Transformational Tech Initiatives

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Overview

- **DoD Research and Engineering (R&E) “Priorities”**
- **Transformational Technology Initiatives**
  - National Aerospace Initiative
  - Energy & Power Technologies
  - Surveillance and Knowledge Systems
- **Global War on Terrorism**
- **Summary**

Research & Engineering Priorities

- **Focus & Integrate DoD R&E on “Transformation”**
- **Enhance Technology Transition**
- **Address National Security S&E Workforce**
- **Expand Outreach to Combatant Commands and Intelligence Community**
- **Accelerate Support to the War on Terrorism**

R&E Priorities - Expanded

- **Focus and Integrate DoD S&T on "Transformation"**
  - **Aligned Investment in Six Transformational Operational Capabilities**
  - **Initiated Three Cross-Cutting Initiatives**
  - **Enhanced Emphasis on Transformation Initiatives**

- **Enhance Technology Transition Efforts**
  - **Enhanced Primary Transition Efforts under DUSD (Advanced Systems and Concepts)**
  - **Increase Investment in Technology Transition Efforts (Quick Reaction Special Projects and Advanced Concept Technology Demonstrations)**
  - **Expanded Use of Technology Readiness Assessments as Part of Defense Acquisition Board Major Program Reviews**

R&E Priorities - Expanded (Continued)

- **Address National Security S&E Workforce**
  - **Started Secondary School Initiative – Rekindling S&E interest**
  - **Initiated a University Freshman Science Program**
  - **Joined NASA in University Consortia**

- **Expand Outreach to Combatant Commands and Intelligence Community**
  - **DDR&E Representative Identified for Each Combatant Commander**
  - **Outreach to Collection Management Staff S&T Planning**

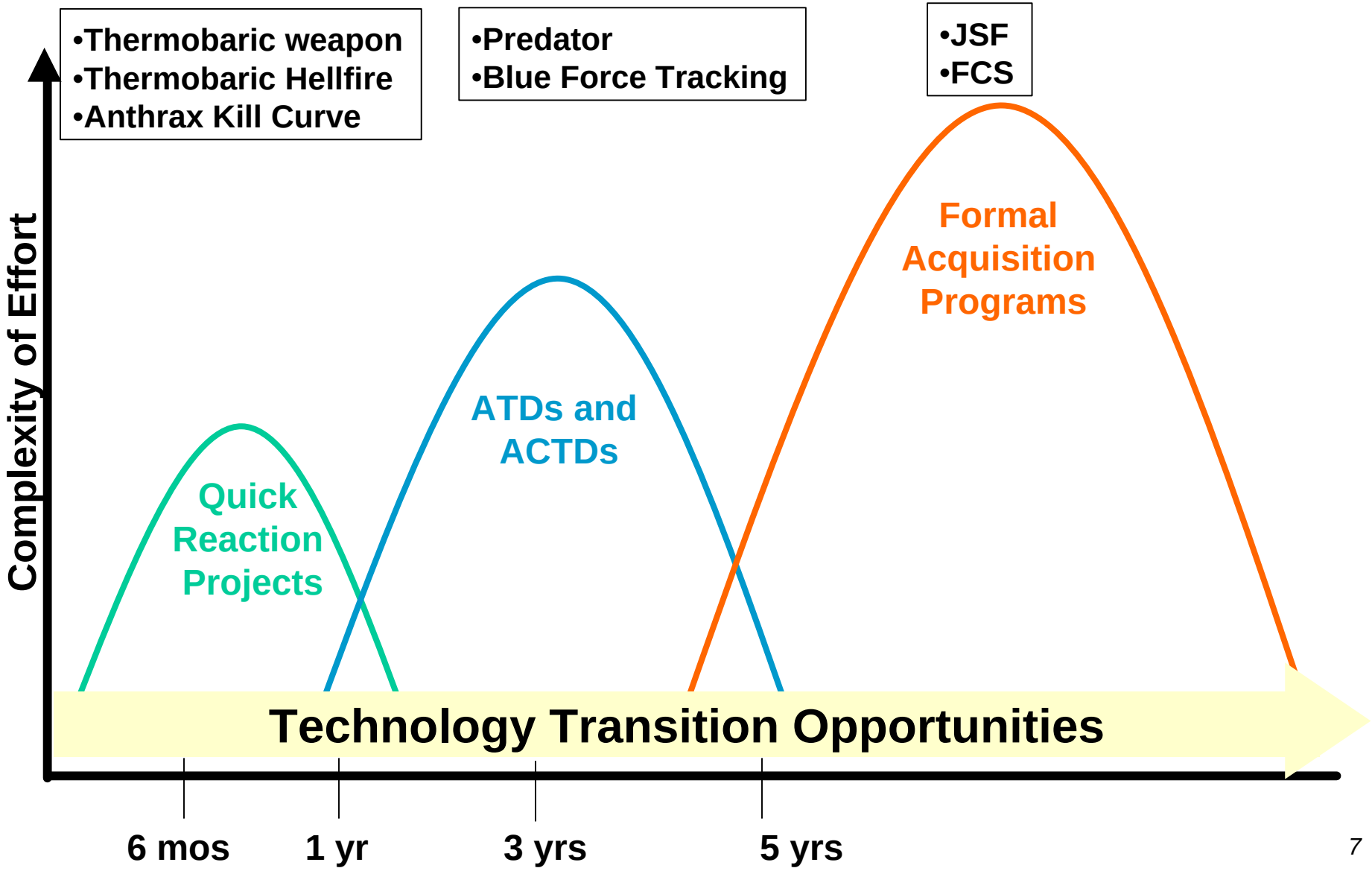
- **Accelerate Support to the War on Terrorism**
  - **DoD Combating Terrorism Technology Task Force**
  - **Several Accelerated Efforts Heading to, or in Theater**
  - **Task Force Continues to Identify Opportunities for Follow-on Operations**

S&T and Transformation

- About 80% of DoD S&T Program Applies to One or More of the Six "Critical Operational Goals"
- There are significant transformational projects that are on-going
  - National Aerospace Initiative
  - Energy and Power Technologies
  - Surveillance and Knowledge
  - Future Combat Systems
  - Objective Force Warrior
  - FORCENet
  - Precision Engagement
- The FY04 PBR increases investment in several cross-cutting areas.
  - Hypersonic Flight / National Aerospace Initiative
  - Advanced Energetics

Continuum of Tech Transition

Complementary Approaches to Meet Warfighter Needs



Quick Reaction Special Projects

Quick Reaction Fund	Technology Transition Initiative	Defense Acquisition Challenge
Idea/ Technology Opportunity	*Transition To Planned/Fielded System*	*Improve Subsystem → Program of Record*

