Precision Strike Winter Roundtable

"Precision Engagement – Strategic Context for the Long War"

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Weapons Technology Blueprint for the Future

February 1, 2007

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Distribution A: Approved for public release

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Program

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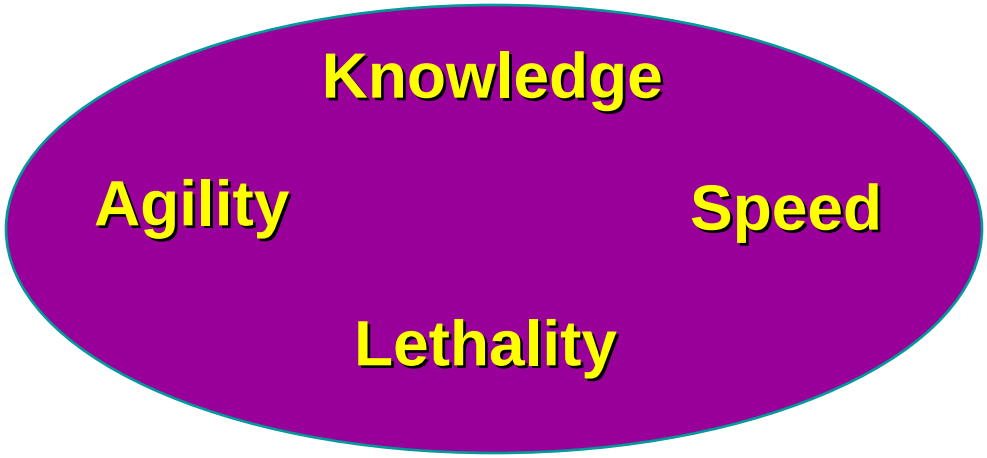
Challenges for DoD Investment

- What Have We Learned?

- **Need to 'Map the Human Terrain' across the Kill Chain**
  - Enables the entire Kill Chain for the GWOT
- **Target Detection may be Difficult and Require Non-Traditional Means**
- **Enemy Exists inside potentially High Collateral Damage Areas**
  - And… in Denied Access Areas
- **Sometimes We ID the Enemy but….**
  - … do not have an adequate/appropriate Strike Solution in time
- **Mobile / Re-locatable Targets Remain a Problem!**
- **The Target Characteristics may Remain Unknown even at… Time Over Target … & "How Did We Do?"**
- **If Decision Timeline Varies and can be Long… let's Enable the Rest of the Kill Chain to be Dynamically Responsive**

DDR&E Transformation
- Technology Initiatives



- Surveillance and Knowledge Systems
- Energy and Power Technologies
- Combat ID & Rapid Targeting Technologies
- Weapon Technology Investment

Key Areas for Technology Investment
Context: Precision Engagement - 'The Long War'

- **Persistent Surveillance**
  - '*Sensing in new dimensions*' for the enemy
- **Combat Identification**
  - *'Realize' the Blue Force kinematic advantage*
- **Netted Weapons**
  - *ISR constellation & 'shooters'*
- **Penetrating Weapons Technology**
  - *Goal: Increased Weapons Effectiveness*
- **The 'Right Types' of Weapons**
  - *Realize the 'Importance of 'Speed'*
  - *Can compensate slow decision timelines!*

Unchallenged Advantage Across the Battlespace!

"Find" - Persistent Surveillance

Joint Warfighting Problem

• GWOT demands additional persistent Intelligence, Surveillance and Reconnaissance (ISR) to conduct intelligence operations including forensic intelligence.

• Endurance measured in days, not hours, required for an "unblinking eye" system is a transformational capability that does not exist today.

• Satellite coverage at most latitudes depends on orbiting satellites with known revisit times, permitting the enemy to conceal, hide and avoid detection.

• Bandwidth availability on the battlefield is at a premium and many communications systems cannot be optimized due to higher priority communications conducted via other options.

Attributes

- Very Long Endurance
- Multi-Dimensional Payloads - "non-traditional" ISR
- Avoid Forward Logistics 'Footprints'
- Survivable and Difficult to Detect

Global Observer

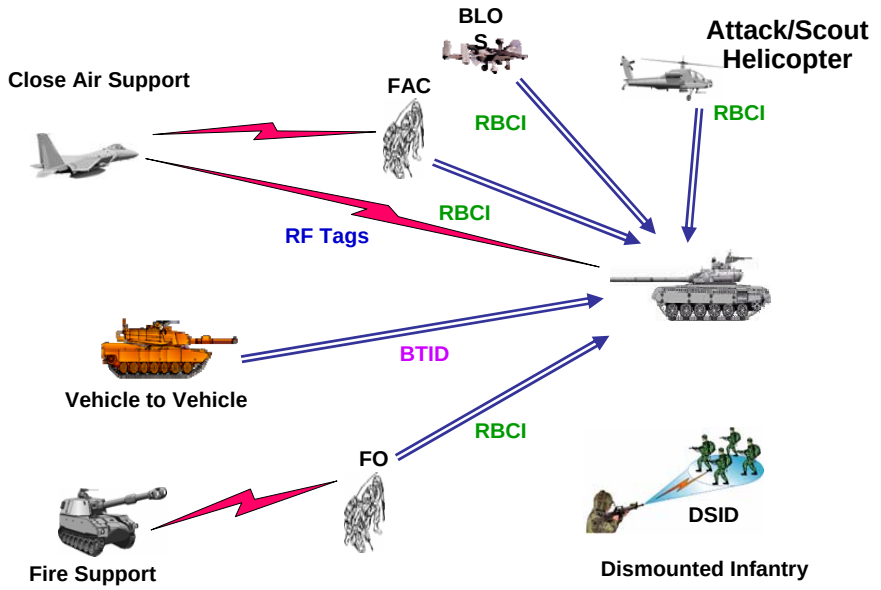
- Hydrogen Powered UAV

- **Global Observer UAV**
  - Liquid hydrogen fuel enables 7-day endurance
  - Provides the persistent presence required for an “unblinking eye”
  - Enables forensic intelligence operations and other critical missions for all COCOMS and Services

- **Advantages**
  - Long endurance minimizes ops tempo/cost
    - Fewer flights
    - Fewer aircraft
    - Reduced logistic tail
  - Upgradeable multiple payload capability
    - EO / IR
    - GMTI / SAR
    - Communications Relay
    - Psyops
    - GPS Augmentation
    - Other (SIGINT, COMINT, MASINT)

Global Observer UAS
Prototype (in flight)

Coalition Combat Identification (CCID)



Led by JFCOM & ACC with participation of 9 nations

Demo – Operation Bold Quest

- **"Laser Vision" - Laser Target Imaging – Increased ID Range**
- **"Radar Vision" – Advanced Radar Algorithms for Target ID**

