

# Missiles & Weapons Market in Perspective

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# Introduction

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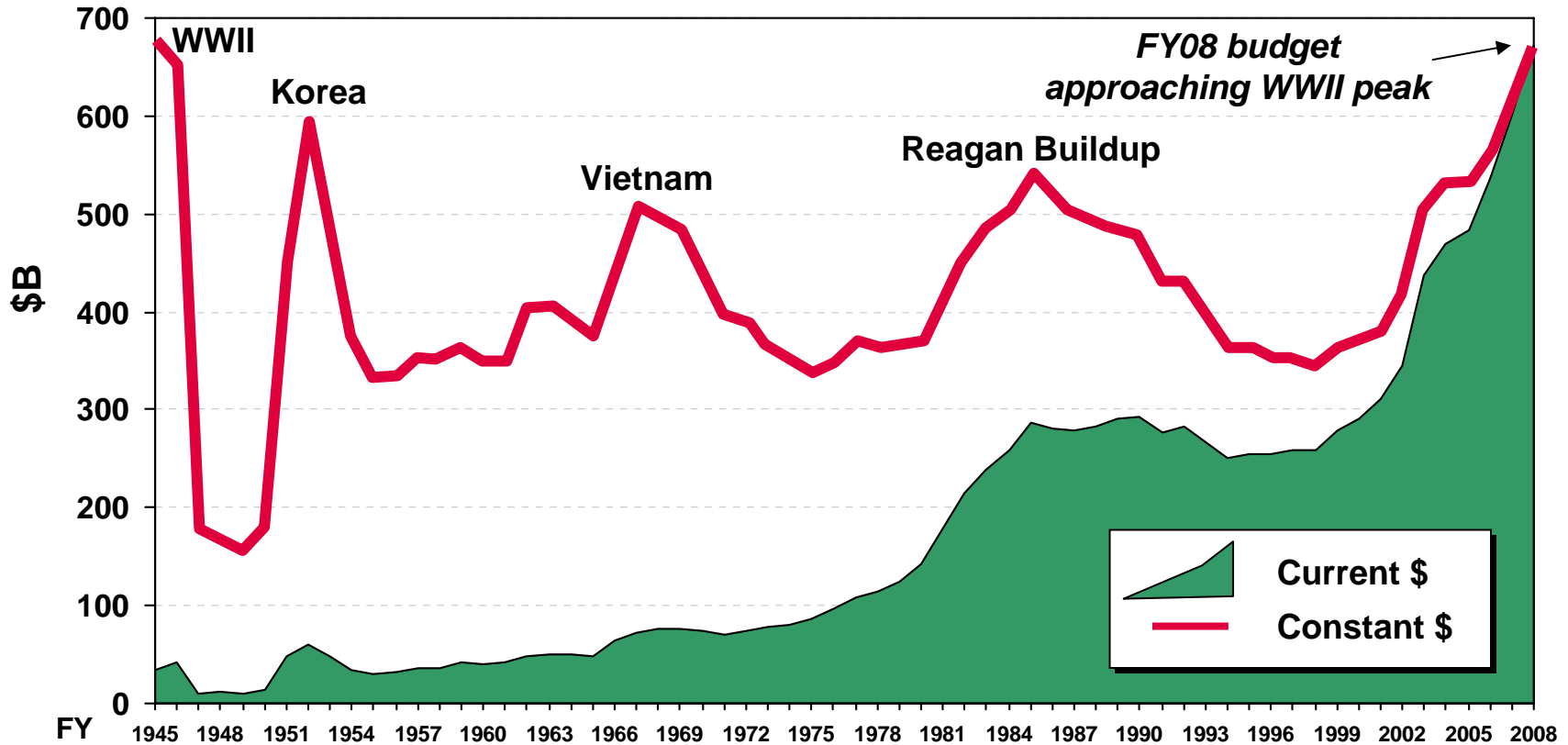
- 1** US defense budget outlook
  - Scenarios
  - Drivers
- 2** Missiles & Weapons budget outlook
  - Missiles, PGW, munitions and ordnance
  - Market forecast
- 3** Trends to reorient capabilities
  - Capability gaps
  - Future scenarios