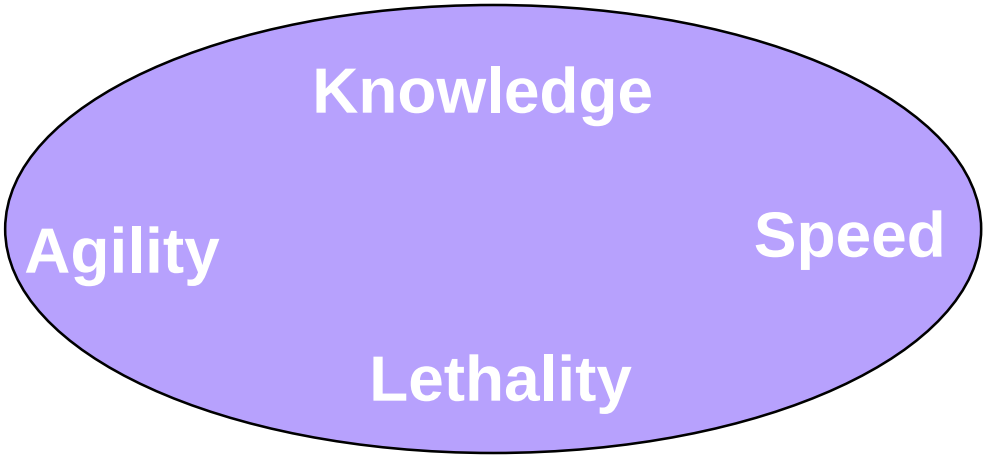
Three Complementary Projects to Develop Technology at Different Maturity Levels

Quick Reaction Special Projects

- **Quick Reaction Fund**
  - Provides flexibility to respond to emergent DoD needs within budget cycle
  - Takes advantage of technology breakthroughs in rapidly evolving technologies
  - Completion of projects within a 6-12 month period
- **Technology Transition Initiative**
  - Establishes a Technology Transition Council
  - Jump starts selected components/subsystems into systems
- **Defense Acquisition Challenge Program**
  - Provides opportunities for inserting innovative and cost-saving technology into acquisition programs
  - Funds used only for review and evaluation of proposals, not implementation

Transformation Technology Initiatives

- **Transformation Attributes**

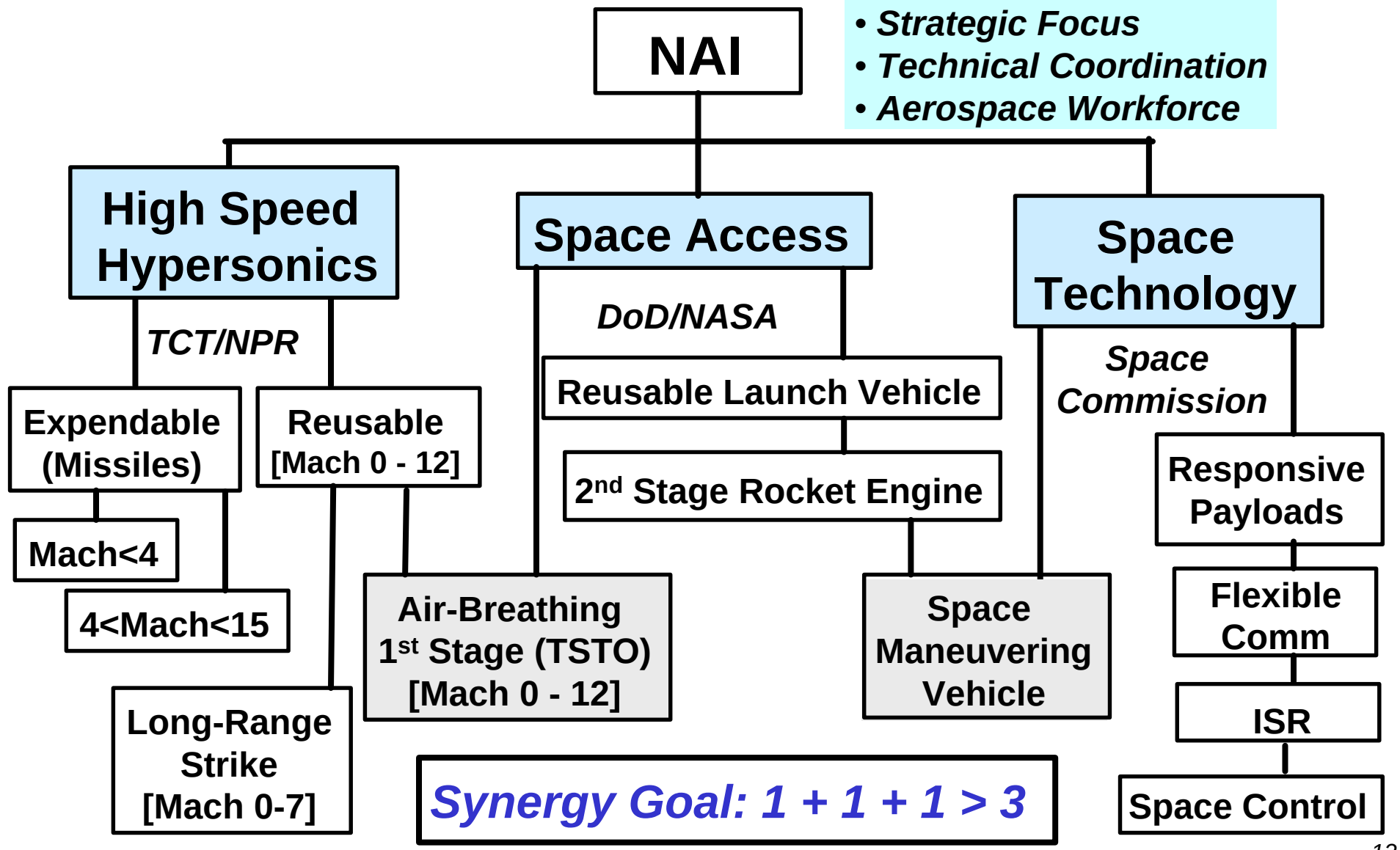


- **Transformation Technology Initiatives**
  - **National Aerospace Initiative**
  - **Energy and Power Technologies**
  - **Surveillance and Knowledge Systems**

