DARPA / Department of the Navy

Naval Unmanned Combat Air Vehicle

(UCAV-N)

Advanced Technology Program

DARPATech 2000

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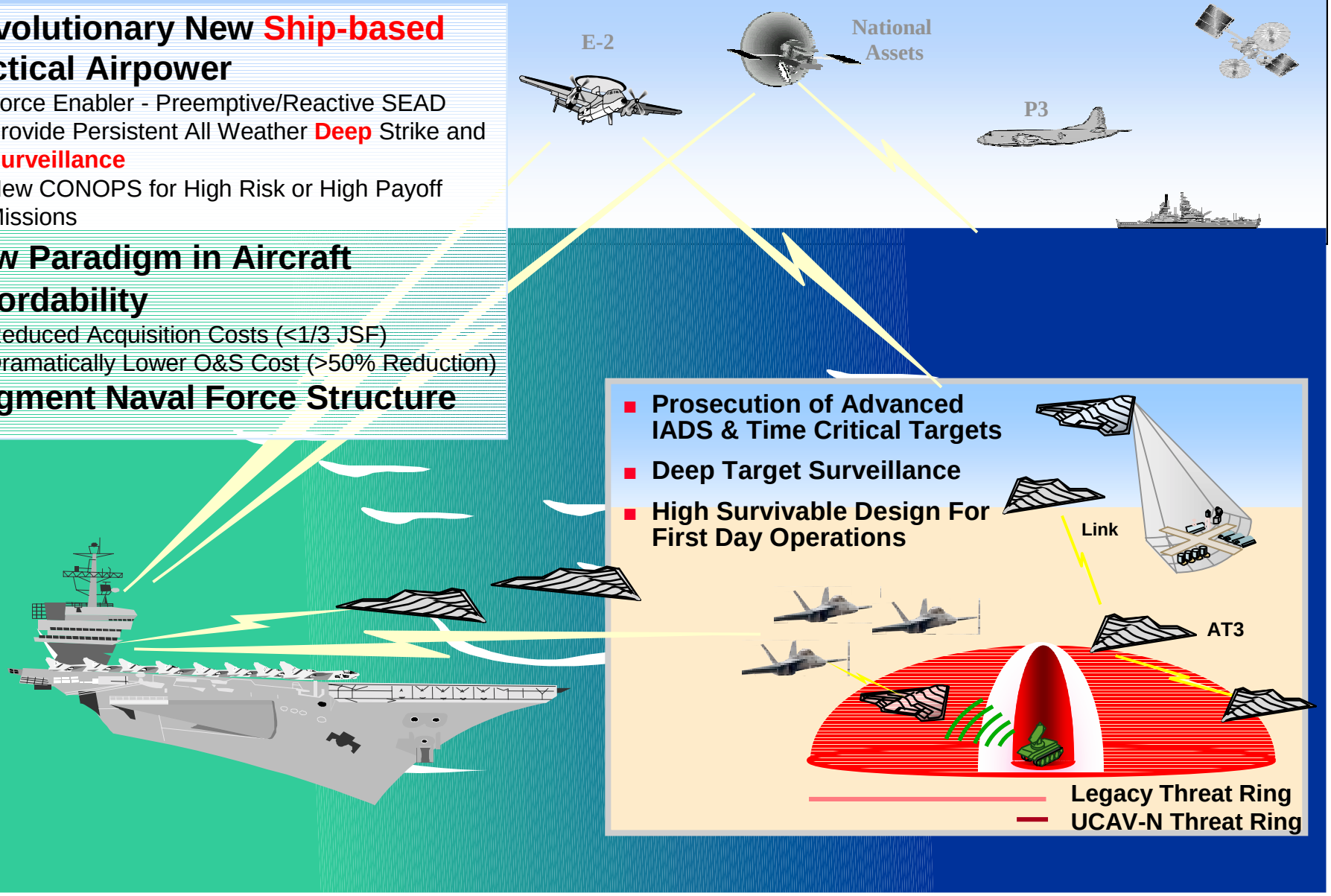
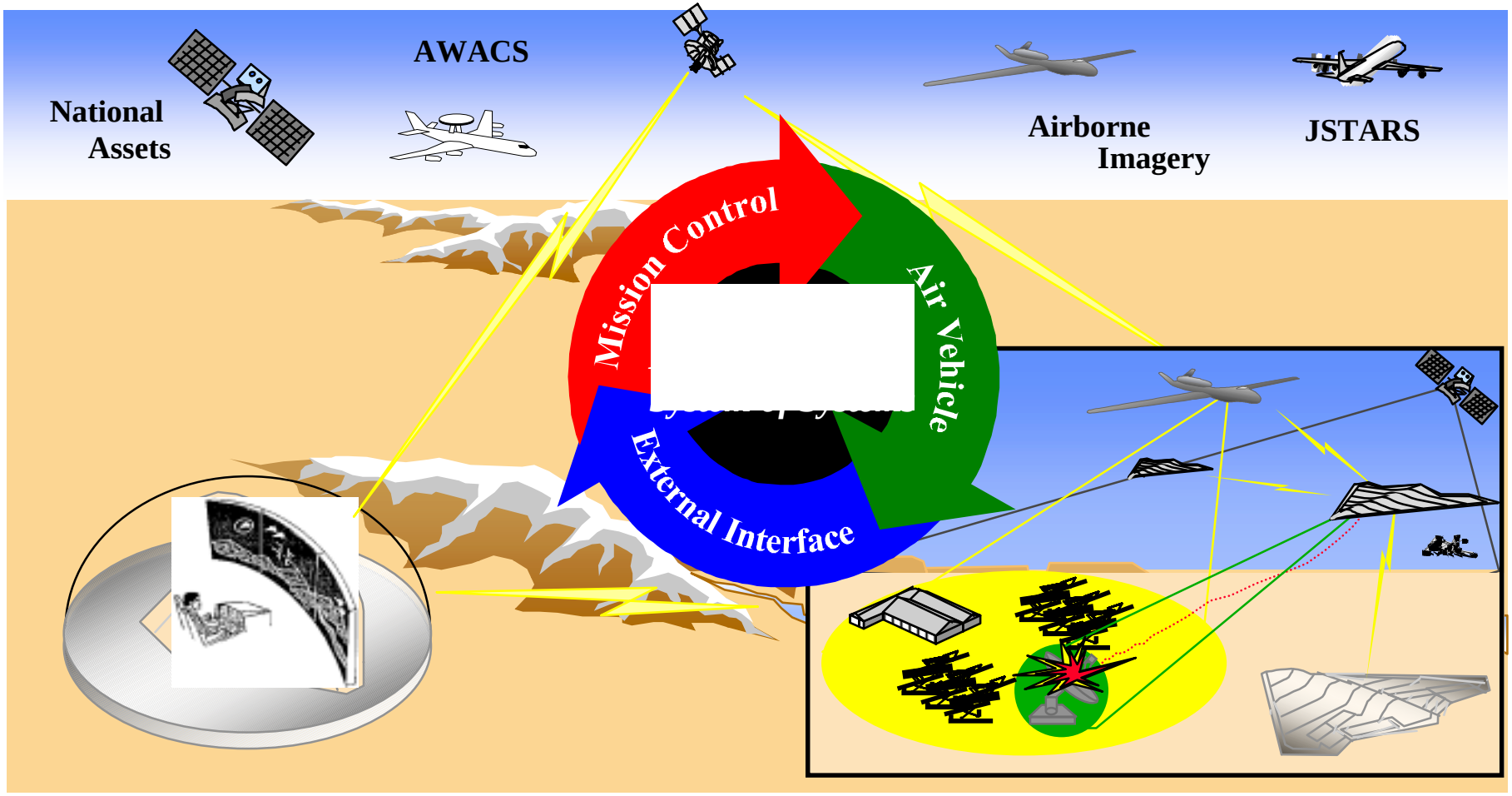
UCAV-N Vision