## Approach

- GEIA: interview based, cross-industry analysis
- Defense budget analysis

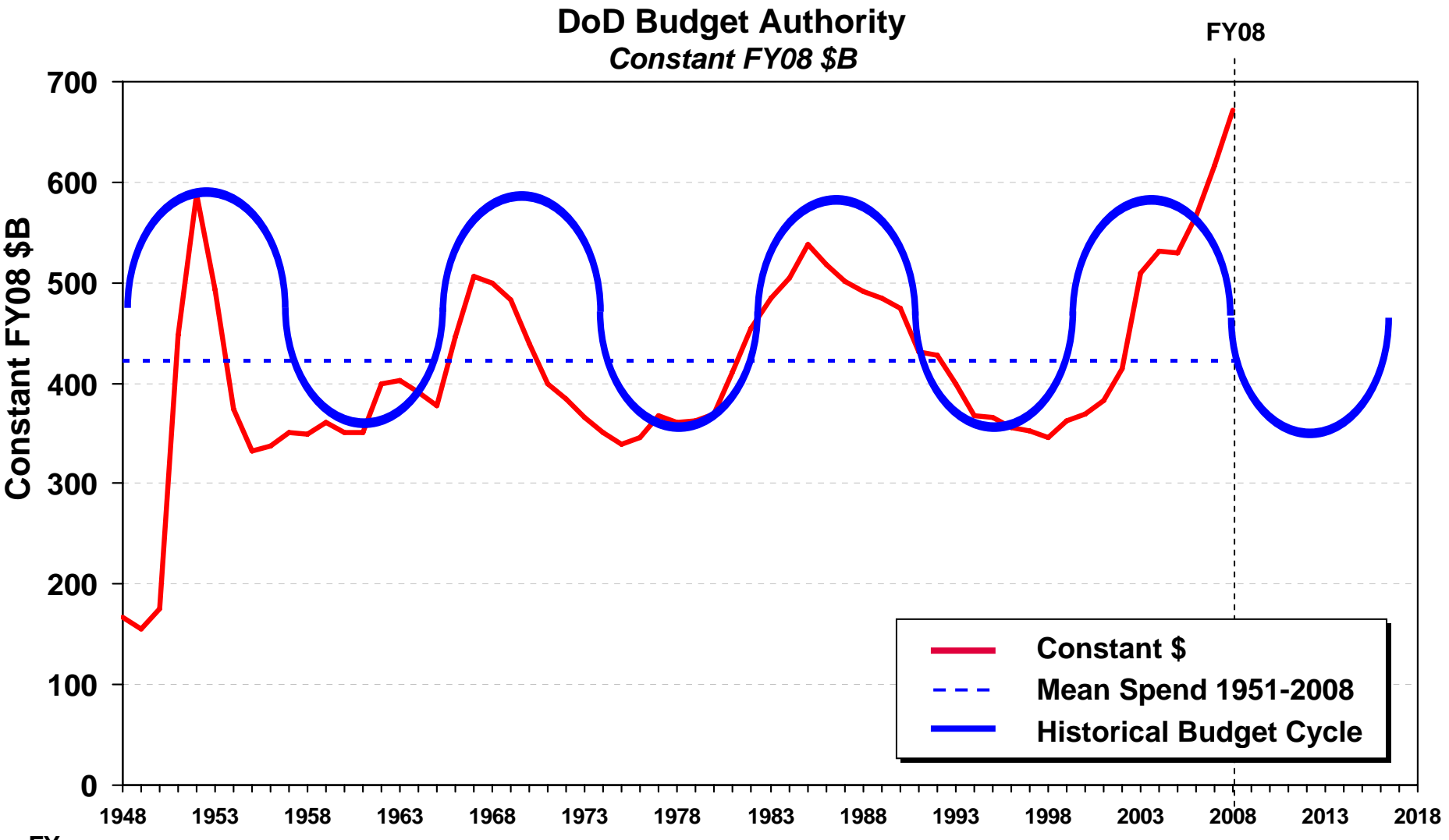
# The defense budget is approaching record-breaking levels

**DoD Budget Authority**  
*Current and Constant FY08 \$B*



Source: DoD Greenbook

# The budget is currently “off cycle” – a return to historical cyclicity would suggest a decline is imminent



Source: DoD Greenbook

# A number of factors shape the budget outlook – threat perception, politics and economics matter most

## Primary budget-shaping factors:

- Threat
- Politics
- Economics



## Factors that pressure the budget:

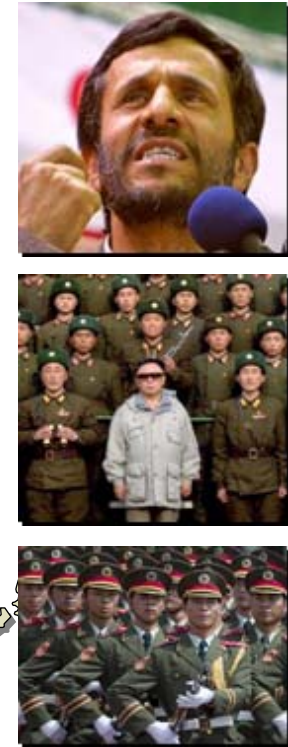
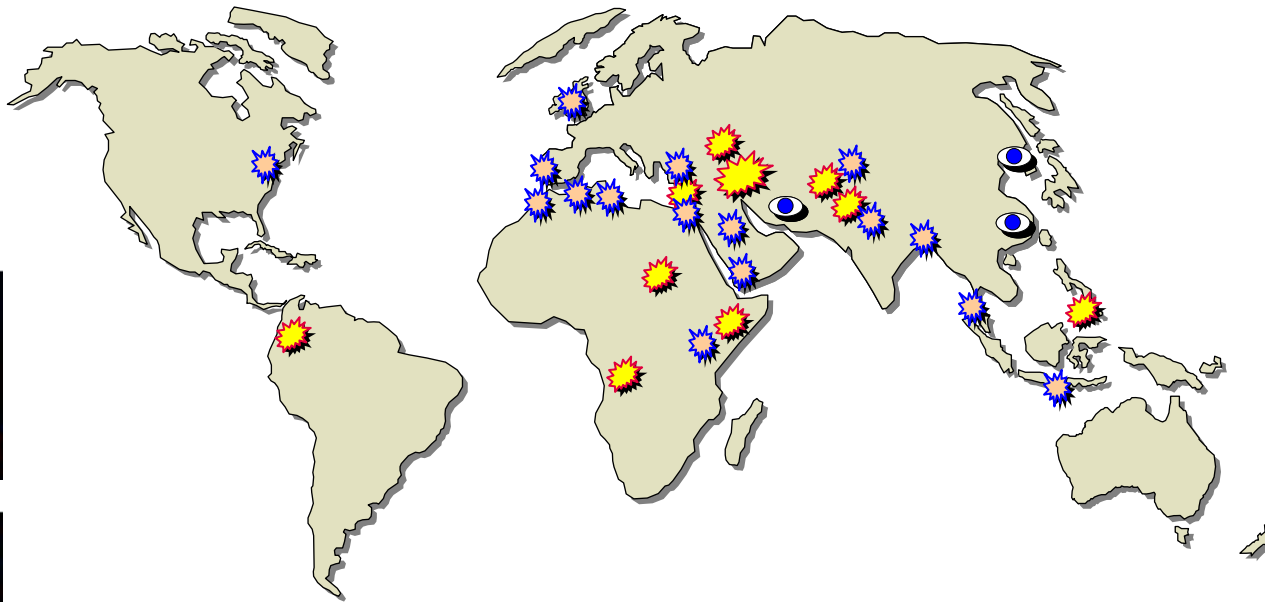
- Withdrawal from Iraq
- Increase in mandatory spending
- Popular disapproval of defense spending

