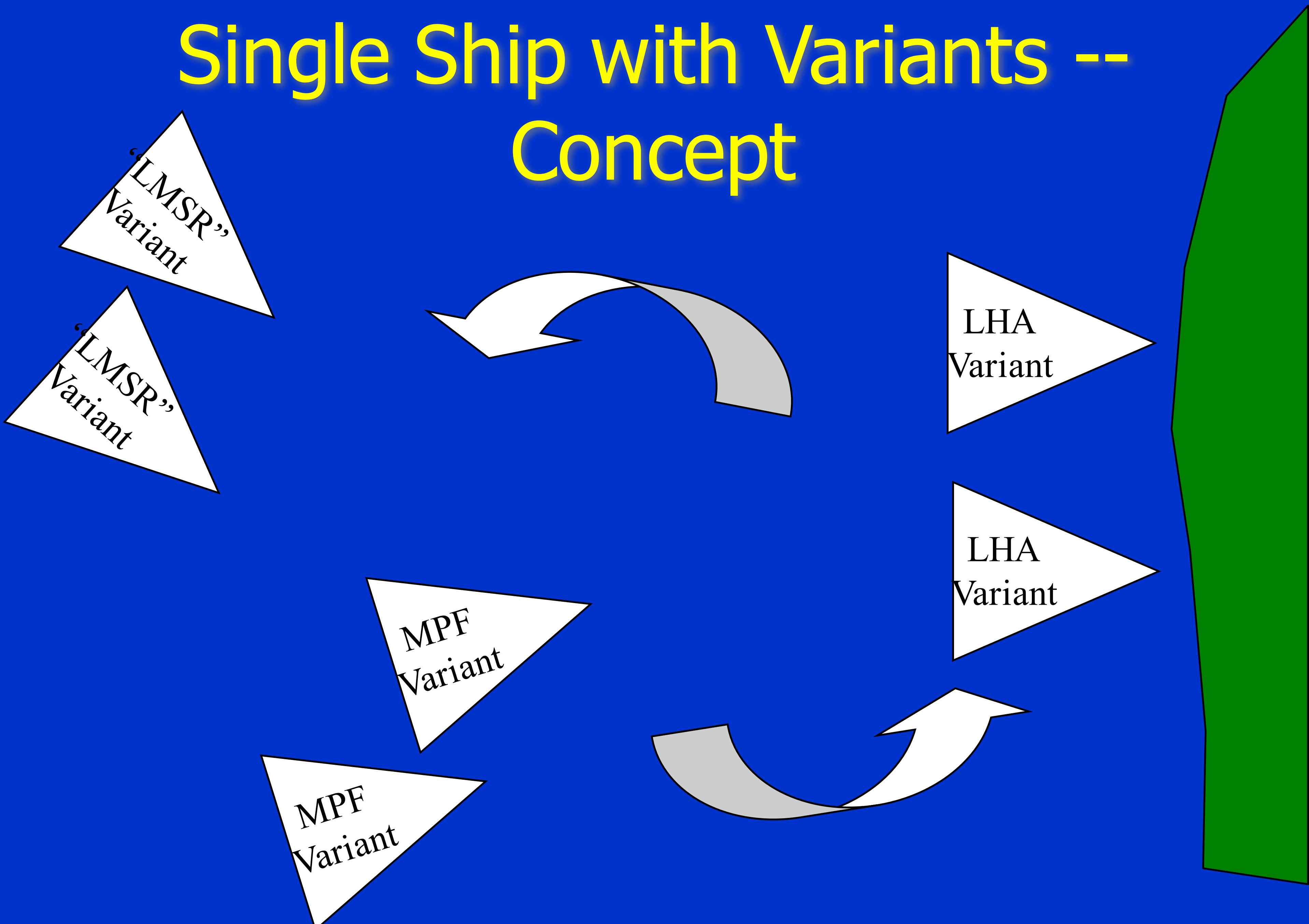
Major Points – the Ship

- High Speed Response Ship needed
  - Lethal surge capability
- Expeditionary Strike Groups must have significant defensive capability
  - To "climb into the ring"
- MPF ships must be able to accept JSF
- High logistics throughput needed for Sea Base in support of MEB