National Aerospace Initiative
- *Strategic and Tactical Framework*

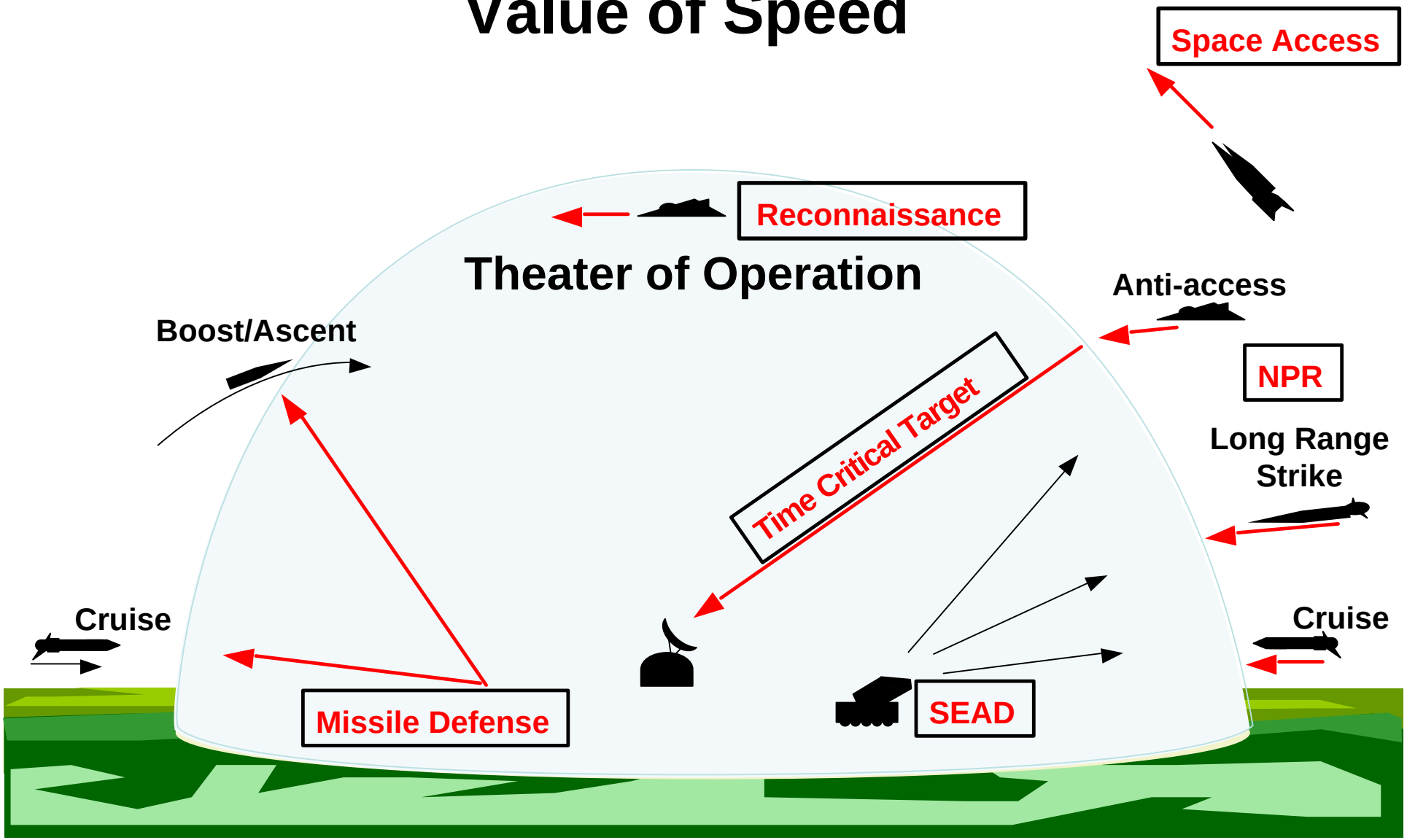
- **Hypersonics**
  - **Strategic Strike, Time Critical Targets, Suborbital Vehicles, UCAVs, Fast Transportation, etc.**
- **Access to Space**
  - **Two Stage to Orbit: 1st - Air Breathing, 2nd - Rocket; Single Stage to Orbit**
- **Advanced Space Technologies**
  - **Microsats, Multifunction Satellites, etc.**

National Aerospace Initiative (NAI)
Technology Framework



The National Aerospace Initiative
Sustaining US Aerospace Leadership

Value of Speed



The National Aerospace Initiative
Sustaining US Aerospace Leadership

Space Access

RLV (Affordable, timely access to space)

Weapons

Hypersonic Cruiser (Global Reach/Attack)

Far-Term

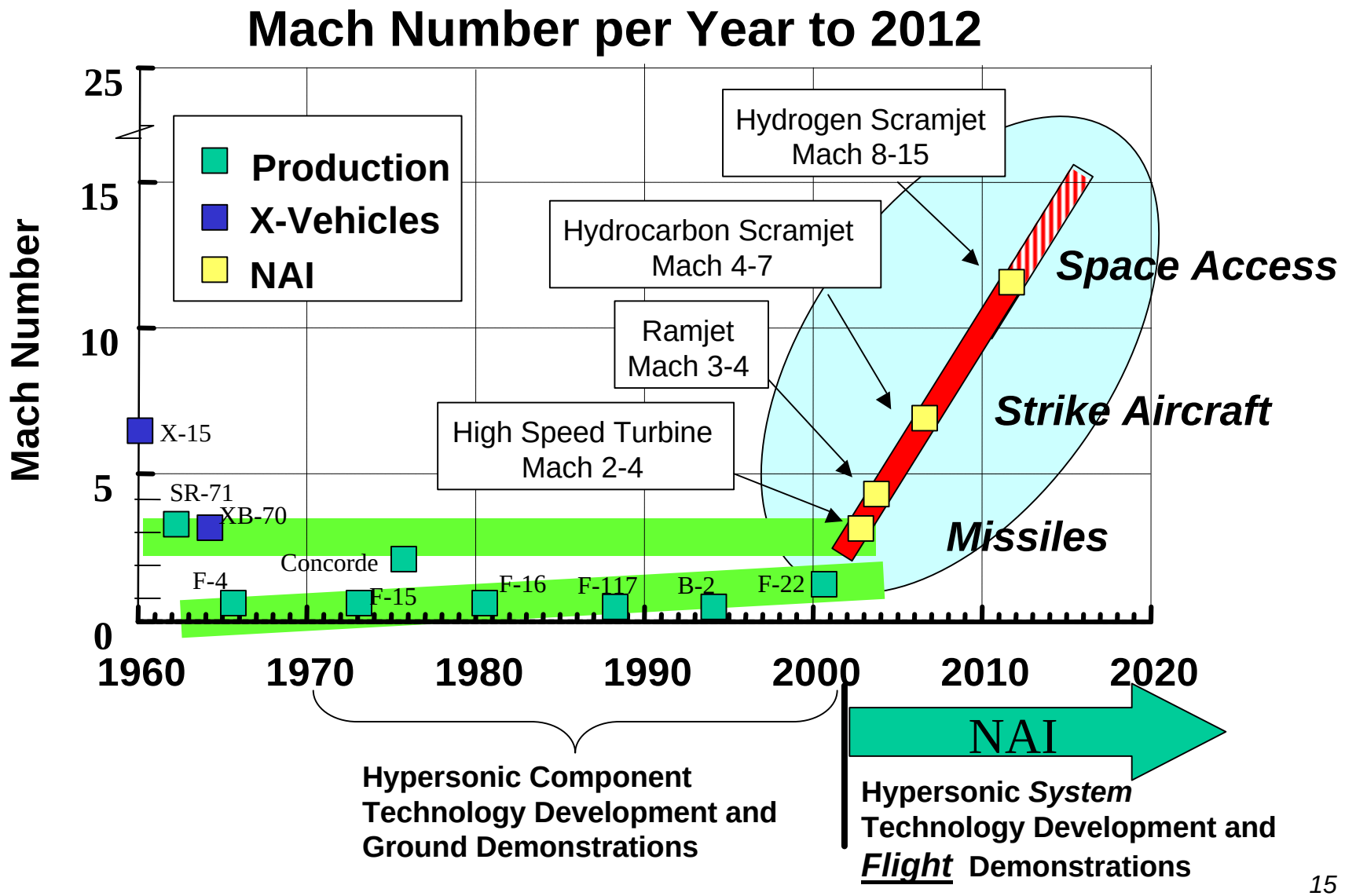
Supersonic/Hypersonic Missiles (Time-critical targets)