- **Revolutionary New Ship-based Tactical Airpower**
  - Force Enabler - Preemptive/Reactive SEAD
  - Provide Persistent All Weather **Deep** Strike and **Surveillance**
  - New CONOPS for High Risk or High Payoff Missions
- **New Paradigm in Aircraft Affordability**
  - Reduced Acquisition Costs (<1/3 JSF)
  - Dramatically Lower O&S Cost (>50% Reduction)
- **Augment Naval Force Structure**



- **Prosecution of Advanced IADS & Time Critical Targets**
- **Deep Target Surveillance**
- **High Survivable Design For First Day Operations**

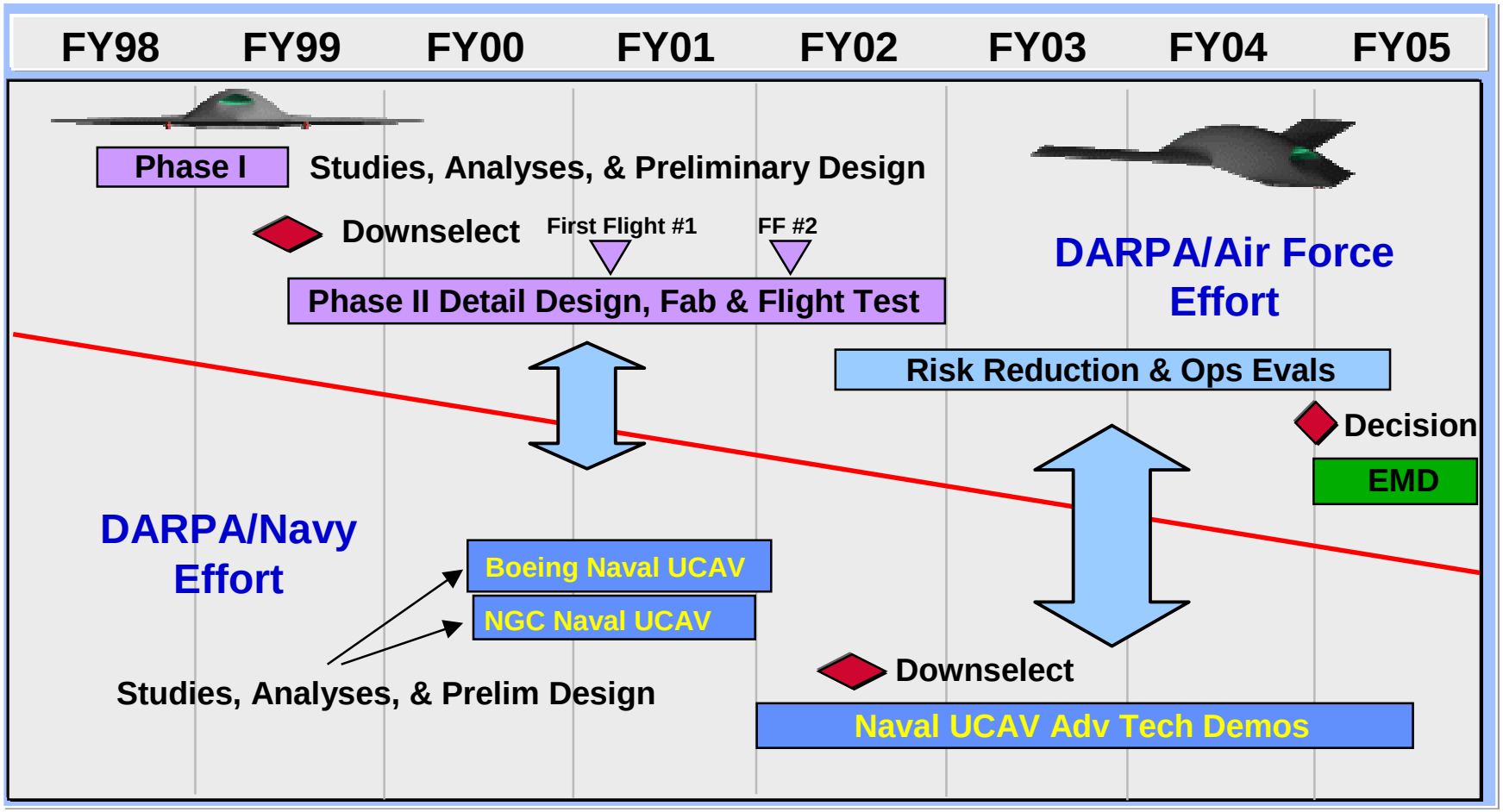
System Concept



System Themes

- **Network Centric Warfare**
- **Revolutionary Mission Control System Potential**
  - Operators at the center of information
  - Intelligent decision aids
  - Teams control swarms
- **Revolutionary Air Vehicle Potential**
  - End-node of a lethal system
  - High degree of on-board intelligence
  - Product of latest design/manufacturing tools
  - Tailored yet robust capabilities
  - Minimal maintenance/high sortie rate
- **All Technologies Buy Their Way onto the System**
- **Lowest Mission Cost per Target Kill**

UCAV & UCAV-N Acquisition Plan



Program Philosophy

- Partnership to Demonstrate Technical Feasibility
- Exploit Design Freedom
- Think Out of the Box
- Mission Focus but Not a Point Solution