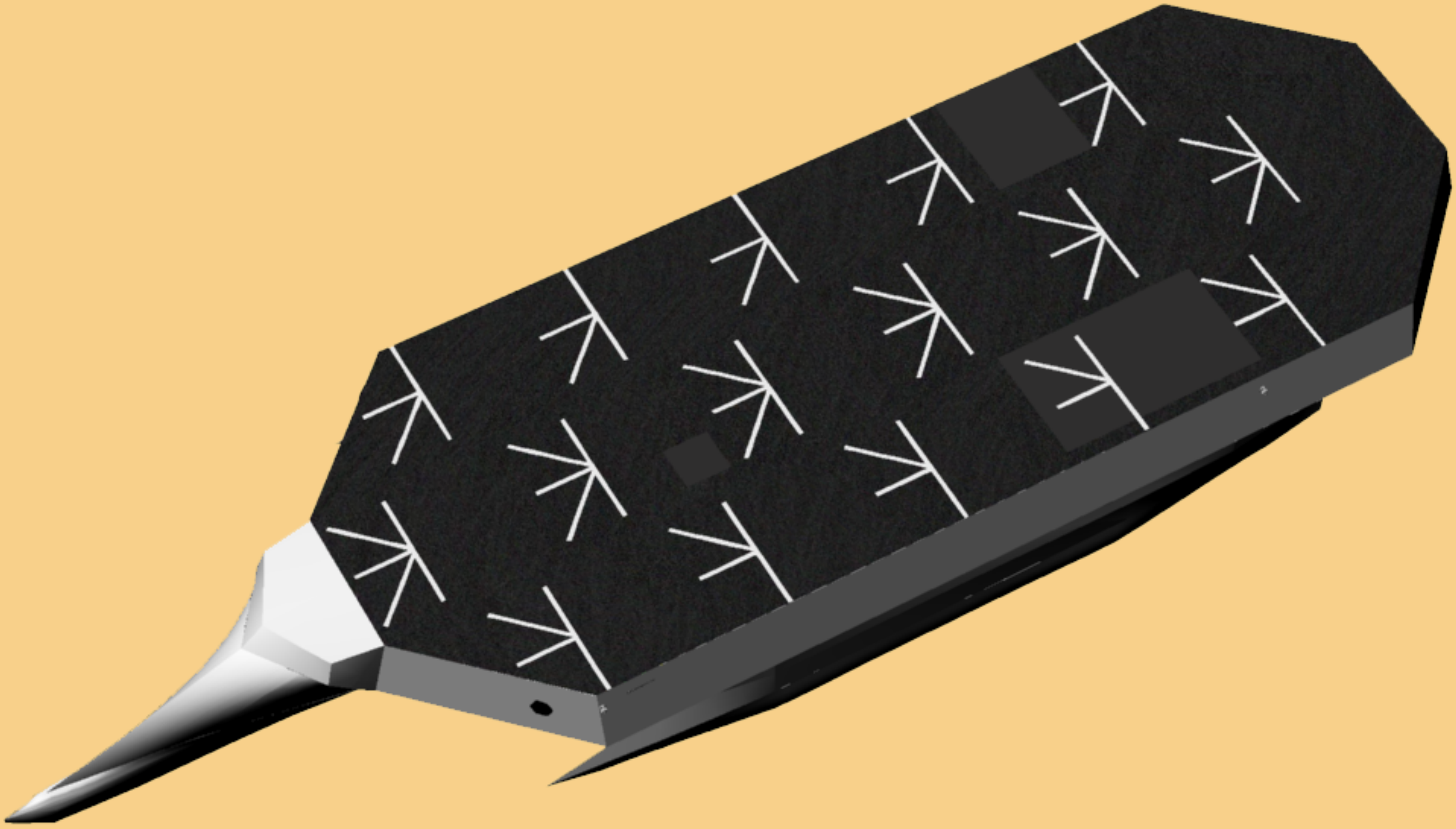
Sea Base Ship

- Major Sea Base Ships should be a Single design with variants
  - Large cargo capacity
  - Large flight deck
  - Space for a well deck
  - Durability/Survivability
  - Speed