## Factors that buoy the budget:

- High Optempo
- Rising Operations & Support (O&S) costs
- Reset requirements
- Investment requirements

# The security environment has become increasingly complex

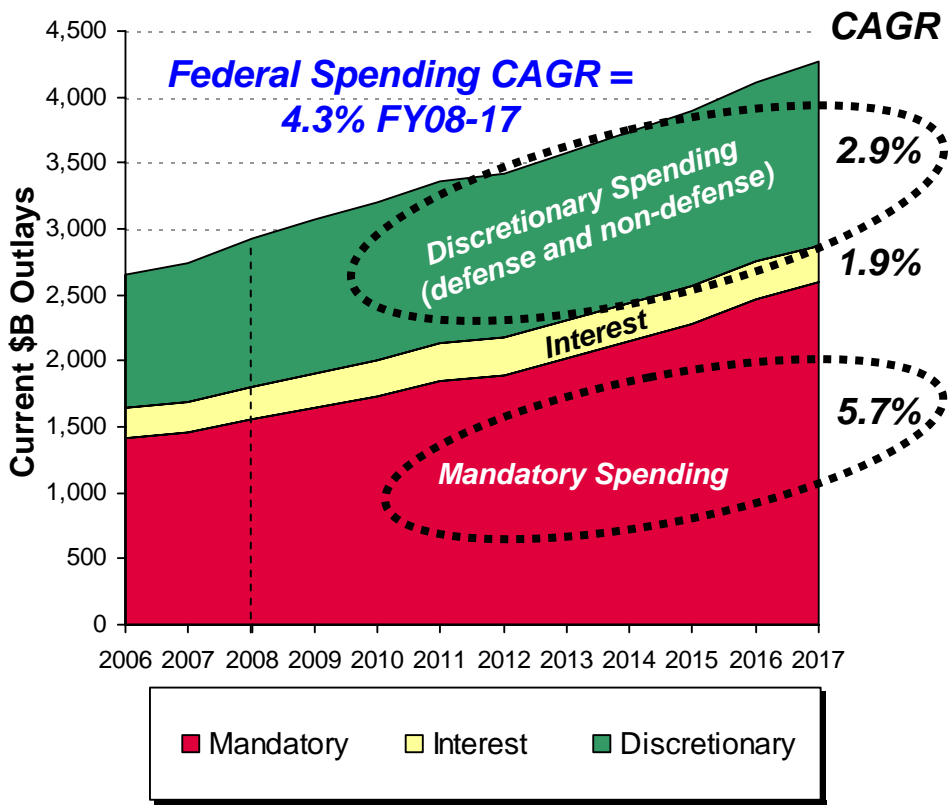
## Global Security Environment



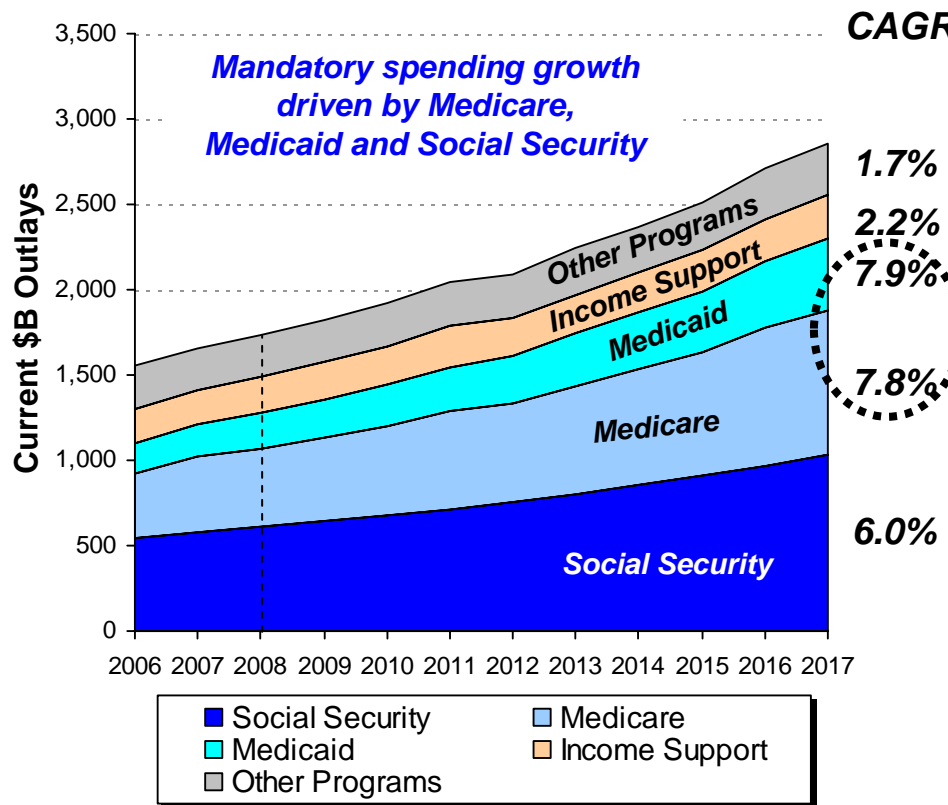
-  Al Qaeda Attack
-  Conflict Zone
-  Ongoing Concern