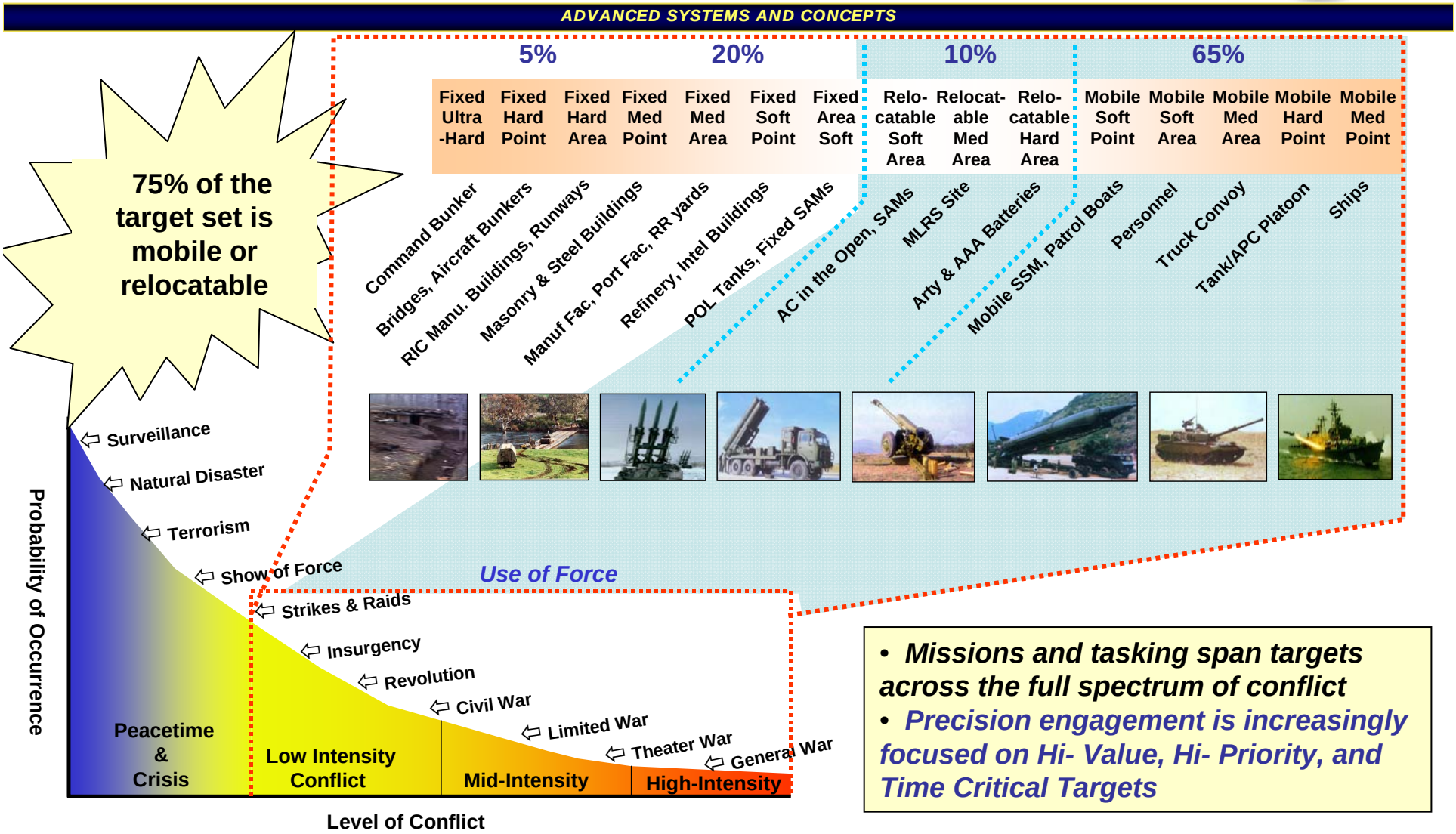
Problem This Solves: Reduced combat effectiveness, constrained tactics, and eroded force cohesion as a result of an increased fratricide rate potential

Solution:

Coalition interoperable Combat ID systems including:

- **Battlefield Target ID (BTID)**
- **Radio Based Combat ID (RBCI)**
- **Dismounted Soldier ID Device (DSID)**
- **Radio Frequency (RF) Tags**

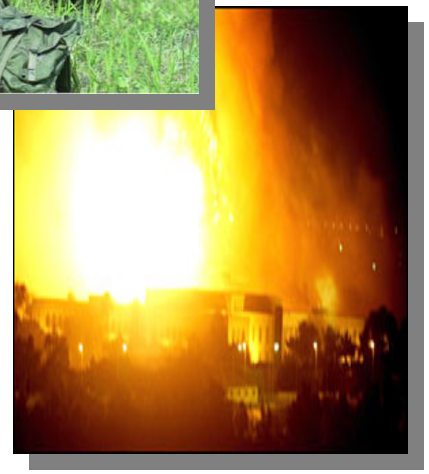
Dynamic Operational Environment



- ***Missions and tasking span targets across the full spectrum of conflict***
- ***Precision engagement is increasingly focused on Hi- Value, Hi- Priority, and Time Critical Targets***

Net-Enabled Weapon Capabilities

- **Weapon In-flight Tracking**
  - Strike De-confliction and Synchronization
  - Health, Arming Status, Location, Target Acquisition, …
- **Weapon In-flight Target Update**
  - Key For Moving and Mobile Targets
  - Key Enabler for Interdiction Role
- **Weapon Retargeting**
  - Importance Increases with Standoff
  - Enhanced Time-Sensitive-Target Capability
- **Weapon Impact Assessment (WIA)**
  - Post-strike Assessment and Re-strike Decisions
  - ISR information
- **Weapon Abort**
  - Collateral damage changes



Key Player in Irregular Warfare!

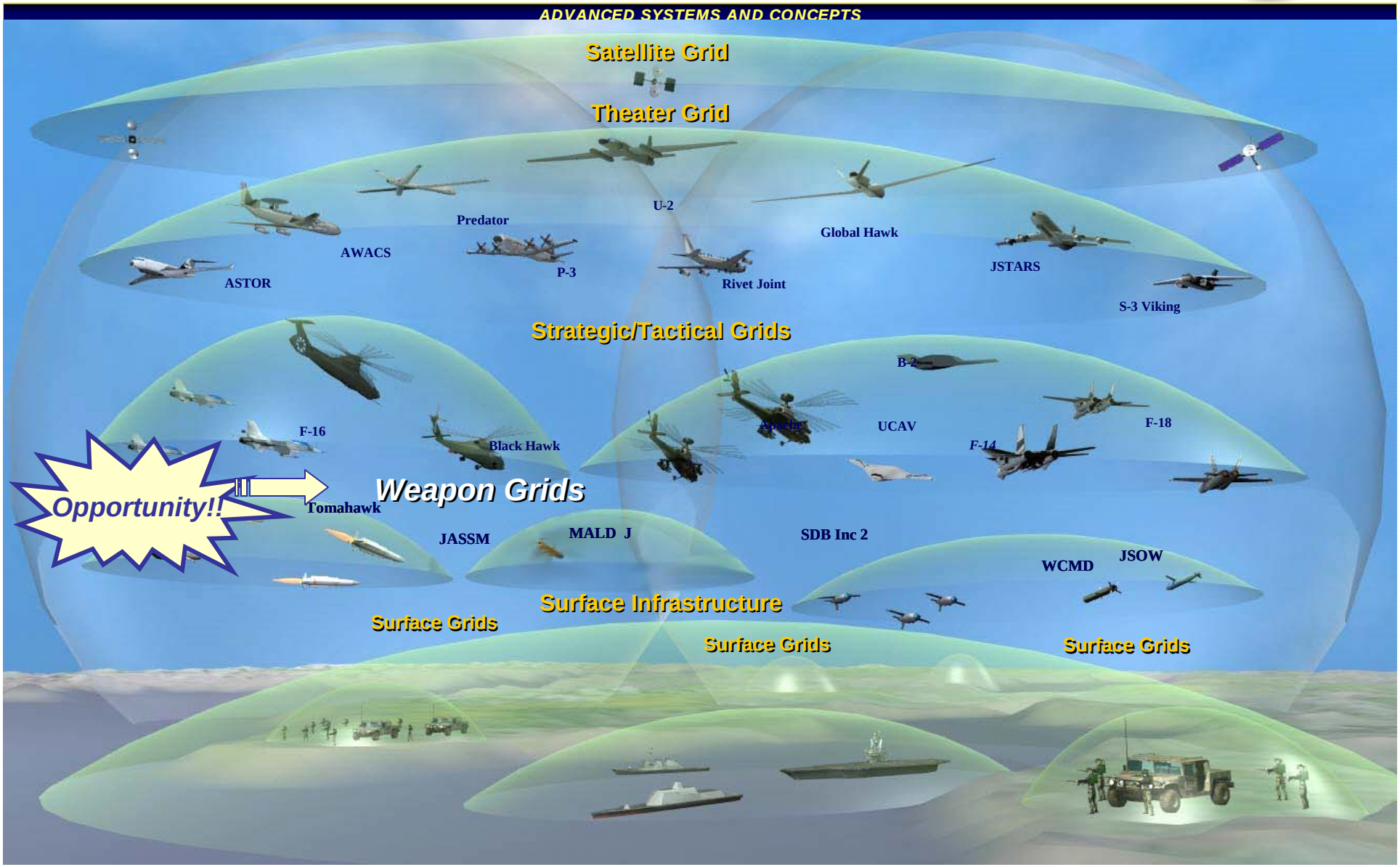
"Target & Engage"
Netted Weapons - Weapon Data Link

What have we done to date?...