- Exploit UCAV ATD
- Focus on Naval Unique Environment/Issues
- Advanced Technology NOT an Acquisition Program
- Seamless Path to EMD Decision
- Provide Focus for S&T

Goal & Objectives

Demonstrate the technical feasibility for a UCAV system to effectively and affordably prosecute persistent, sea-based 21st century SEAD/Strike/Surveillance missions within the emerging global command and control architecture.

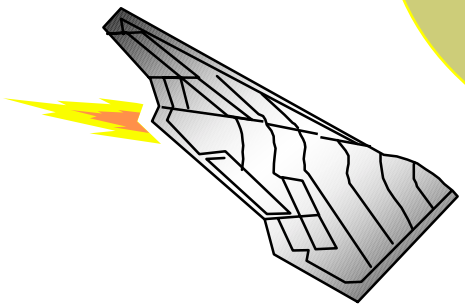
- **Develop**
  - **A low life-cycle cost, mission effective sea-based design for a SEAD/Strike/Surveillance unmanned air vehicle**
  - **A reconfigurable control system for multi-vehicle operations in Naval environments**
  - **Robust/secure command, control & communications, including line-of-sight and over-the-horizon**
- **Evaluate**
  - **Human computer function allocation, dynamic mission planning & management approaches**
  - **Off-board/on-board sensor integration, weapon targeting & loadouts**
- **Demonstrate**
  - **Naval operations including ship launch and recovery, deck handling and storage, maintenance and training, and interoperability with other Naval aviation systems and operations**
  - **Human-in-the-loop, detection, identification, location, real-time targeting, weapons authorization, weapons delivery and target damage indication**