# A key economic/fiscal factor in the defense forecast is the rapid growth in mandatory spending accounts

**Federal Spending  
by Major Category 2006-2017**



**Mandatory Spending  
By Account 2006-2017**



Source: CBO projections, August 2007

# Future spending will likely remain high by historical comparison

**US Defense Budget Scenarios vs. Budget Benchmarks**  
*Budget Authority, Constant \$FY08*

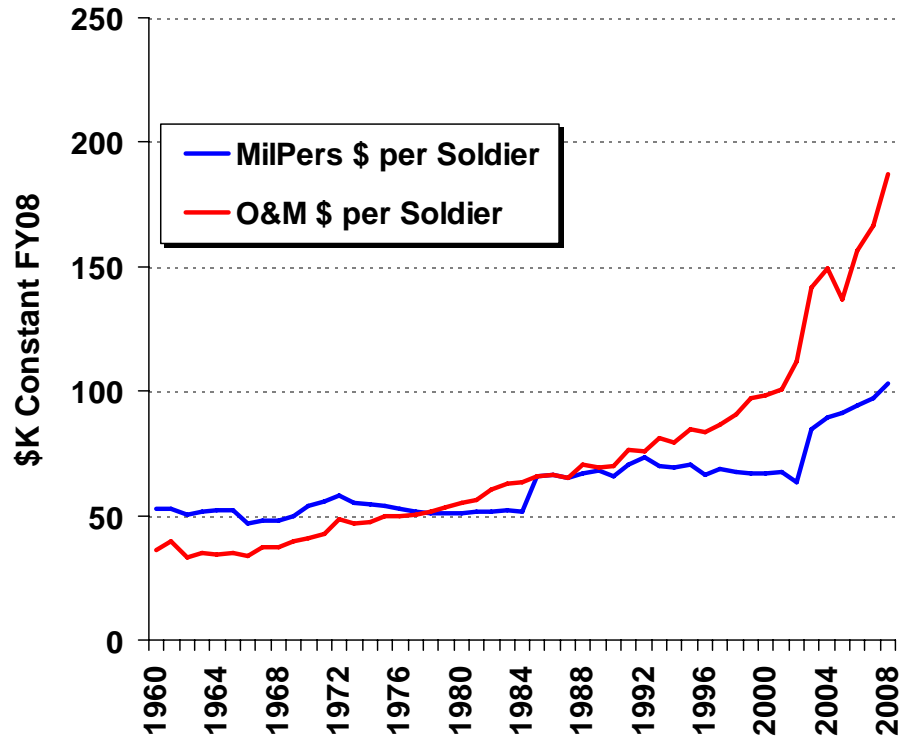


Source: DoD Greenbook FY08, GEIA, BAE Systems, Inc.