- Common Weapon Language To Achieve Required Capabilities
- Developed Standard Architecture for Integrating Weapons Into Network – Completed Wpn Interface Control Documents (ICDs)
- Demonstrated Communication Network With A Transceiver In Weapon Surrogate
- Identify Infrastructure Modifications
- Establish Baseline CONOPS For Weapons Network Communication
- Risk Reduction For Weapon SPOs' Data Link SDD Programs

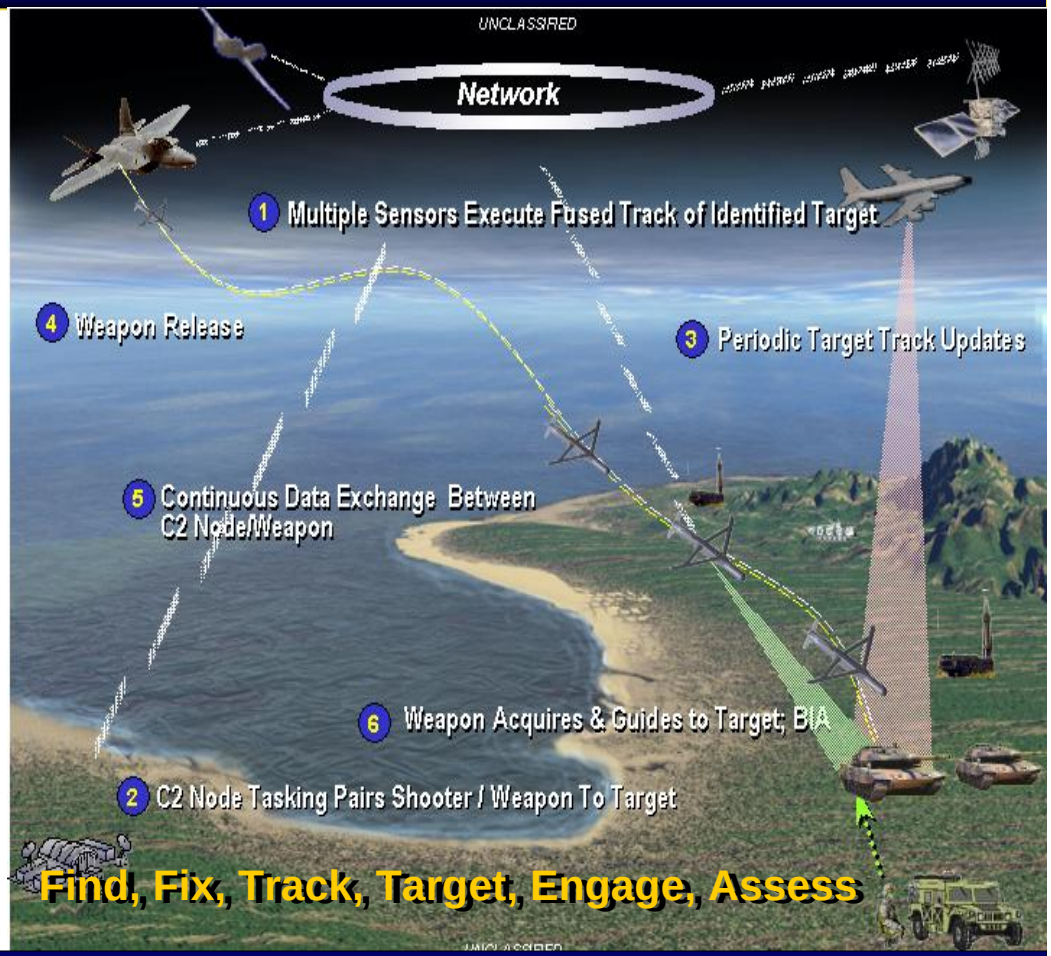
USAF, USN & JFCOM 2005 ACTD

Networked Weapons



Weapon Data Link Network ACTD

- Integrated Data Link Capability into Weapons, Sets Stage for Weapon Integration into Network Centric Warfare
  - Risk Reduction for Weapon SPOs Data Link Programs
  - Develops Architectural Framework Supporting Current/Future Weapons Needs (2010, ~2020)
  - Establishes CONEMP and Common Network Interface
  - Identifies C2 and Aircraft Infrastructure Mods



Pathfinder for Network-Enabled Weapons Capability

"Find, Fix, Track, Target & Engage" Netted Weapons – Joint Surface Warfare

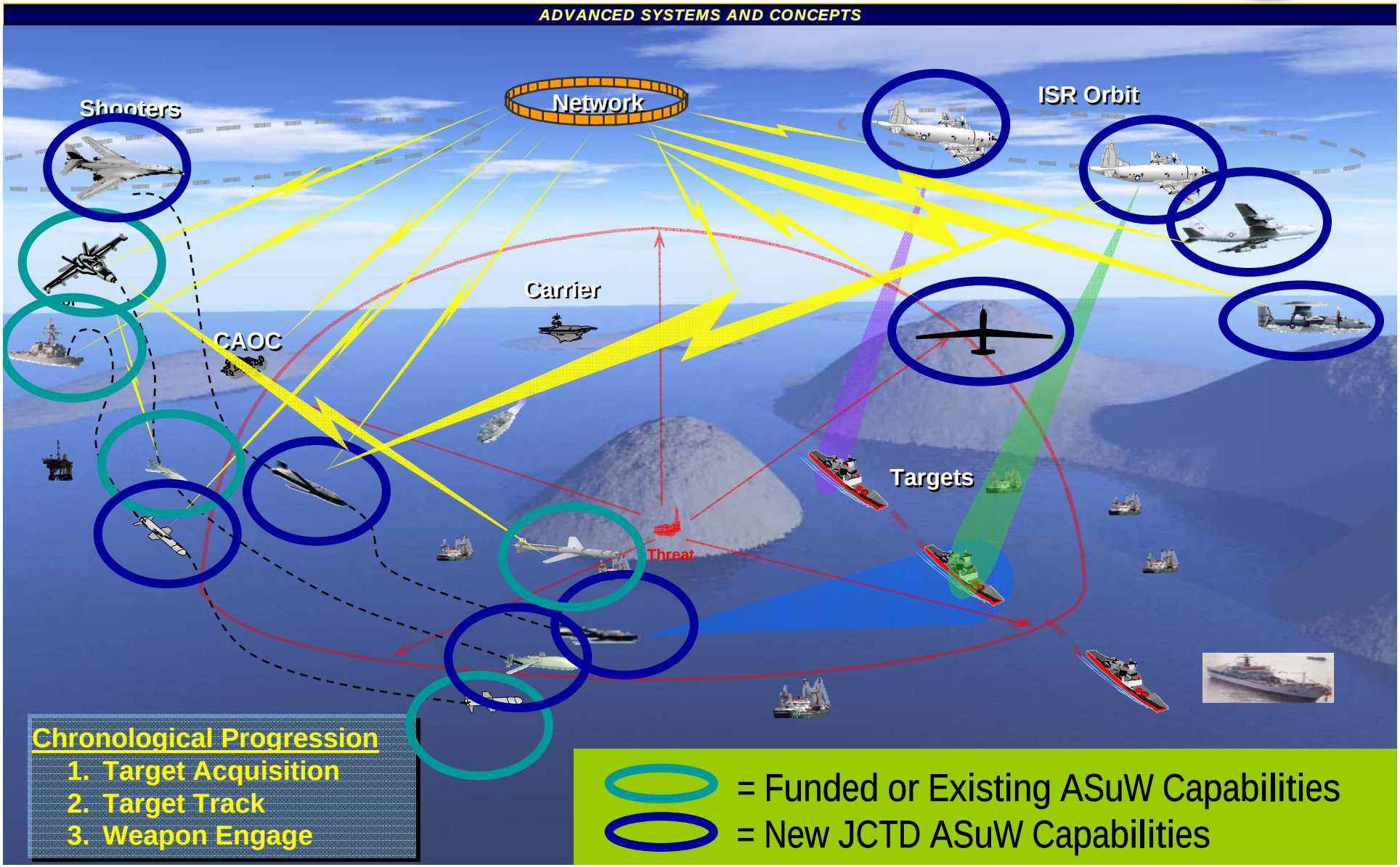
What needs to be done?...