Mid-Term

Near-Term

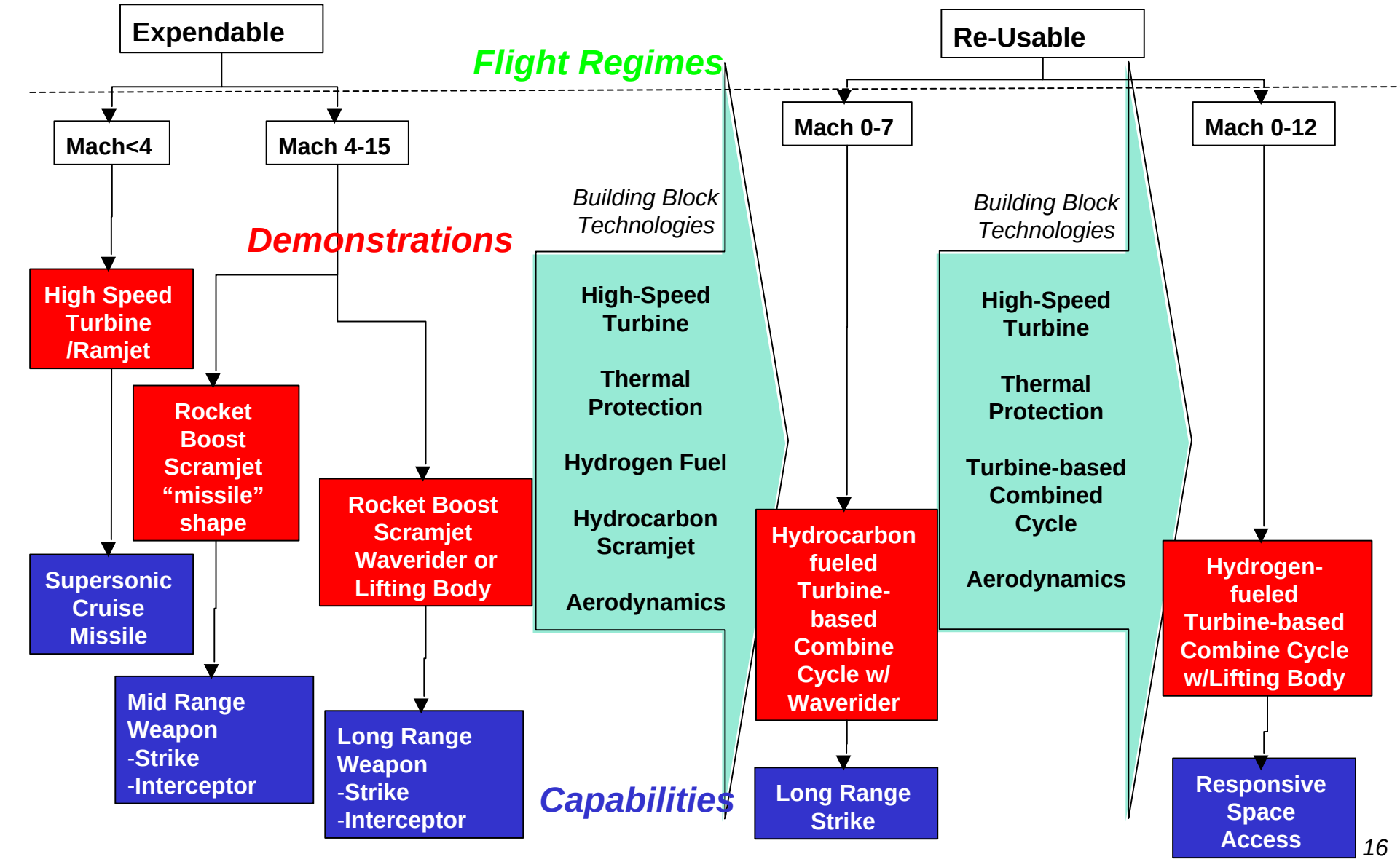
- **Mach Number Per Year to 2012**
- **Significantly decrease time to target**
- **Accelerate Access to Space Capability**
- **Provide alternatives for global strike**
- **Advance Space Technology**

National Aerospace Initiative



Technology Development Approach

-- *High Speed / Hypersonics* --



Energy and Power Tech

- Enabling An "Electric" Force -

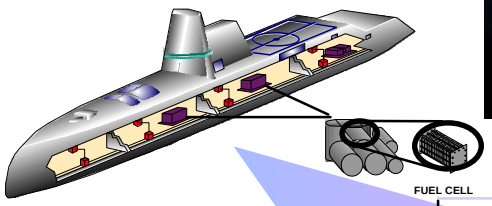
- **Power Generation**
  - **Nuclear, Diesel, Jet Engine, Solar Array, Fuel Cells, etc.**
- **Energy Storage**
  - **Batteries, Fly Wheels, Capacitors, Energetics, etc.**
- **Power Management and Control**
  - **Energy Conversion, Catapults, etc.**
- **Directed Energy Weapons**
  - **Lasers, Microwave, Millimeter Wave, etc.**