# Upwards budget pressure is driven by the inexorable rise in Operations & Support costs

Spending per Soldier: MilPers vs. O&M  
Budget Authority, Constant \$FY08

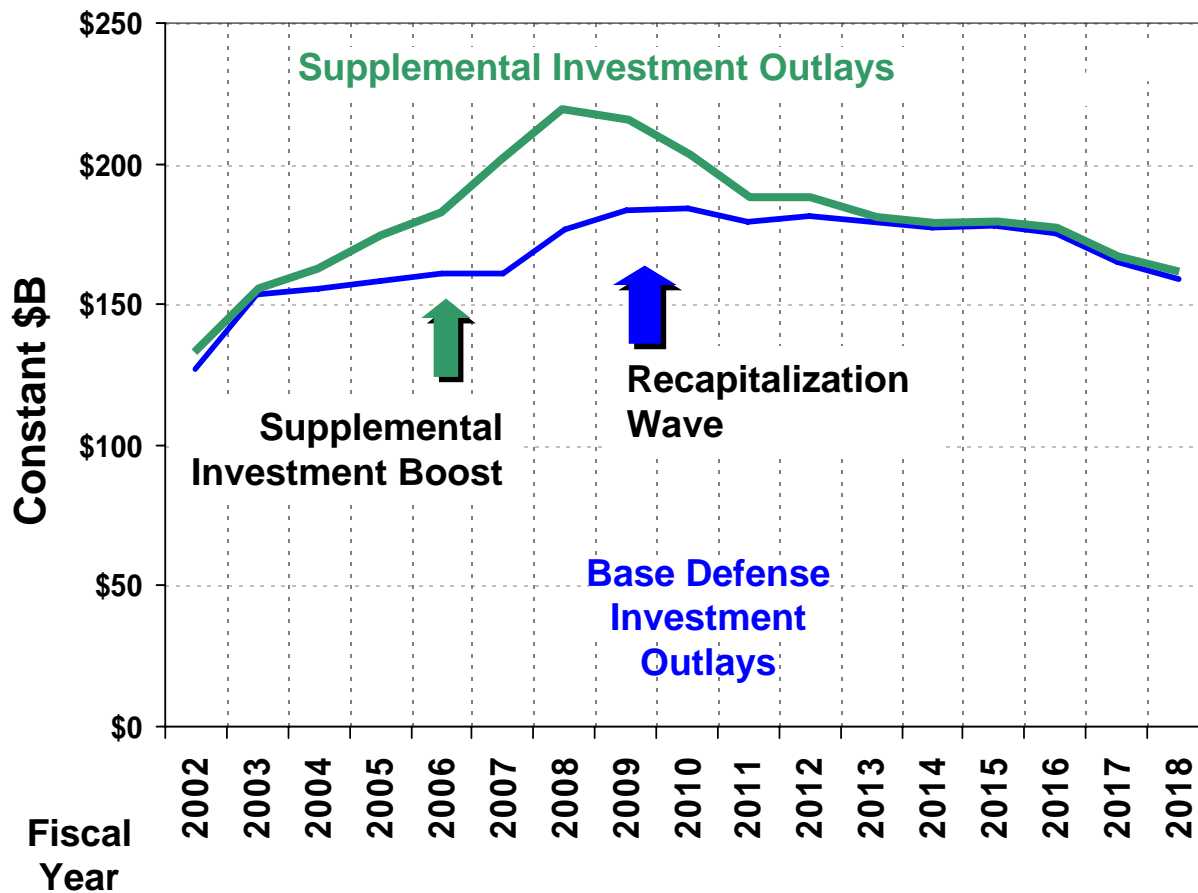







- O&M drivers
  - High Optempo
  - Aging fleets
  - Increasing complexity of weapons
  - Rising fuel costs
  - Increasing use of industry contractors
- MilPers drivers
  - Force augmentation (+92,000)
  - Healthcare (costs doubled 2000-2005)
  - Rate of military retiree and dependents increased 6.0% per year 2001-2005
  - Upwards pressure on compensation due to private-sector benchmarking

- Risk that O&S costs will erode investment accounts
- The only historical means to curb O&S growth has been to reduce end strength

# Investment spending will decline in real dollars

**Investment = Procurement + RDT&E**  
*Budget Authority, Constant \$*



-  Current investment funding forecast insufficient to fully fund current portfolio
-  Cost increases, (historically 15%) could add a \$25B burden
-  May see additional Service requests
-  O&S budget intrusion
-  Portfolio trades will continue, placing premium on program performance

Source: DoD Greenbook FY08, GEIA

## The Services indicate investment prioritization on platforms

### Service Investment Priorities

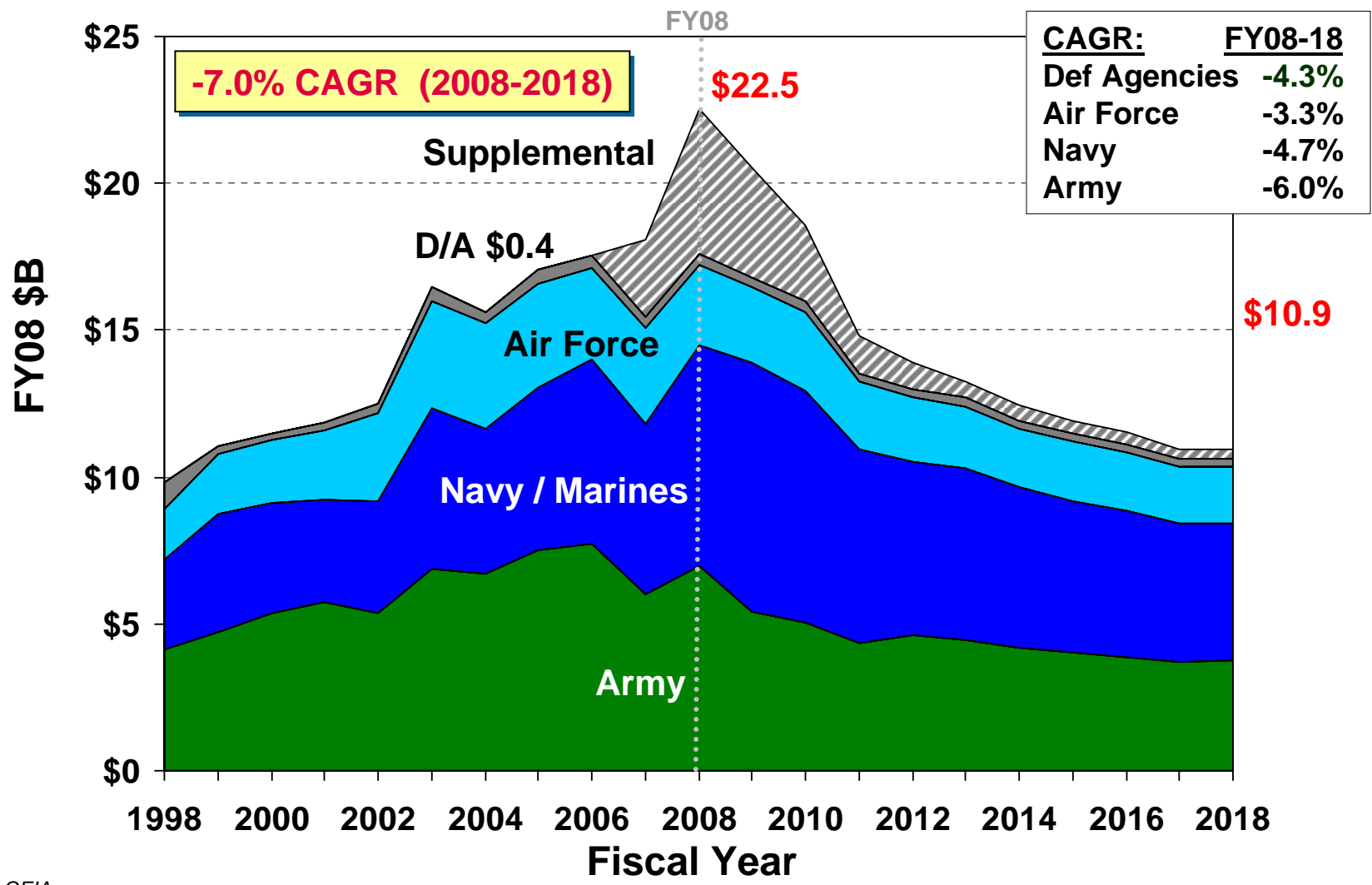
Service	Investment Priorities
Air Force	<ul style="list-style-type: none"> <li>• F-22</li> <li>• KC-X</li> <li>• C-17/C-5</li> <li>• CSAR-X</li> <li>• JSF</li> <li>• LRS</li> <li>• SBIRS</li> <li>• TSAT</li> <li>• Space Radar</li> </ul>
Navy	<ul style="list-style-type: none"> <li>• Shipbuilding (CVN-78, DDG-1000, LPD-17, LHA(R), Virginia)</li> <li>• Aircraft modernization (JSF, F/A-18 E/F, EA-18G, BAMS, MMA/P-8A)</li> </ul>