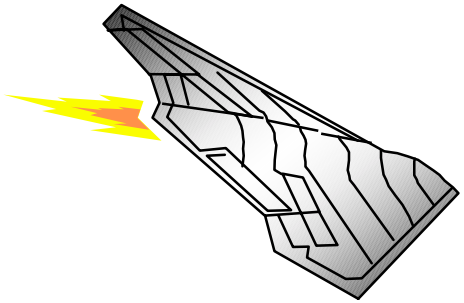
Program Approach
UOS Focuses SMP

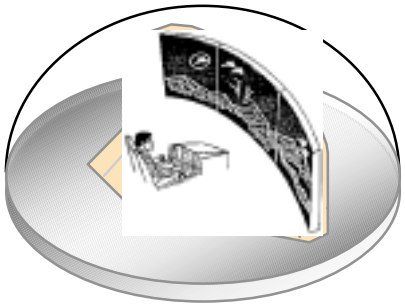
Analyze High Payoff Missions

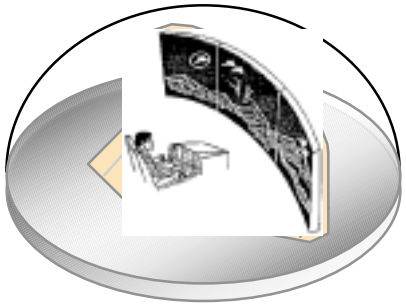
Naval UCAV Operational System (UOS-N)
- Effective & affordable weapon system for post 2010 missions
- Product of multi-dimensional / optimized trade studies
- Designed to identify the critical technologies, processes & System Attributes (TPSAs)

System Maturation Plan (SMP)
- Complete roadmap of TPSA risk reduction activities including cost and schedule to achieve UOS-N vision
- Naval UCAV Demonstrator System (UDS-N) is fundamental component of the SMP
  - Maintains direct legacy to UOS-N
  - Focused by UOS to address critical TPSAs, explore CONOPS design space & validate UOS key assumptions









Technologies Processes & System Attributes (TPSAs)
- Shipboard Integration
- Command / Control / Communications (C^3)
- Targeting / Weapons Delivery
- Supportability/Health Mgmt
- Human-Systems Interaction
- Signature
- Air Vehicle

UCAV-N Technical Challenges

- Focus on Naval unique technology and integration issues
- Leverage DARPA / USAF UCAV Program

- **Ship Suitable UCAV Design**
  - Size, weight, costs for ship design
  - Speed, stability and control of LO design
  - Cat/Trap vs. alternatives (e.g. V/STOL)
  - Maritime environment issues
  - Safety
- **Mission Control Integration**
  - Autonomous launch & recovery
  - Integrated deck operations
  - Shipboard interfaces
  - Integration With Navy C4ISR assets
  - EMI/EMC environment
- **Naval CONOPS**
  - SEAD / Deep Strike / Surveillance
- **Affordable Naval Operations & Support**
  - Storage transport
  - Training
  - Rapid turnaround, maintenance

Phase I Products

- **Trade Study Results**
- **Alternative CONOPS Analysis**
- **UCAV-N Operational System Design (UOS-N)**
- **UOS-N Effectiveness & Affordability Analysis**
- **System Maturation Assessment (SMA)**
- **UCAV Demonstration System (UDS-N) Requirements**