Energy and Power Technologies
Enabling An "Electric" Force

POWER GENERATION
- Fuel Cells & Fuel Reforming
- Novel Power

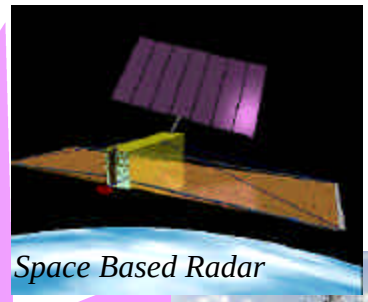
ENERGY STORAGE
- Batteries
- Capacitors

POWER MANAGEMENT & CONTROL
- Switching & Conditioning
- Power Transmission & Distribution
- Thermal Management



Electric Warship

More Electric Aircraft



Space Based Radar

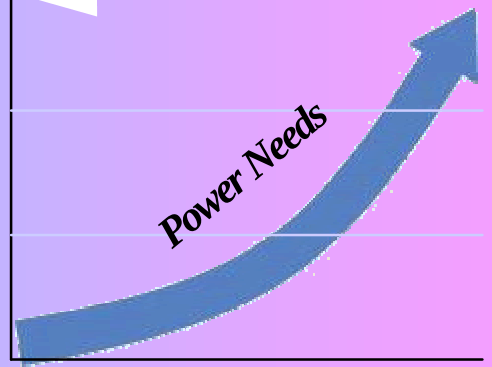
Electric Warship

Warrior

High Power Microwave

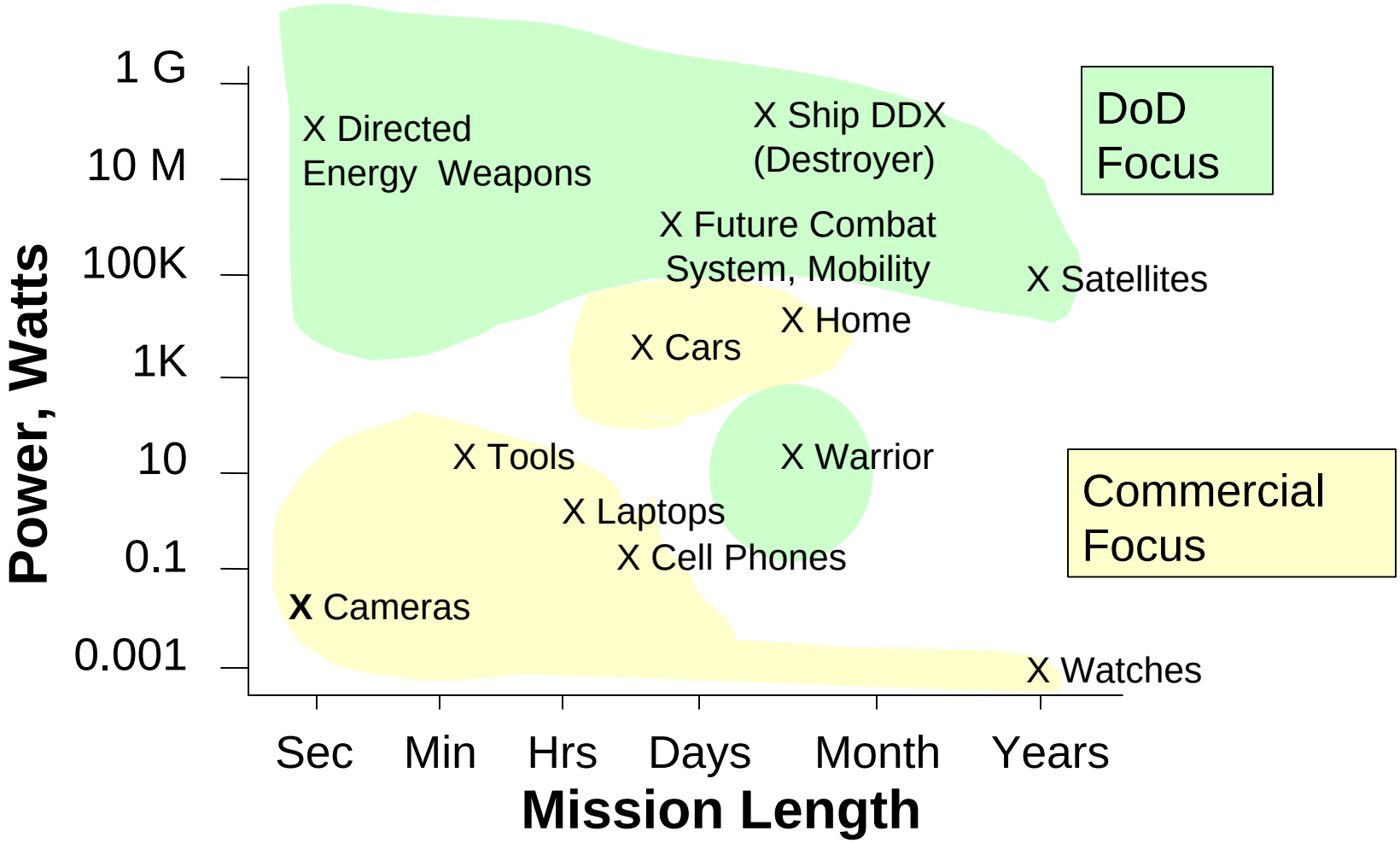
Electric/Hybrid Weapons

Hybrid/Electric Combat Vehicle



New Operational Capabilities

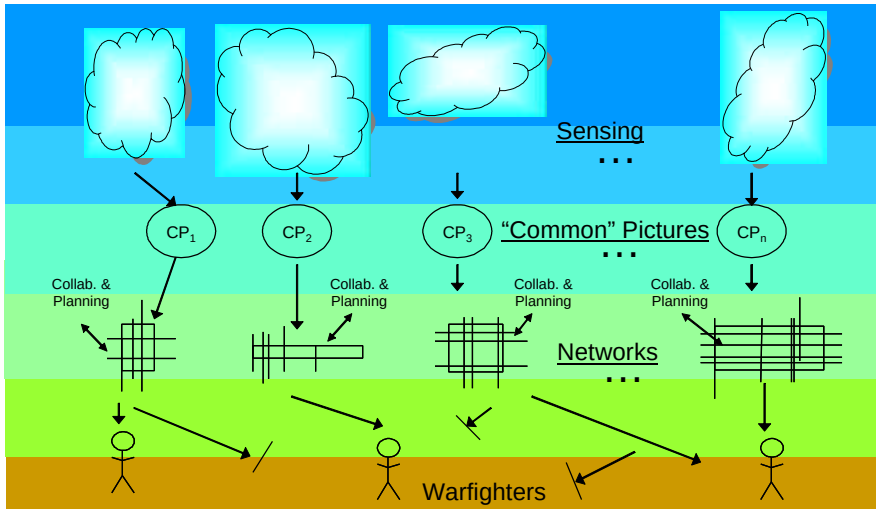
Energy and Power Technologies

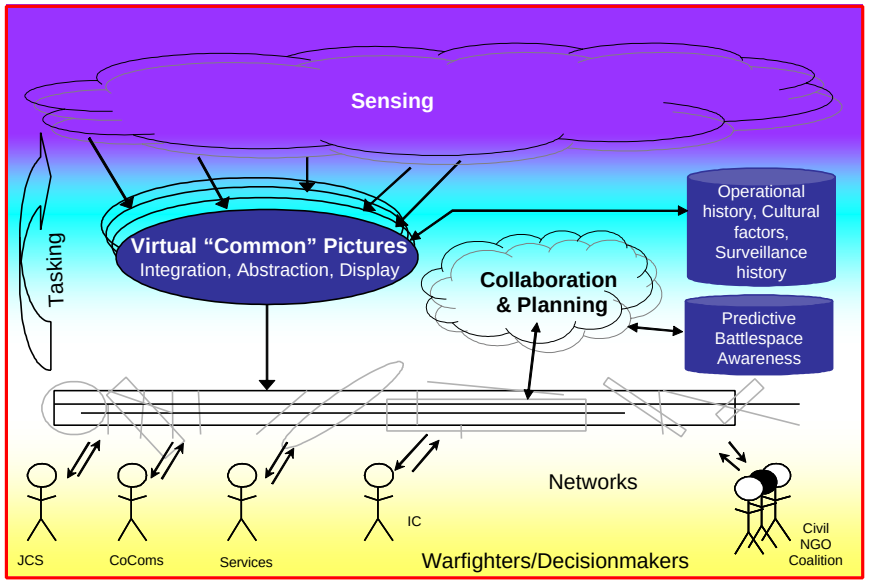


Surveillance and Knowledge System

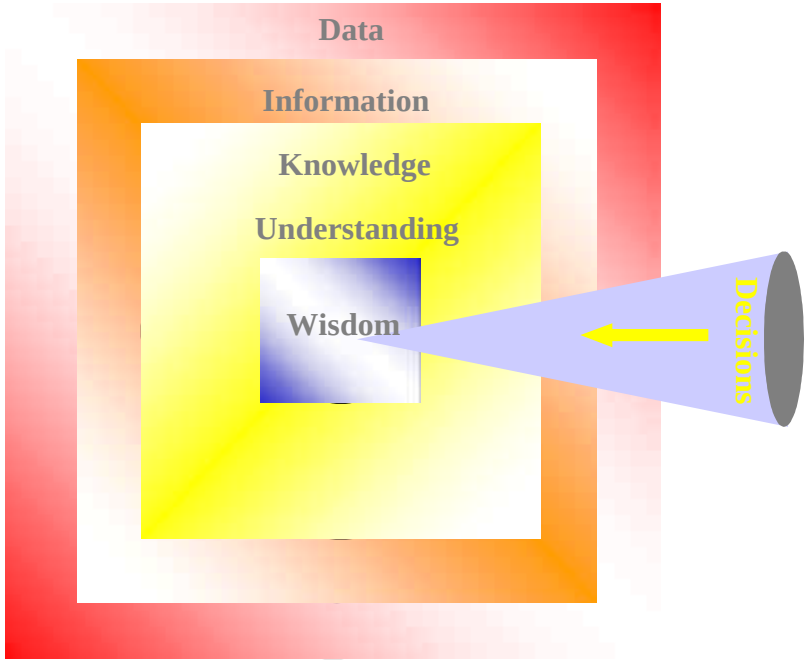