Service	Investment Priorities
Army	<ul style="list-style-type: none"> <li>• FCS</li> <li>• FMTV/JLTV</li> <li>• Helicopter modernization</li> <li>• MRAP</li> <li>• Force augmentation</li> </ul>
Marine Corps	<ul style="list-style-type: none"> <li>• JSF</li> <li>• Expeditionary Fighting Vehicle (EFV)</li> <li>• Light Armored Vehicle (LAV)</li> <li>• Amphibious shipbuilding</li> <li>• V-22</li> <li>• CH-53K</li> <li>• Force augmentation</li> </ul>

## Missiles & Weapons budgets will decline over the next decade, with emphasis on upgrades as opposed to new starts

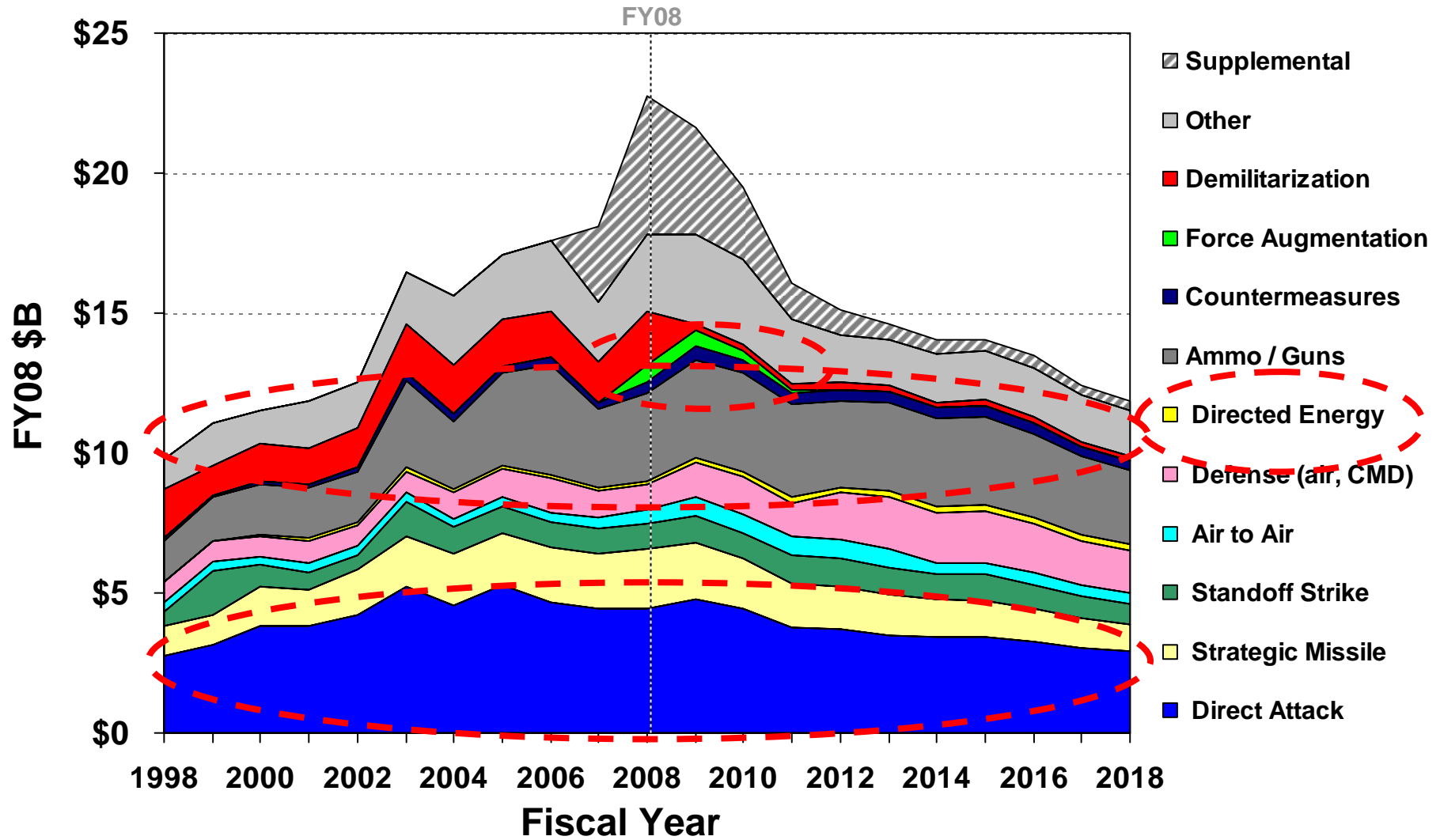
- Missiles & weapons budget will decline over the forecast period
  - Pressure on topline and between Services
  - Supplemental war funding expected to drop off in near term
  - Several major programs have/will be winding down
  - Concern weapons will become bill payer for platforms
- Spending profile shows few new program starts
  - Emphasis on improving and upgrading legacy systems
  - Iraq/GWOT driving primary requirements and capability gaps
  - Replenishment for expended ordnance and fatigue
  - Force Augmentation (Army, USMC) in near term