Naval Focus

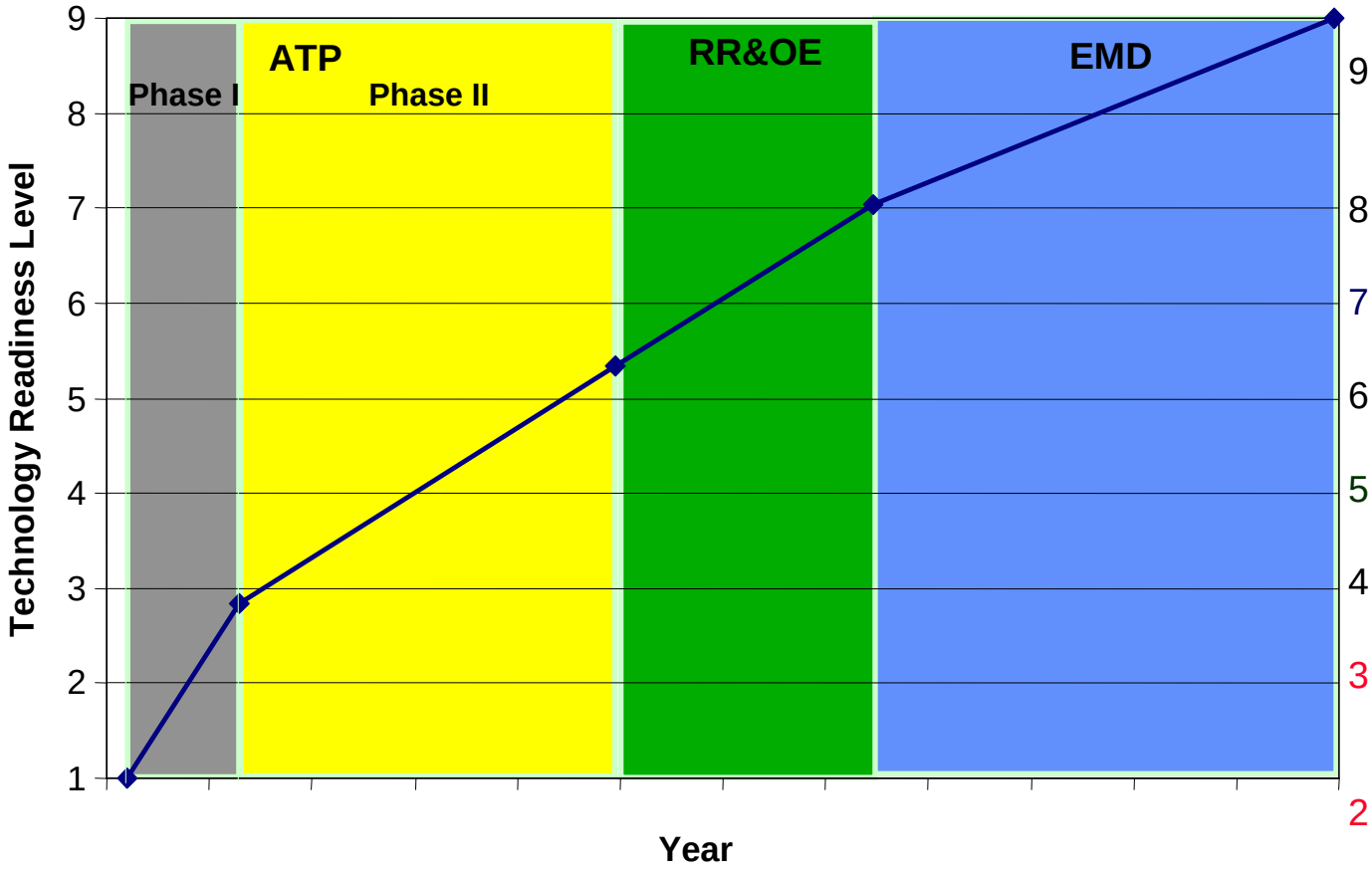
Goal is to Demonstrate That Proceeding into Phase II is Justified and can be Accomplished within Cost & Schedule

Program Approach
Organization

- **Phase II**
  - Wide range of options
    - Full scale advanced technology demo like UCAV ATD
    - Conduct Naval unique aspects of SMP
    - Anywhere in-between
  - Continue to refine effectiveness/affordability projections
  - Provide best value to the government
  - Additional information available with MS 2 feedback
- **RR&OE**
  - Focus shifts to operational utility & military value
  - Completes seamless path to EMD