- **Incorporate the Weapon Data Link J28 Message into the ISR**
  - Expands Targeting Chain
  - Enables Moving Target Engagement
  - Layers in Combat ID for Friendly vs. Hostile
- **Integrates USAF & USN ISR & Shooters**
  - Joint ISR and Launch Platforms with Weapons
  - Capitalizes on mature technologies to enable target discrimination, multi-target track and multi-target location.
- **Expand Cross-Component Net-Centricity in Combat Operations**

USAF & USN FY07 New Start

Joint SuW Concept

Multiple Interchangeable ISR Assets Targeting Multiple Weapons



Joint Warfighting Problem

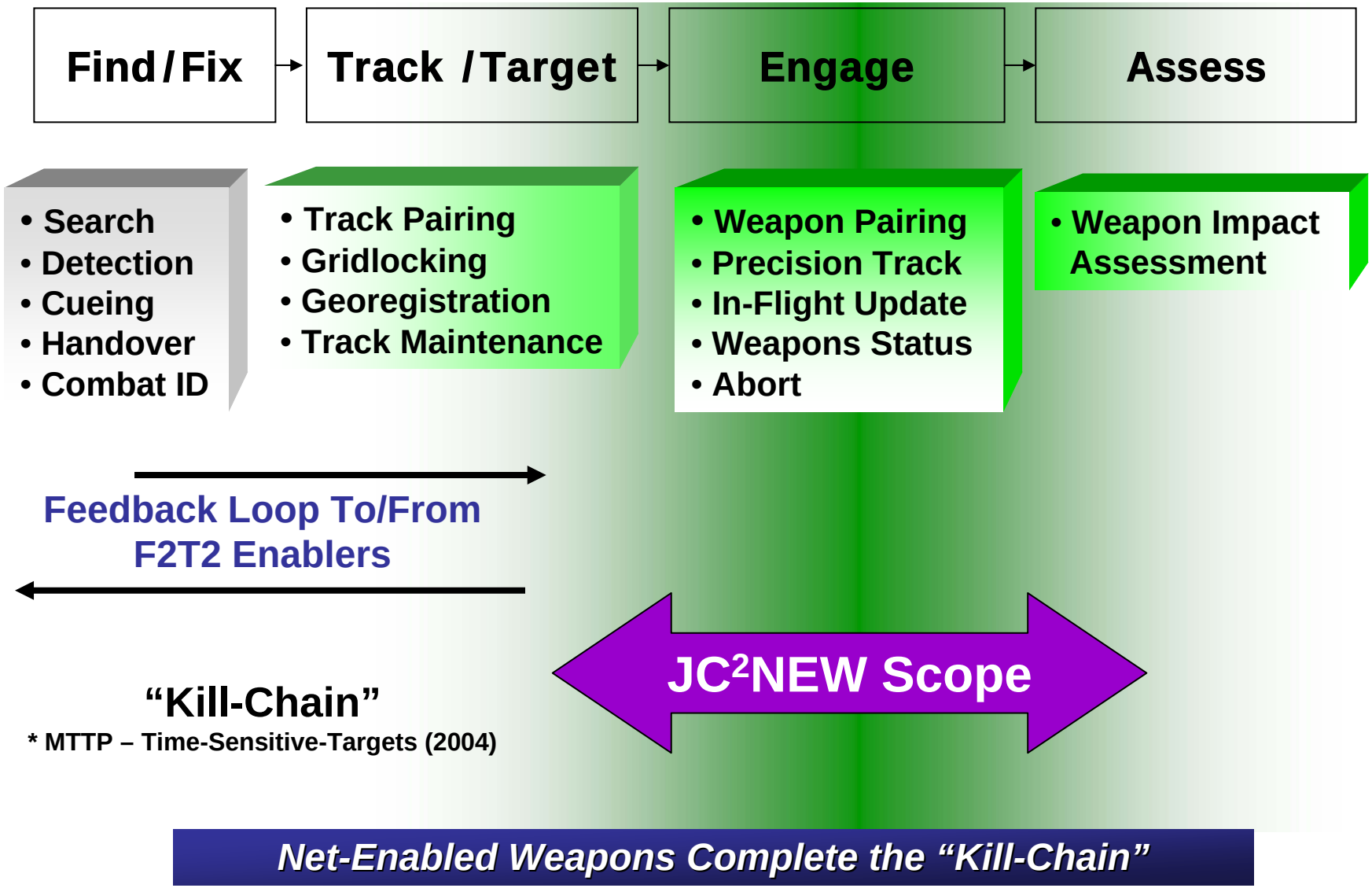
- Limited and marginal targeting at range
  - Targeting accuracy
  - Selectivity
  - Recognition and ID
- Limited weapon capability through the weather
- Very limited weapon capability in obscured
- Limited Kill Chain connectivity

JSuW JCTD

- Comprehensive Kill Chain development and management
- Corrections to existing targeting systems to fulfill those Kill Chains
- Corrections to existing weapons to fulfill those Kill Chains
- Weapons Data Link connectivity to support those Kill Chains

Joint Network Enabled Weapons (JNEW) JT&E (just started!)

ADVANCED SYSTEMS AND CONCEPTS



"Kill-Chain"

*** MTTP – Time-Sensitive-Targets (2004)**

Net-Enabled Weapons Complete the "Kill-Chain"

"Target & Engage" - Penetrating Weapons

- **Effectiveness of current penetrating weapons**
  - … needs to be assessed against worldwide target set
- **'Theme to Date'… Build Large Penetrators with increased HE**
  - Compensates for lack of 'Knowledge' of the Target
  - Large Penetrators are usually limited in numbers and logistically difficult!
- **Need to Generate Effect in the HDBT 'Layers'**
- **"Assess" – Must be able to characterize…**
  - 'How we did post-strike' / HDBT BDA
- **Tunnel Targets Remain a Problem**
  - STRATCOM & DTRA – Strong efforts to provide CoComs with new tools and Targeting Capabilities
  - Tunnel Target Defeat Planning Tool Set
  - Thermobaric Weapon

Why A HTVS Fuze Is Required

1. Intel Uncertainty

- Difficult For Intel to Predict
  - Target Depth and Layering
  - Target Hardness
- Void Sensing Mitigates These Issues

2. Trend Toward Harder Targets

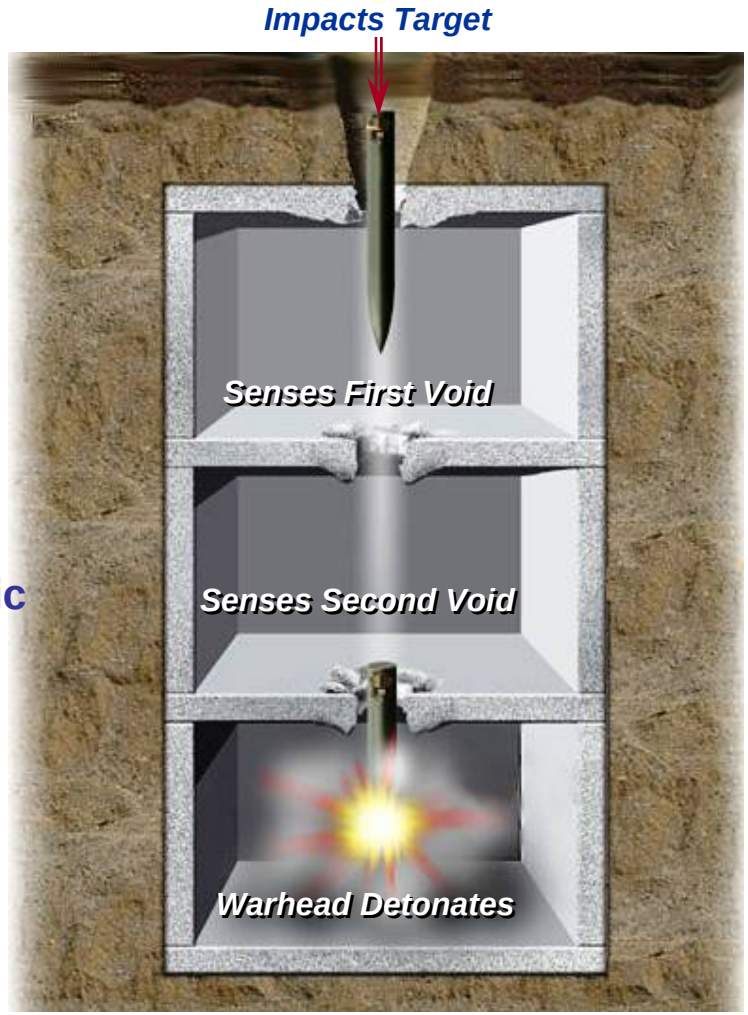
- Need Reliable Fuze to Meet Harder Target Rqmts >10K PSI Concrete
- Legacy Fuzes (FMU-143 & 152) Designed For ≤5K PSI Concrete