Single Ship with Variants -- Concept



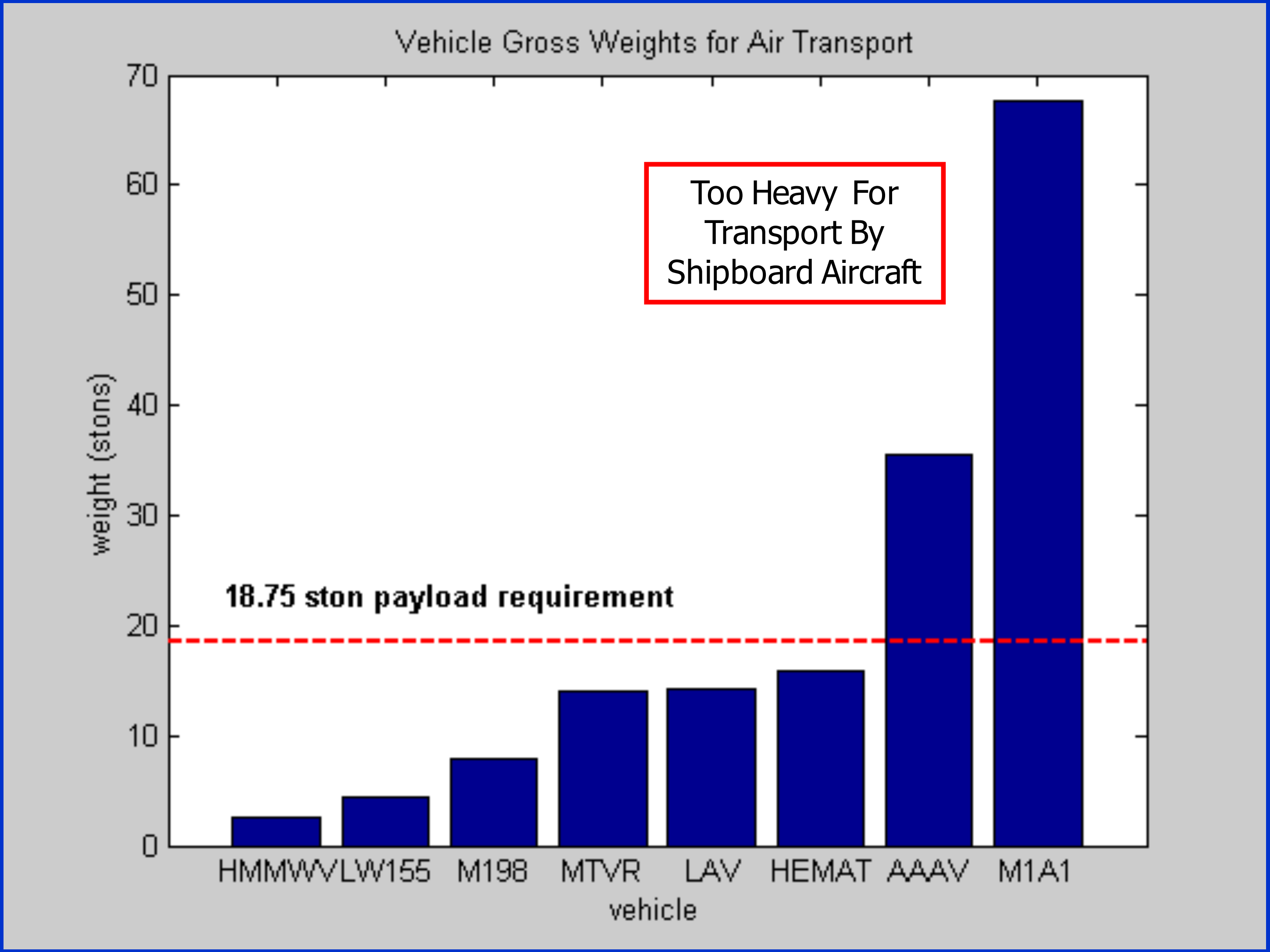
Sea Base Ship (Notional)