Program Approach

Technology Readiness Level Perspective



Technology Readiness Levels

9 "Flight Proven" through successful mission objectives

8 "Flight Qualified" through test & demonstration

7 Prototype demonstration in an operational environment

6 System/Prototype demo in a relevant environment

5 Component validation in relevant environment

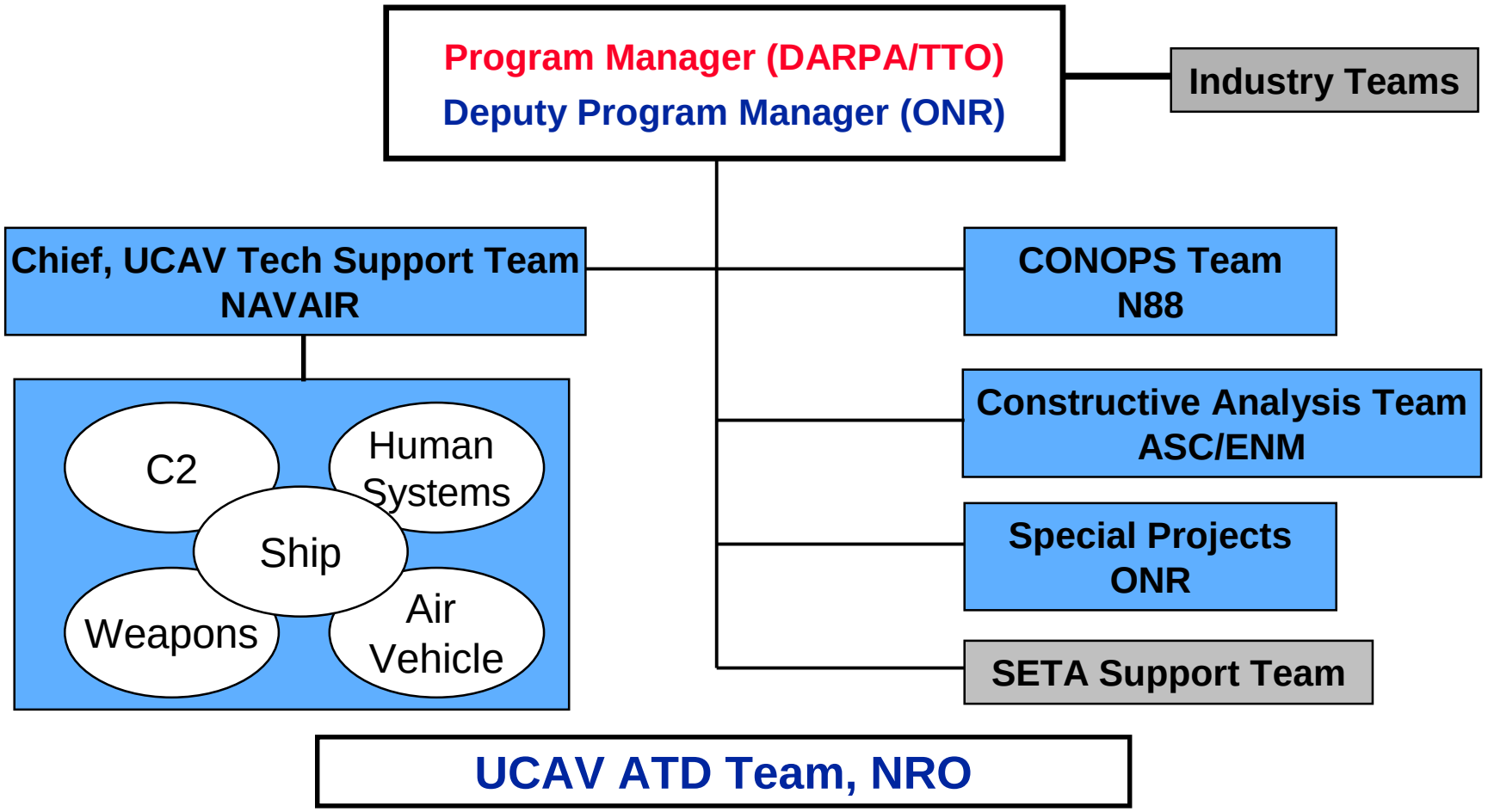
4 Component validation in laboratory environment

3 Analytical, experimental or characteristic proof of concept

2 Technology concept/ application formulated

1 Basic principles reported

Management Structure



Summary

- **Naval UCAV program**
  - **Meets high priority Naval needs**
  - **Technology and program opportunities exist**
  - **Potential revolutionary payoffs**
- **Phase I underway**
  - **Boeing and Northrop Grumman selected**
- **Phase II**
  - **Funding identified**
  - **Execution contingent on successful Phase I outcome**
  - **Draft solicitation out to industry for comment**