- **Sensors and Unmanned Vehicles (Bio Detectors, Robotics, UAVs, etc.)**
- **High Bandwidth Communications / Information Assurance**
- **Information / Knowledge Management Systems**
- **Cyber Warfare**

Surveillance and Knowledge
Enabling Integrated C4ISR





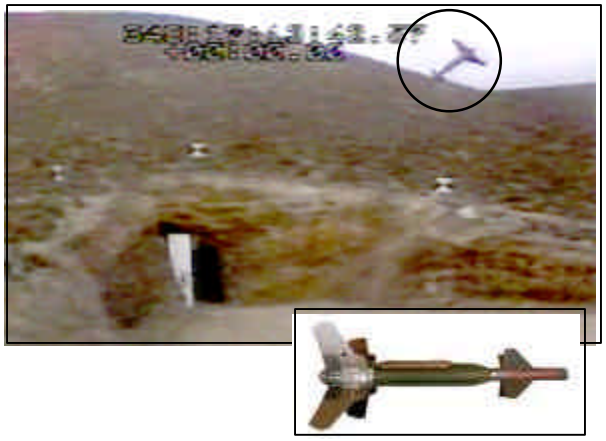
- **Adaptive Networks**
- **Ubiquitous Sensors**
- **Decision Aids**



DoD Combating Terrorism Technology Task Force (CTTTF) - Phase I (Sep 2001 - Jan 2002)

- **Terms of Reference**
  - **Technologies to Combat Terrorism**
  - **Deliverables – Near (1 Month), Mid (1 Year), Long (5 Years)**
  - **Develop an Action Plan**
    - **Participants / Lead Organization(s)**
    - **Process For Soliciting, Evaluating, and Prioritizing Technology Candidates**
  - **Collaboration: Military Services, Joint Staff, Defense Agencies**
- **K[illegible]oduct**