# Market Forecast: By Military Service



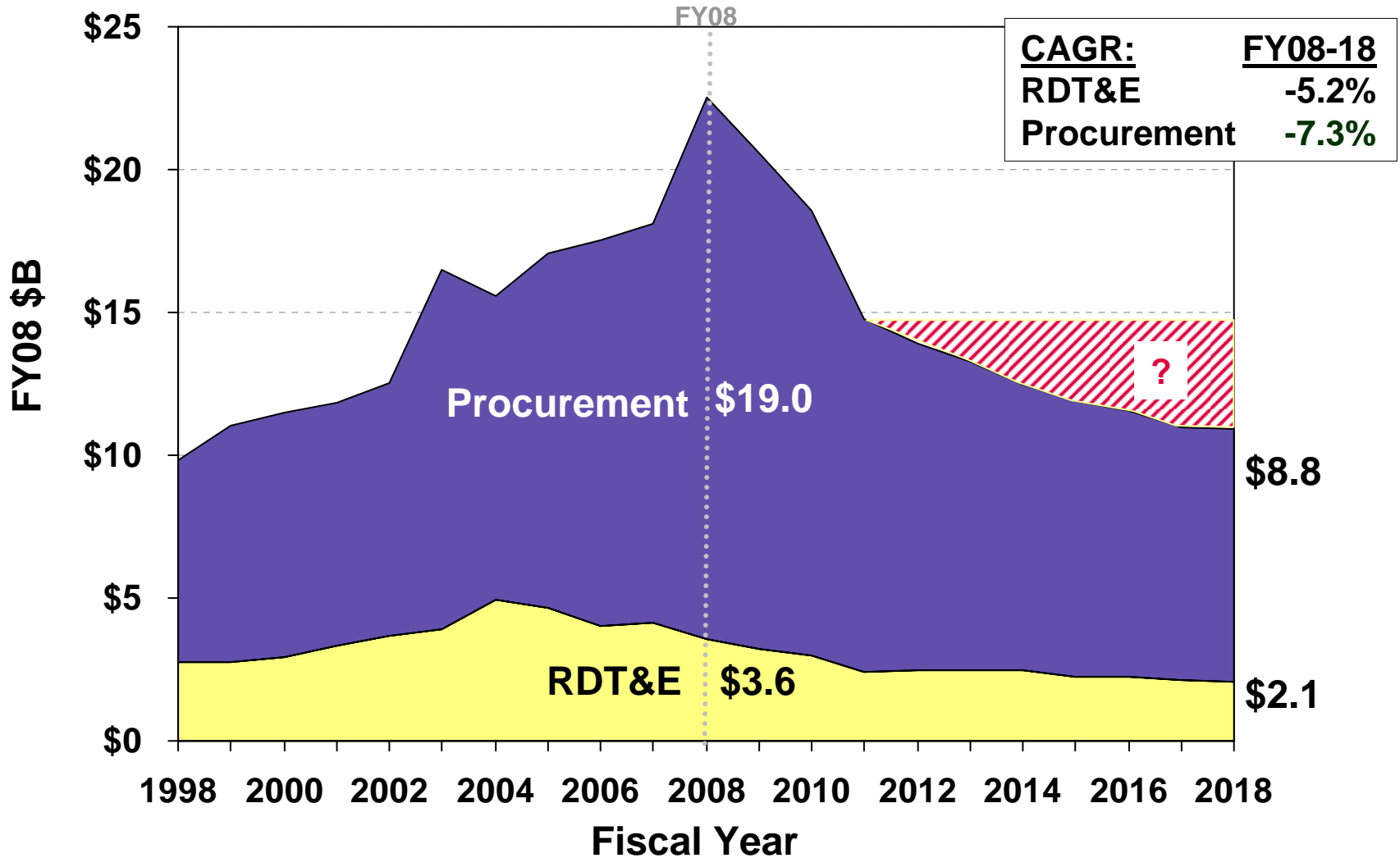
Source: GEIA

# Market Forecast: By Segment



Source: GEIA

# Market Forecast: Procurement vs. RDT&E



Source: GEIA

# Evolution of precision engagement drives perception of missiles and weapons versus other defense investment segments

**1943**



**1970**



**Accuracy**

**1991**



**2003**

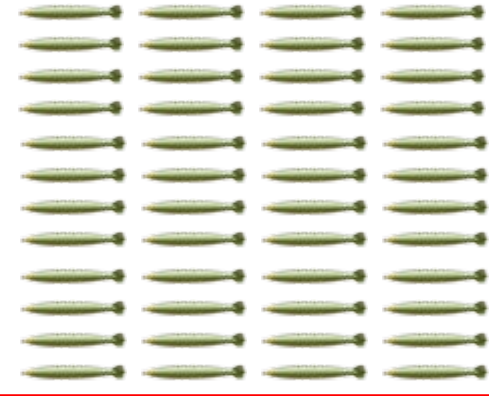
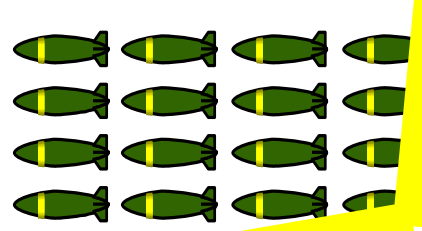
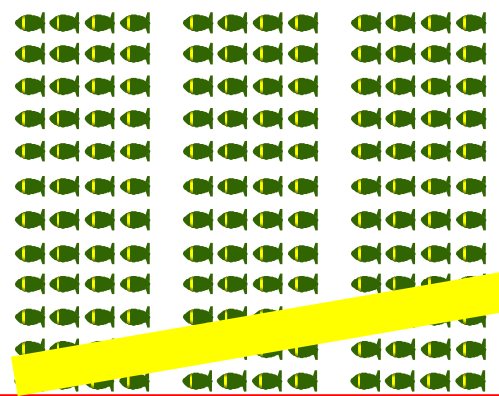