3. Risk Reduction For Future Weapons, e.g. Hypersonic

4. Fuze Industrial Base Must Remain Viable

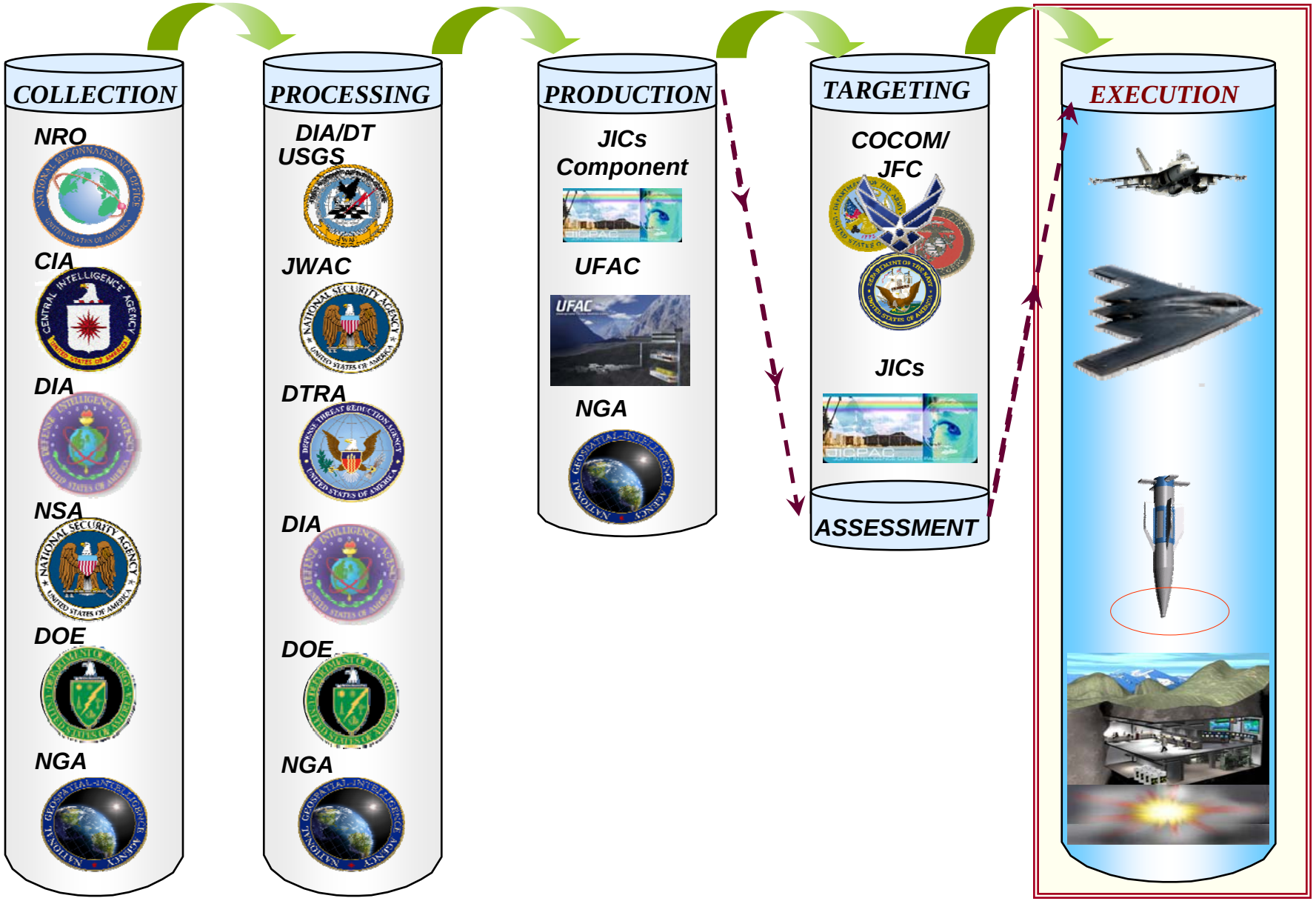
5. Multiple Capability Documents - Stated Fuze Rqmt

- HDBT Mission Area ICD
- HDBT Characterize/Engage/Assess (CEA) ICD
- Chemical, Biological, Agent Defeat (CBAD) Capability Development Document (CDD)



Hard and Deeply Buried Target Characterize, Engage and Assess ICD OV-1

The HDBT 'Kill Chain'



"Target & Engage & Assess" - The 'Right Types' of Weapons

- **Generate the Desired Effect**
  - Focused Lethality
- **Moving / Re-locatable Targets**
- **Time Sensitive Targeting**
  - Speed? Seeker vs. speed investment
  - Avoid Unnecessary Collateral Damage
- **Improve the Targeting Equation**
  - Target Location Accuracy Improvements
  - GPS Accuracy / Weapon Accuracy
- **Post – Strike Assessment**
  - UAVs
  - Seeker information through Weapon Data Link
  - Unattended Ground Sensors

CENTCOM Need Statement

USCENTAF/CD
524 Shaw Drive, Suite 200
Shaw AFB, SC 29152-5029

There is an **urgent operational need** to provide airborne platforms, including the **F-15E**

SDB I, modified to include a **composite case** and **DIME fill**

MEMORANDUM FOR USCENTCOM/Deputy Director, CCJ8

FROM: USCENTAF/CD
524 Shaw Drive, Suite 200
Shaw AFB, SC 29152-5029

SUBJECT: Focused Lethality Munition (FLM) Advanced Concept Technology Demonstration

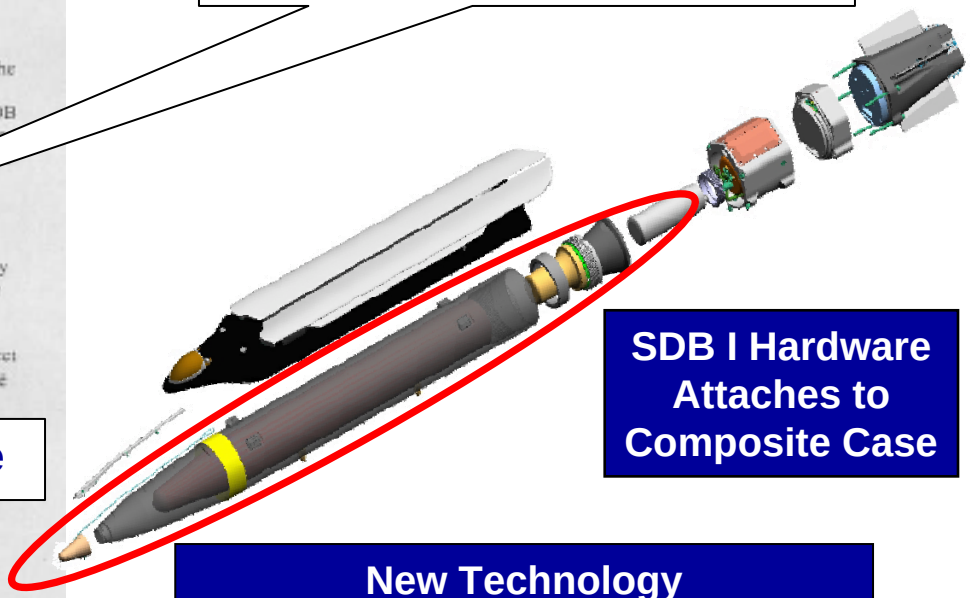
1. (U) USCENTAF fully supports the FLM Advanced Concept Technology Demonstration (ACTD). The intent of this ACTD is to demonstrate the military utility of a low collateral damage (LCD) warhead integrated into the Small Diameter Bomb I (SDB I). The FLM is not intended to replace the SDB I but to complement it. This ACTD exploits the Dense Inert Metal Explosive (DIME) fill and composite warhead technologies being developed in the Air Force Research Laboratory. DIME is a tungsten high explosive that imparts increased [illegible] blast/lethality over traditional high explosives. A composite case encapsulates the DIME fill and breaks into small non-metal fibers [illegible] minimizing warhead fragmentation effects.