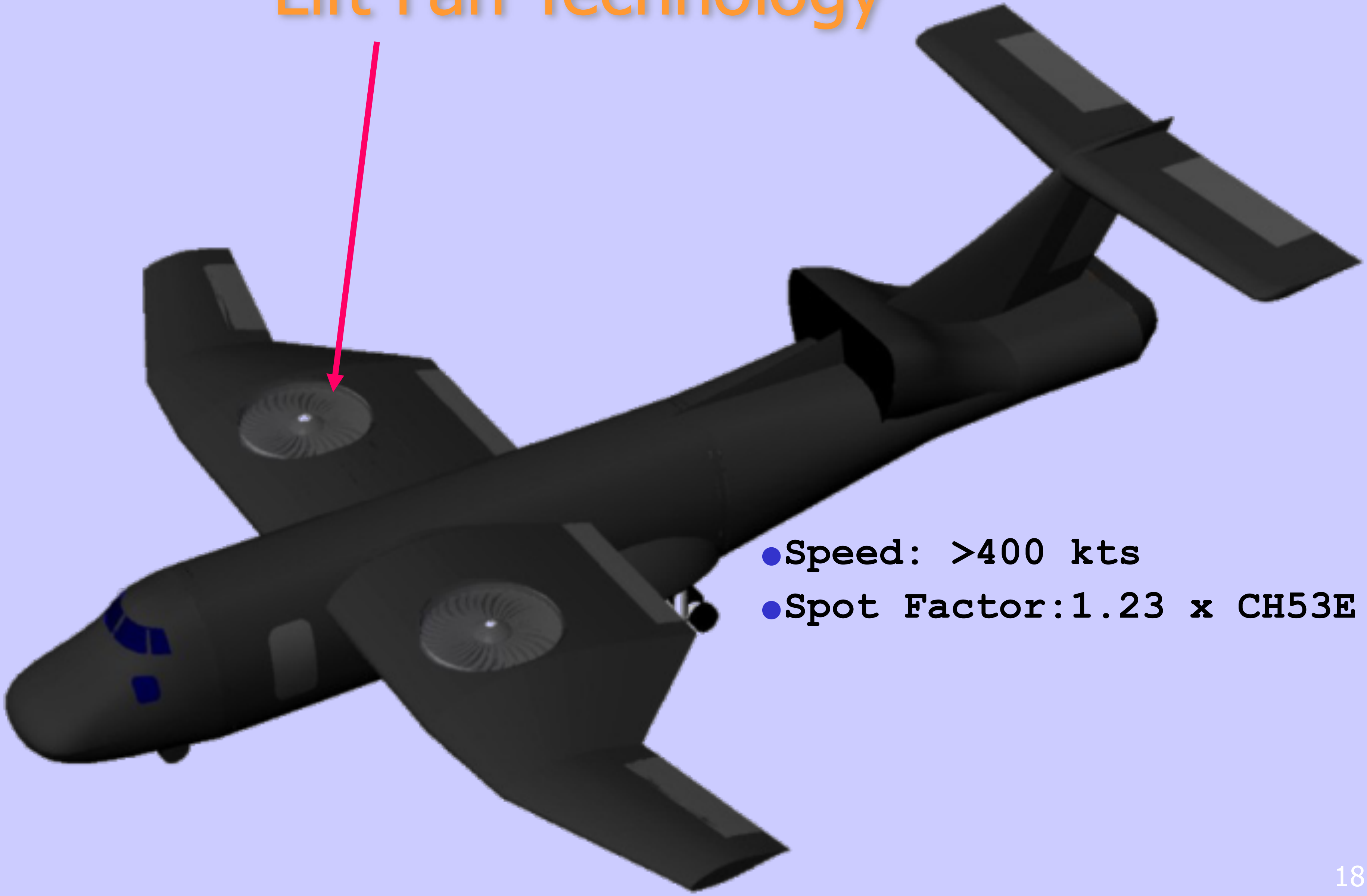
Long Range, Heavy Lift Aircraft

- Key requirements:
  - 300 nm radius of action
  - Payload: 37,500 lb (18.75 ston)
  - Desired speed in 200 – 250 kt range
  - Capability to carry vehicles like LAV, MTVR, or HEMAT (internal or external)
  - Capable of 15 minute cargo on load or off load using only aircrew
  - Shipboard compatible