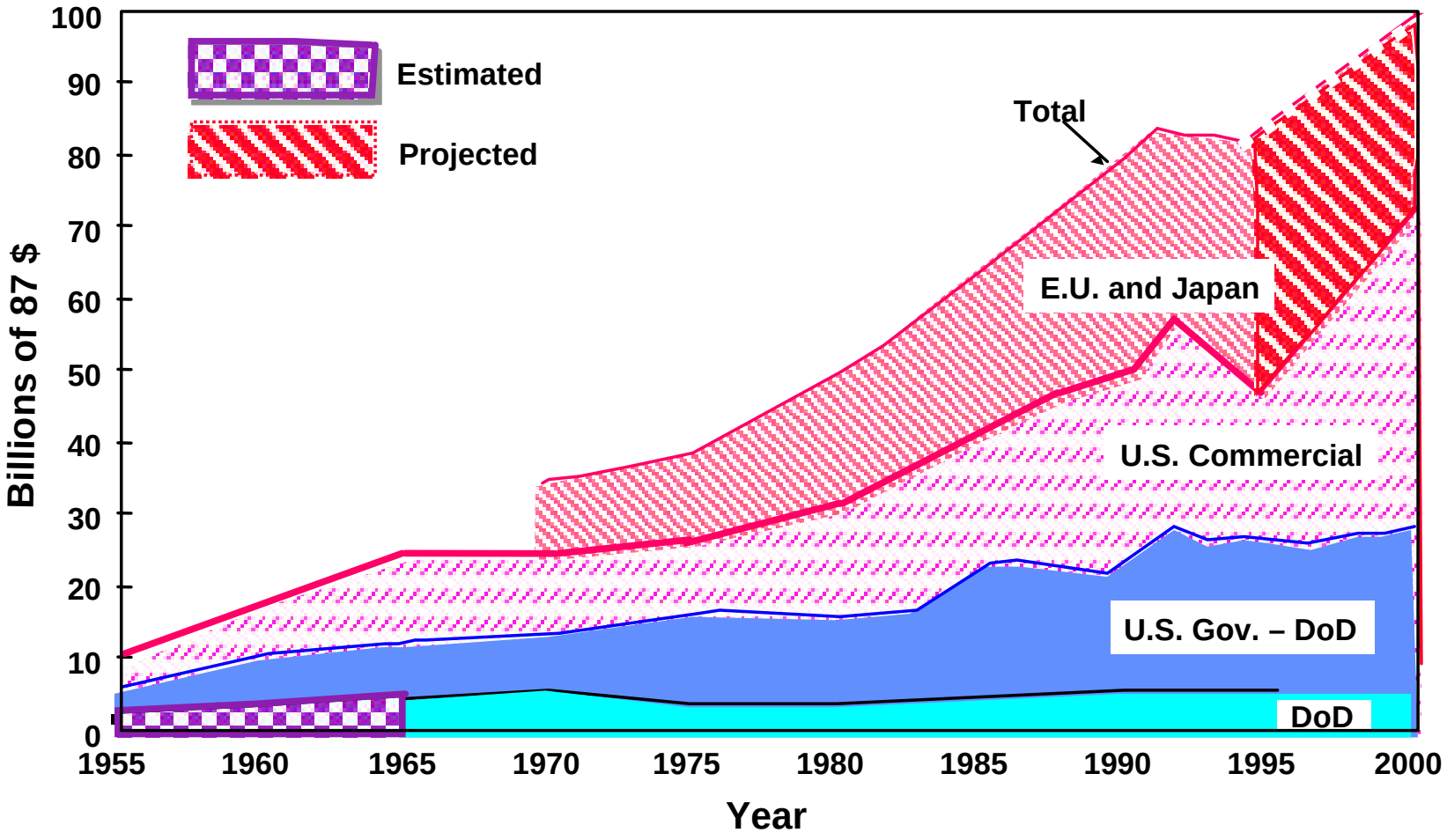
Thermobaric Weapon



Conventional Air-Launched Cruise Missile (CALCM)

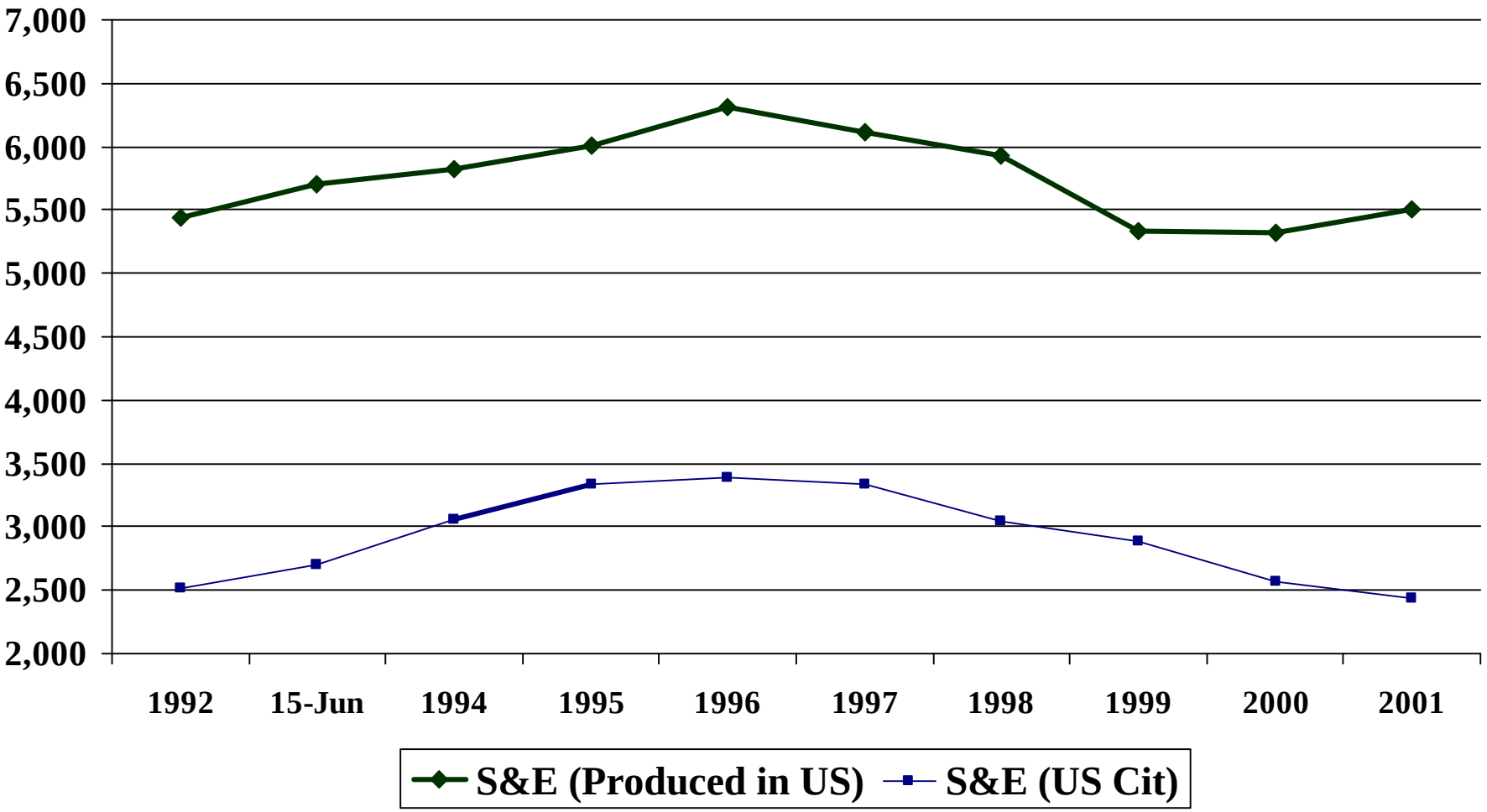
Nuclear Quadrupole Resonance Detector

U.S. and Worldwide Research Base Since WWII



Source: Report of the Defense Science Board Task Force on the Technology Capabilities of Non-DoD Providers; June 2000; Data provided by the Organization for Economic Cooperation and Development & National Science Foundation