2. (U) There is an urgent operational need to provide airborne platforms, including the F-15E, the ability to kill targets in a high collateral damage environment. SDB I, modified to incorporate a composite case and DIME fill, offers the potential for precisely delivering a lethal blast against soft targets and dramatically reducing collateral damage. USCENTAF requires precision-guided weapons explicitly tailored to [illegible] within a complex battlespace. While our current enemies have shown little respect for international laws of armed conflict, the US military must always strive to minimize the impact of war [illegible] the ability to prosecute previously off-limit targets with a precision

dramatically reducing collateral damage

offers the potential to fill an existing capability gap – the ability to precisely engage high collateral damage targets. This ability to effectively prosecute previously off-limits targets would enable USCENTCOM to shorten conflicts while minimizing collateral damage.

BLAIR E. HANSEN
Brigadier General, USAF
Deputy Commander



SDB I Hardware Attaches to Composite Case

New Technology
- Composite Case Warhead
- MNX-1209 Explosive (MBX)
- Blast Only

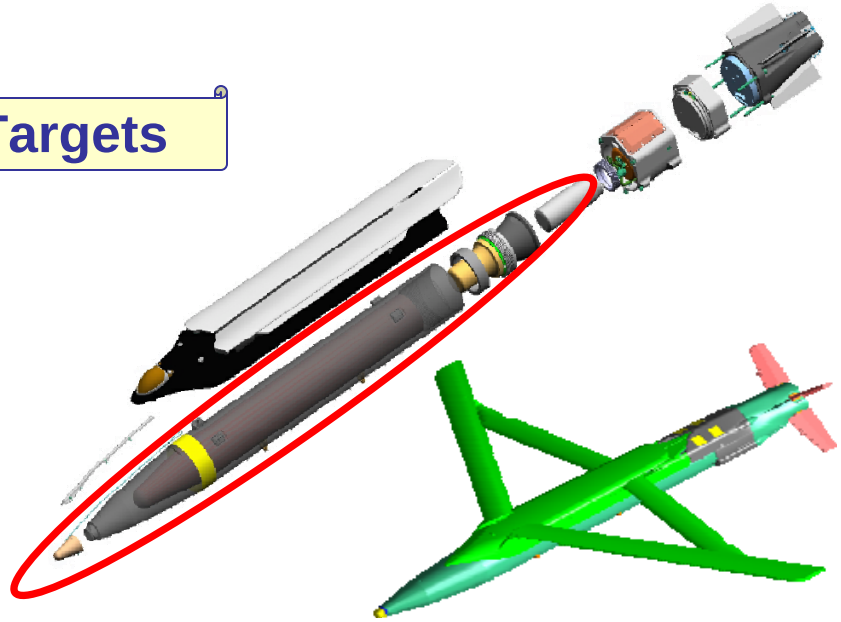
Focused Lethality Munition (FLM) - Small Diameter Bomb – Eglin AFB

- **Problem Statement:** Collateral Damage from Current Weapons Result in Target Restrictions Limiting COCOMs Ability to Prosecute Targets Requiring Minimized Collateral Damage
- **Objective:** Develop Composite Cased Warhead w/ Specialized Fill to Reduce Fragmentation Effects While Increasing Blast Effects → Focused Lethality Munition (FLM)

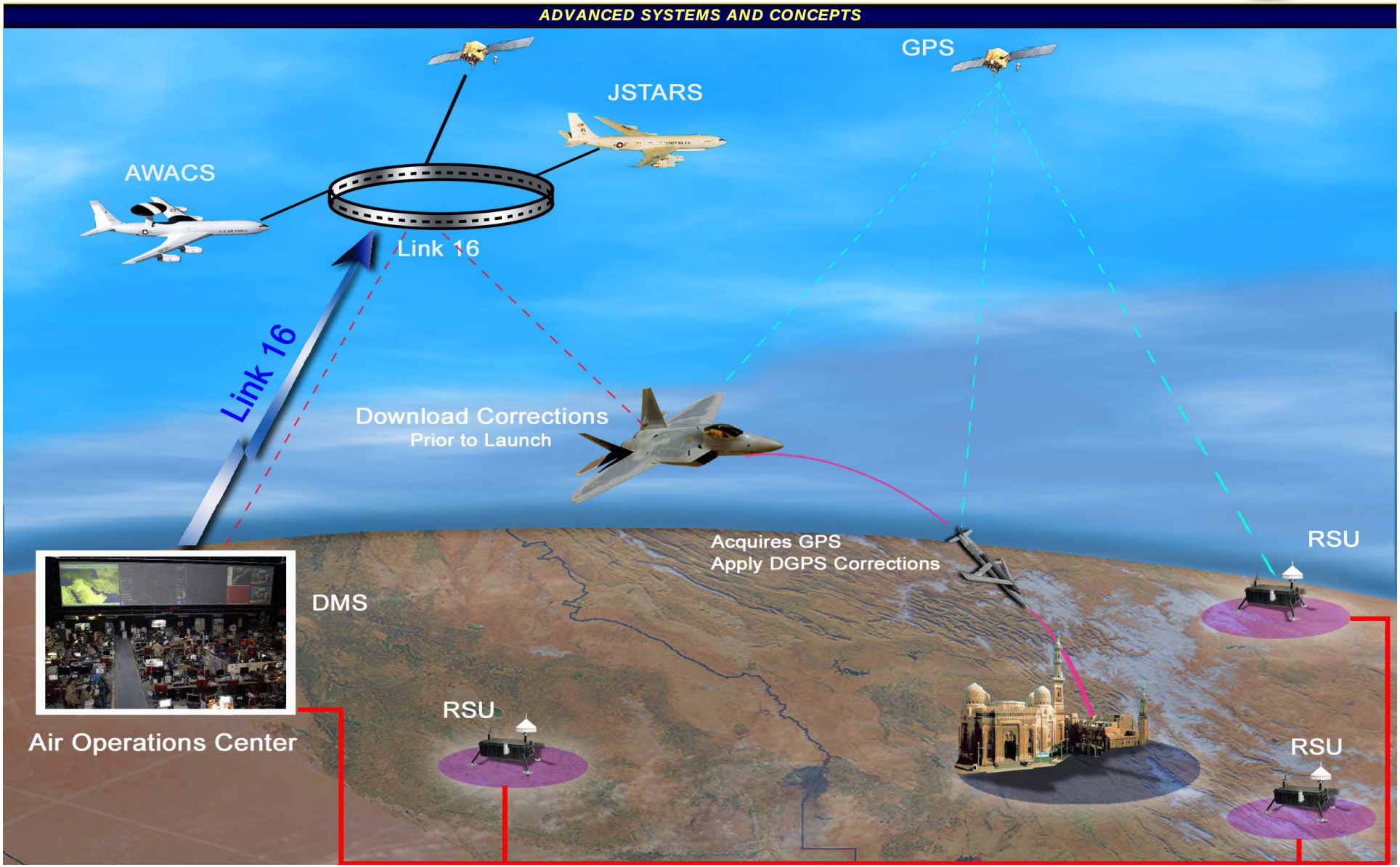
Prosecute Previously Off-Limits Targets

Solution

- Integrate Dense Inert Metal Explosive (DIME) w/ Composite Warhead Case into the Small Diameter Bomb (SDB) I Airframe



FLM CONOPS


ADVANCED SYSTEMS AND CONCEPTS
GPS
JSTARS
AWACS
Link 16
Link 16
Download Corrections
Prior to Launch
Acquires GPS
Apply DGPS Corrections
RSU
DMS
RSU
Air Operations Center
RSU

Proposed FLM Target Set

- **Personnel**
  - Open, rural areas
  - Open, residential areas
  - Mortar sites
  - Close Air Support
- **Light vehicles, stationary**
  - Vehicle with gun in rear
  - Non-Armored transport vehicles
- **Soft Buildings**
  - Terracotta
  - Dried Mud Hut