Payload Determination



Alternative 1 – JHL – based on JSF Lift Fan Technology

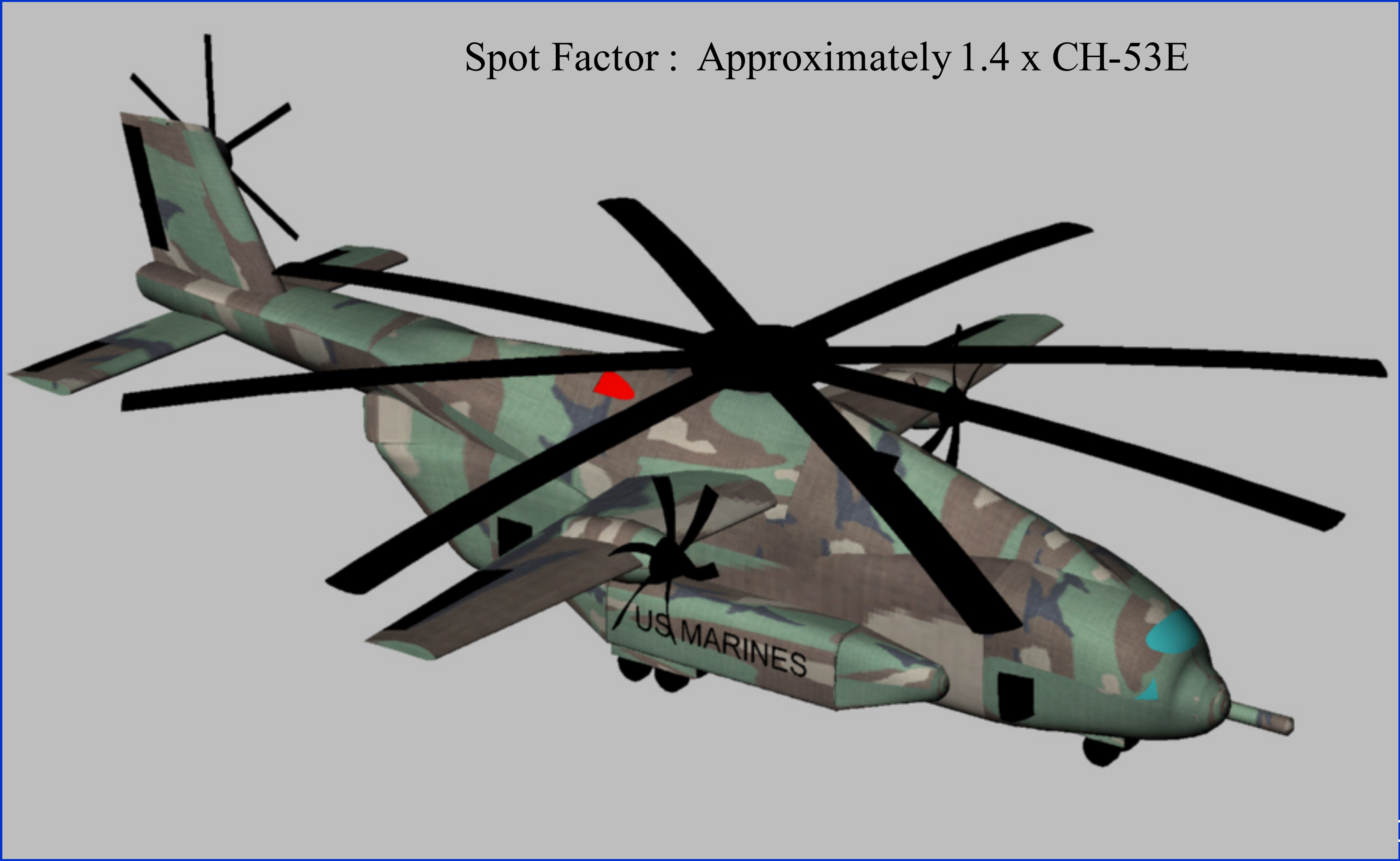


- Speed: >400 kts
- Spot Factor:1.23 x CH53E

A/C Alternative 2 – **Reverse Velocity Rotor** (RVR) Technology Overcomes Limitations

- Current rotary wing limited to 150-160 kts.
  - Retreating blade stall and high tip speeds set limitations.
- Compound helicopters (wings + auxiliary propulsion) can increase speed range to 200-220 knots,
  - Penalty from rotor drag reduces performance
- Emerging RVR technology allows for performance increases without sacrificing desirable rotor lift.
- <u>Coupling the RVR with a compound wing</u> can provide the performance balance required to satisfy Heavy Lift Requirements.

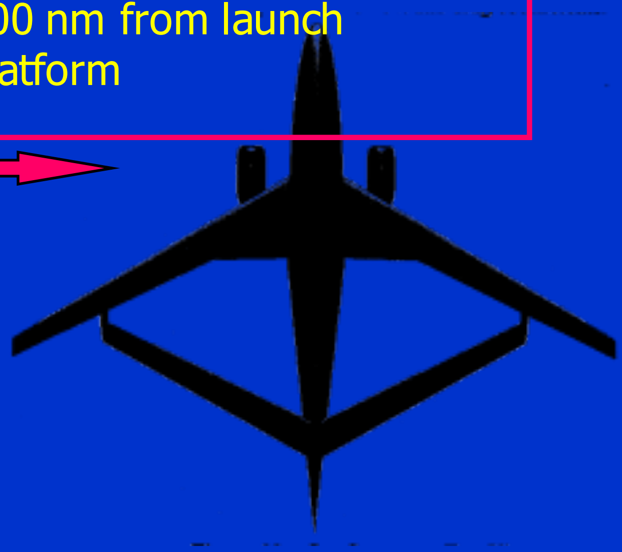
General Configuration



ISR Family of Systems

- STOM places premium on timely acquisition and dissemination of ISR data
- ISR family of systems (organic to force) included in conceptual architecture
- Three tiers
  - 1st: UAVs from ships or shore
  - 2nd: Long endurance UAV
  - 3rd: Low Earth Orbit satellite system

- Shipboard compatible
- "Global Hawk" payload
- 12 hr endurance at 60K ft 300 nm from launch platform



Key Outcomes

- Rapid surge capability with minimal footprint desired
- Sea Base can be logistically viable
  - Ship-to-ship cargo transfer problematic
  - Weather concerns for surface transfer
  - Need heavy-lift aircraft
- Above enabled by Sea Base Ship type combining roles of LHA, MPF and re-supply
  - Some emphasize military systems
  - Variants all compatible with transfer assets
  - Ships can “rotate” as conditions evolve
- Ships must accommodate MEB air, including JSF
- Heavy Lift Aircraft essential for MEB STOM
- Simulation as done in EXTEND™ very effective
  - Of considerable interest outside NPS

Value of Integrated Studies at NPS

- Large numbers of students exposed to open-ended, demanding analytical and design studies
- Faculty/student teams combine strengths of both
- Possible to produce results of interest to Navy/DOD
  - Insights
  - Identification of trends and sensitivities

The Future and Needs

- 2003 study is focusing on Sea Base force projection
  - Expect to incorporate LCS
- Expecting to increase level of faculty researcher involvement
  - NFN/Forcenet research team

Questions?

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