Engineering PhD's



Summary

- **Robust, Integrated, Capabilities-Based Research and Engineering Program is Vital to Transforming the Force**
- **FY 04 PBR is aligned with Transformation**
- **National Security Workforce and Laboratories are Critical**
- **DoD R&E is "Accelerating the Transition of Technology into Operational Capability"**

CTTTF - Phase II
(Initiated May 2002)

- The "Next Theater of Operations"
  - Exploit lessons learned from recent operations
  - Engage Joint Staff & Combatant Commanders for emerging needs
  - Update warfighters on technology options
- Update Phase I CTTTF results
- Homeland Security support
- Special Topics
  - Suicide bombers, MANPADS, others

Interagency Coordination: White House OHS, CIA, DoE, State, Treasury ...

Focus Areas:

- Intelligence, Surveillance & Reconnaissance
- Weapons of Mass Destruction
- Coalition Command, Control, Computers, Communications & Intelligence (C4I)
- C4I Infrastructure
- Information Operations
- Language Translation
- Network Assurance
- Power & Power Management
- Remote Operations
- Force Protection

Th

"Power to the Edge"

In response to QDR, Defense Planning Guidance, and JV 2020:

Information and Decision Dominance achieved through integrated C4ISR technologies that enable seamless, interoperable, knowledge-based, and assured Joint & Coalition Network-Centric Operations & Warfare.

"Populate the Net"

- ***Sensing:*** *Management and tasking of pervasive, persistent sensors for enhancing battlespace knowledge*

"Build the Net"

- ***Comms & Networking:*** *Guaranteed, 365x24x7, mobile, information access and delivery (always-on "internet dial tone")*

"Exploit the Net"

- ***Knowledge Management:*** *Dramatically improved speed of command through integrated Common Picture, Collaboration, and Planning*

"Protect the Net"

- ***Information Security (Cyber Ops):*** *Network protection, information assurance; offensive disruption*

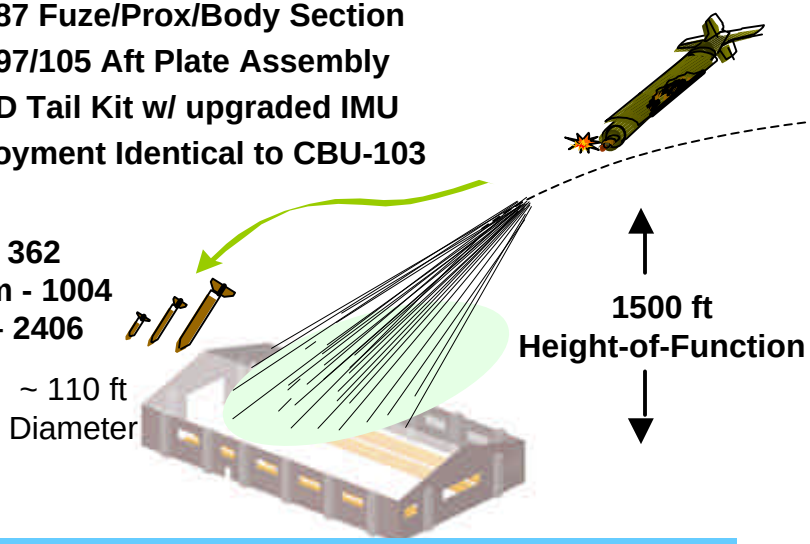
Potential Advanced Electric Power Applications

- **Dramatically Improved Sustainability, Maintainability and Logistics:**
  - **JP8 fuel replaces batteries**
- **Extended Operations in Hostile Environments:**
  - **Silent Watch & Silent Mobility**
- **Electric Launch and Recovery:**
  - **Control of forces applied to aircraft**
- **Electric Power Generation & Storage for Enhanced Lethality & Survivability:**
  - **Directed Energy Weapons (HEL/HPM)**
  - **Electrothermal Chemical (ETC) & Electromagnetic (EM) Guns**
  - **Electric Armor & Active Protection**

Ph

Passive Attack Weapon (CBU-107/B QRC)

- CBU-87 Fuze/Prox/Body Section
- CBU-97/105 Aft Plate Assembly
- WCMD Tail Kit w/ upgraded IMU
- Employment Identical to CBU-103



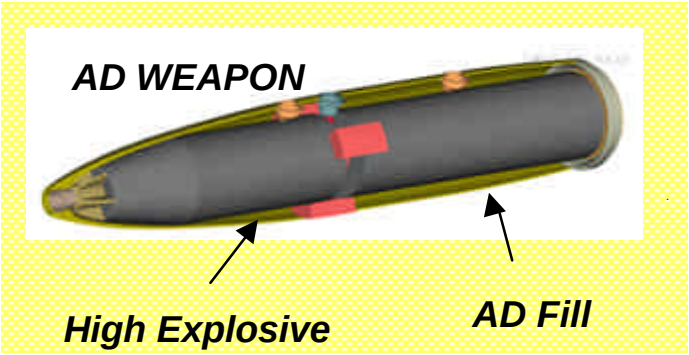
Program Deliverables

- 240 Weapons (Buy-to-Budget)
- Collateral Effects Prediction Tool
- Red-lined TOs
- CBU-107 Pilot Instructions

Crash Prompt Agent Defeat (CrashPAD)

Milestones

✓	*Small-Scale Testing*	*23 Sep 02*
✓	*PDR*	*10 Oct 02*
•	*HE Baseline Test*	*5 Dec 02*
•	*Sled Test*	*7 Jan 02*
•	*CDR*	*9 Jan 03*
•	*Static Test*	*15 Jan 03*
•	*Flight Test*	*26 Feb 03*



Goals

- Deliver 10 weapons in 6 months
- Perform a flight demonstration of a modified MK-84 prototype weapon
- Provide warfighter with reach back capability enabling them to weaponeer and determine collateral effects for weapon employment
- Quantify Collateral Effects of prototype versus high explosive baseline weapon