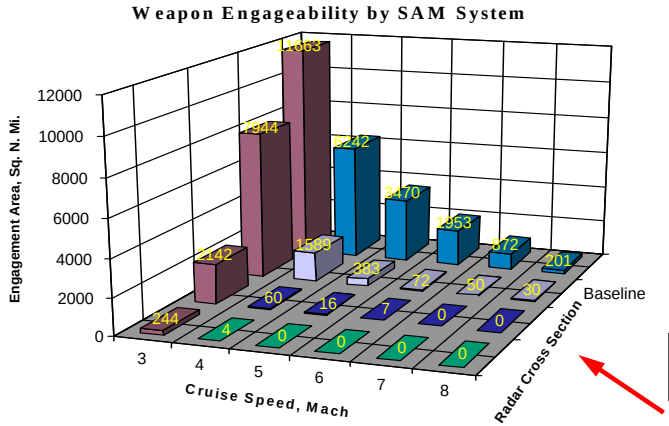
Value of Speed… global strike

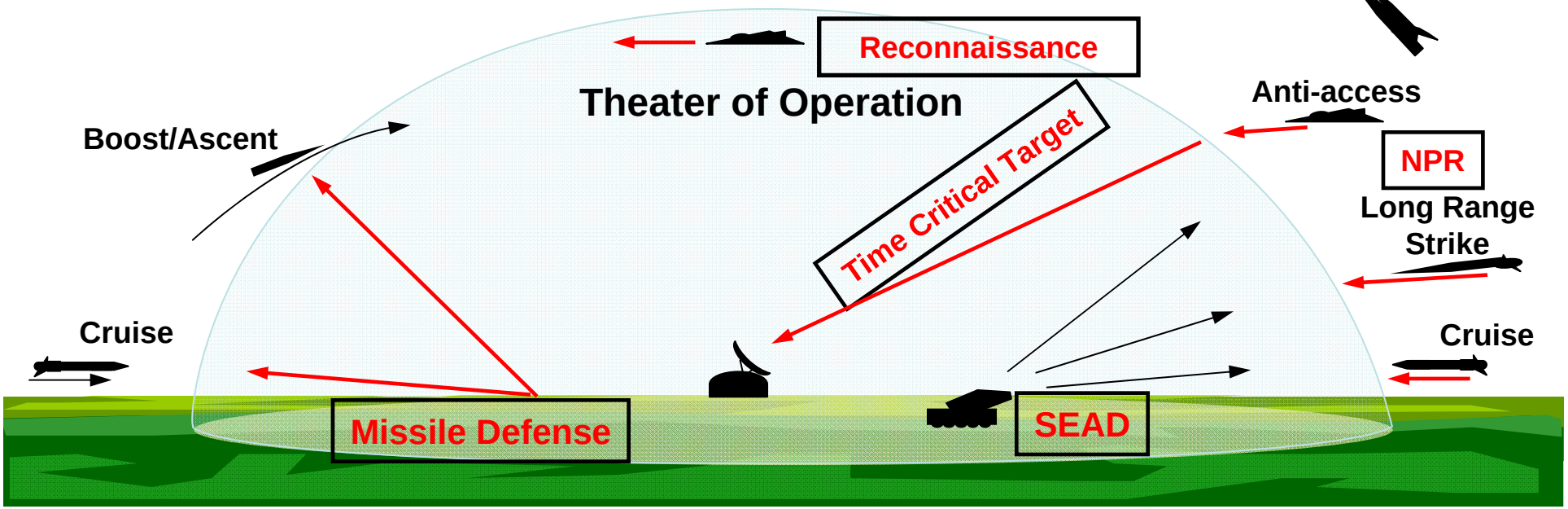
ADVANCED SYSTEMS AND CONCEPTS

Benefits

- Reduced Adversary Detection and Reaction Time
- Reduced Strike Package Assets
- Increased Engagement Area by a Single Platform
- Increased Shooter Survivability
- Increased Kills per Launch
- Address the Deep Penetration Problem

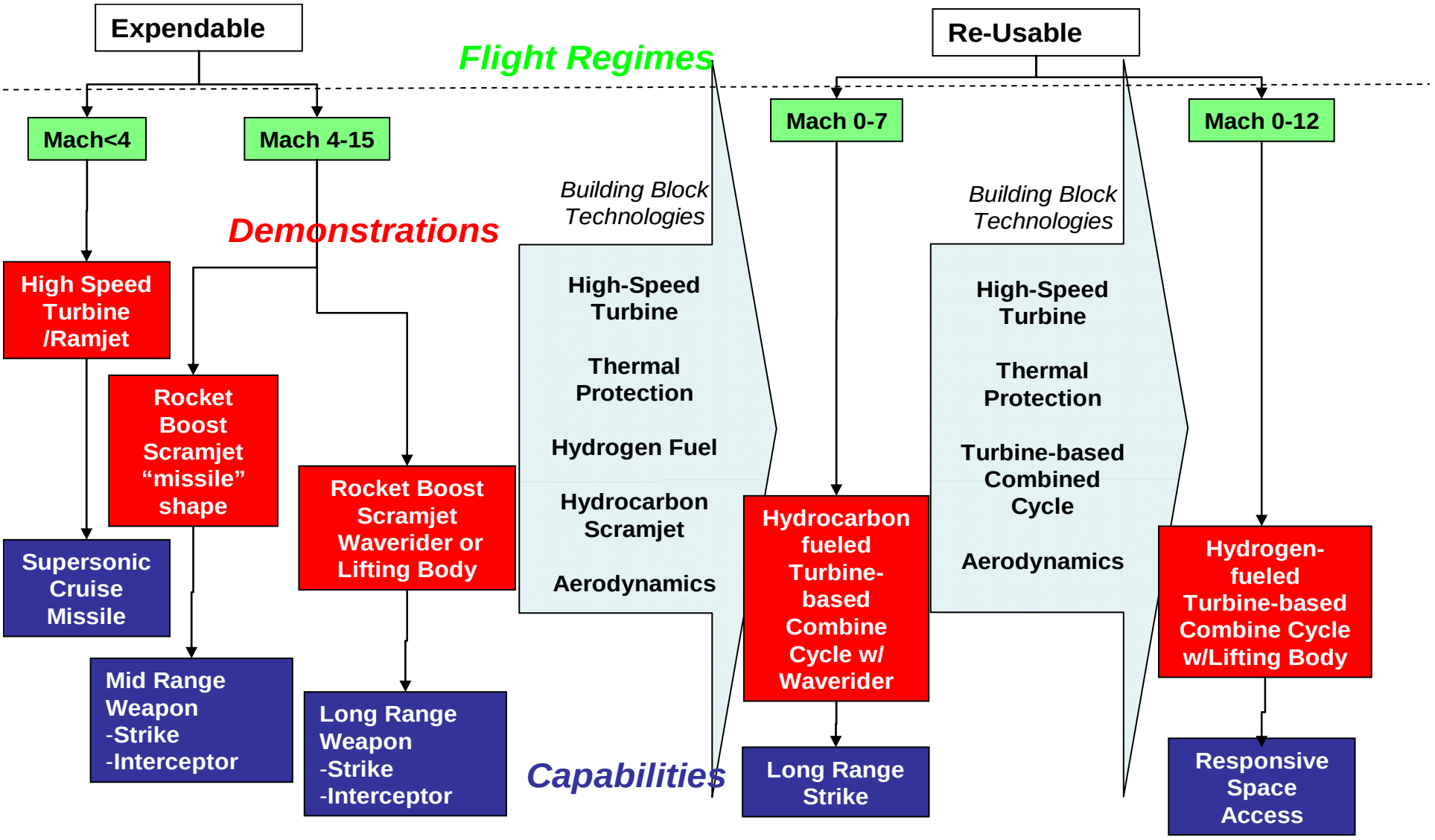
1.8m (speed) ~ Survivability/Vulnerability ~ 1/10 (Signature)





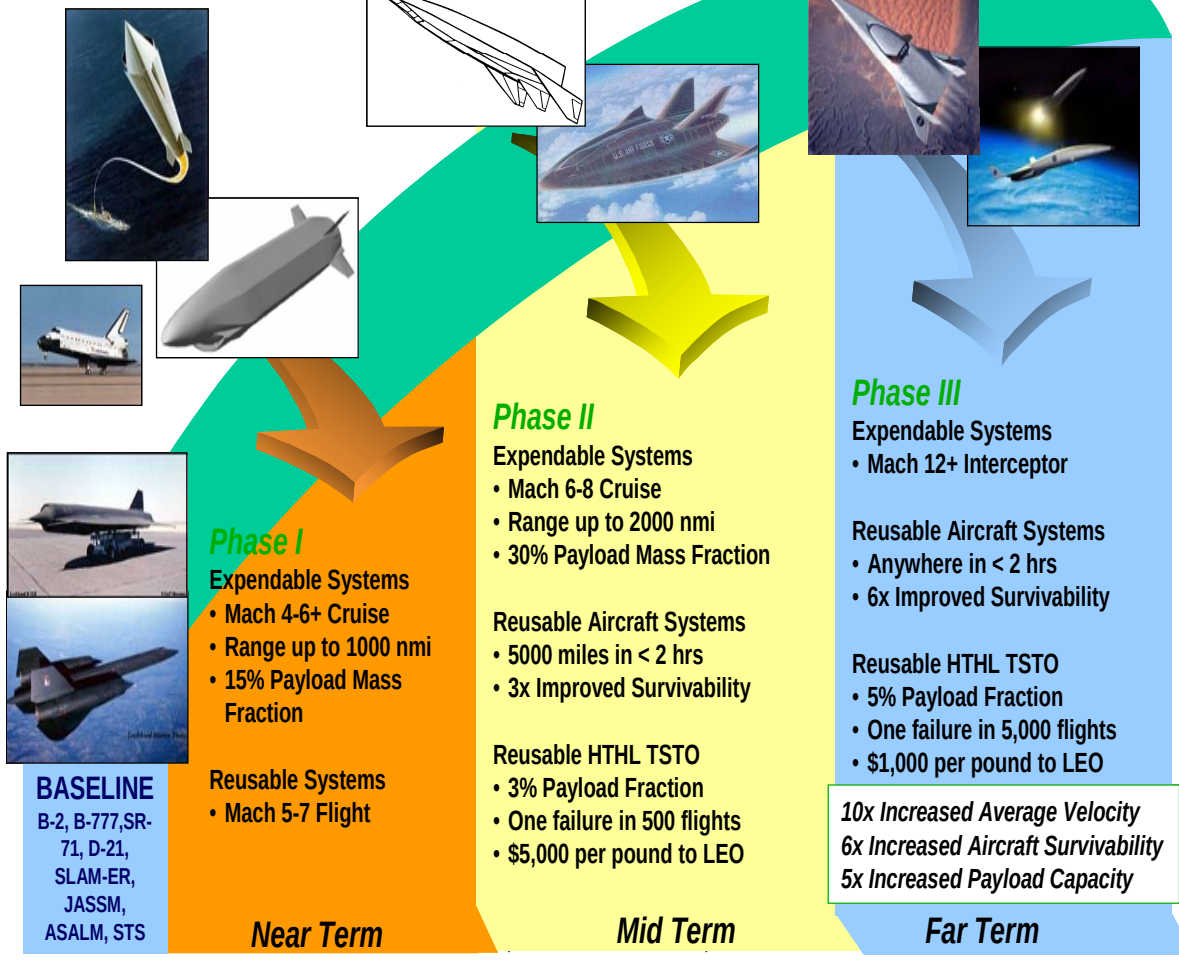
Technology Critical Path

ADVANCED SYSTEMS AND CONCEPTS



High Speed / Hypersonics Taxonomy

ADVANCED SYSTEMS AND CONCEPTS



Capabilities Supported

- On-demand Spacelift
- Assured Access Spacelift
- Long Range Strike
- Global Precision Engagement
- Air & Missile Defense

Note: Reusable airframe technologies addressed via Space Access pillar

Sensor to Shooter Needs

- **"Find" - Terrorist Hides in Many Dimensions**
  - They know our Title X ISR investment … & spectrum
  - Enemy will move to where we cannot look!
  - Need to 'sense' in those Dimensions… Niche ISR?
- **"Find/Fix" - Sensors need to collaborate**
  - Track mobile entities in the 24 hour immediate TGT'ing cycle
  - Track dimension to dimension at a high sample rate
  - Fusion to hold the track or immediately pick up
- **"Fix/Finish" - Sensor can Target the Shooter… or shoot!**
  - Metric Sensing… platform inaccuracies!
  - Fuse for more robust Combat ID Capability
  - Rapid targeting of available weaponry

High Value Target (HVT) Kill Chain!

Precision Engagement Needs…
… for the Near Future

- **QDR / SPG - mandating new capabilities**
- **Combating WMD… in all phases**
  - Effective Agent Defeat
- **STRATCOM's Global Strike / ISR / IO Mission**
  - Prompt Theater/Global Strike (conventional capability) – Speed!!
- **Robust HDBT Defeat Capability**
  - Target sets going deeper
  - FCT: Programmable Intelligent Multi-Purpose Fuse (PIMPF)
- **Geospatial Intelligence (Better Accuracy! / TLEs too large!)**
  - Immediate targeting of battlefield sensors (UAVs Included) for rapid employment of GPS Weaponry
- **Moving Targets – Advanced SAMs / Counter Maritime**

Challenges for the Future…

- **Theater TST (can't get around the laws of physics!)**
  - To hit anything in a 600nm Theater in 10-15 mins… need a Mach 3.5 – 4 Weapon !
  - Need In-Flight Re-targeting / Re-Directing
- **Persistent ISR & Rapid Geo-Registration to support 'High- Speed' Weapons**
  - End-to-End Rapid Planning Capability Worldwide
  - Hydrogen Powered UAVs? Airships?
- **Alternatives for Speed Investment**
  - Seeker Investment (TLEs) / Stealth Investment (Loiter/Survive)
  - But… Doesn't get you to the Target quicker!!

OSD Advanced Systems & Concepts

Questions?

http://www.acq.osd.mil/asc

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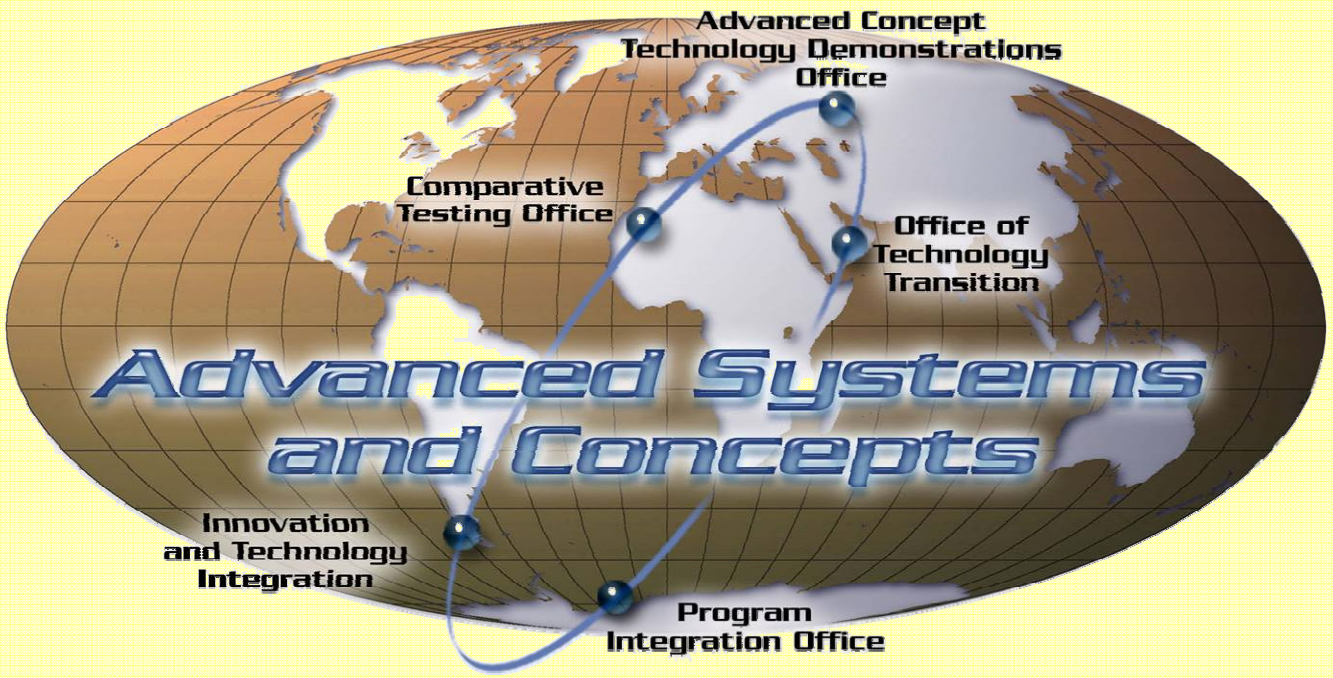

Advanced Systems & Concepts

http://www.acq.osd.mil/jctd