**1500 B-17 sorties**  
9000 bombs  
3300 ft CEP  
One 60' x 100' target  
WWII

**30 F-4 sorties**  
176 bombs  
400 ft CEP  
One Target  
Vietnam

**1 F-117 sortie**  
2 bombs  
10 ft CEP  
Two Targets per Sortie  
Desert Storm

**1 B-2 sortie**  
80 bombs  
<20 ft CEP  
80 Targets per Pass  
All Weather



Source: USAF



**Despite today's battlefield challenges, US forces are using existing weapons for desired effect...**



**...the real issue is targeting and networking**

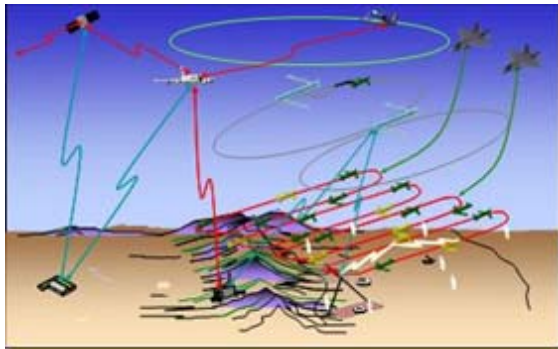
# Iraq is driving many of the capability requirements

- Moving targets, fleeting targets
- Precision engagement in all weather
- Urban Close Air Support (CAS)
- Shortened kill chain
- Improved reliability
- Low collateral damage
- Non-lethal effects
- GPS interrupted / denied environments
- Hard and Deeply Buried Targets (HDBT)
- O&S assumptions built into design due to captive carry



## Current Environment: Key Technologies

- Multi-mode seekers
- Datalinks
- Sensor fuzing
- Flexible warheads, scalability
- Hypersonic
- Smart fuzes
- Directed energy



**Smart technology insertion needed to achieve cost-friendly, balanced capability portfolio**

# Numerous potential opportunities...

## Near term <2010

- JAGM
- Smart artillery, mortars, rockets, tank rounds
- Direct attack moving target capability (DAMTC)

## Mid-Term 2010-2015

- FCS Precision Munitions
- Weapons for UAVs
- Hard and Deeply Buried Targets
- Tactical Laser
- High Power Microwave
- Over-the Horizon Anti-Surface Warfare Weapons
- Swarm Ship Defense
- Joint Dual Role Air Dominance Missile (AA, AG)
- Long-range strike weapon
- Next-gen Torpedoes
- Non-Lethal Effects

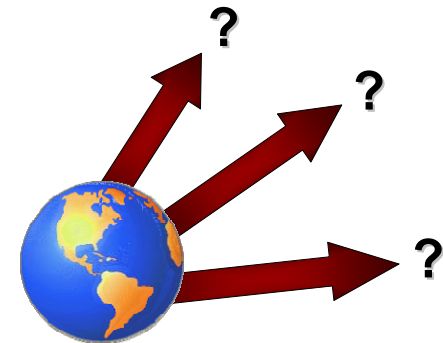
## Far-Term 2015+

- Directed Energy
- Future Cruise Missile
- Electro Magnetic Rail Gun
- Autonomous Target ID

**...but no clear roadmap**

## Impact of a “Global Terrorism” vector

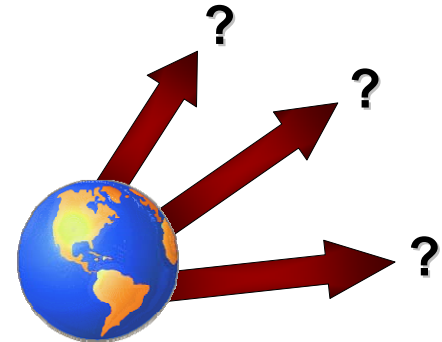
- Emphasis on CAS in any environment with small, high-speed, precision weapons
- Requirements may expand for:
  - Fleeting target capability
  - Sensing and discriminating low-profile targets
  - Networking of all ISR platforms to rapid strike
  - Emphasis on speed over range
  - Low collateral damage
  - Scalability
  - Precision in all environments
  - Directed energy for non-lethal effects
  - Loitering weapons
  - Weaponizing UAVs



**No appreciable difference versus baseline budget, though requirements may shift**

## Impact of a “Multipolar Alignment” vector

- Technology development to prepare for near-peer challenge:
  - Increased emphasis on baseline requirements (i.e. moving targets, all weather, networked weapons, etc.)
  - Emphasis on range as well as speed – fast, standoff weapons
  - Over-the horizon surface warfare
  - Advanced torpedoes
  - Cruise missiles
  - Hypersonic propulsion technology
  - Directed energy for force application / protection
  - UCAV weapons



**Budget increases, though missiles & weapons  
will continue to compete with platforms**

# Potential disruptions

- Directed Energy
  - DE expected to be complementary to kinetic weapons
  - Technology development may come in advance of CONOPS / policy evolution
  - User pull required
  - ABL shutdown (FY 09) and ATL, HEL tech demonstration programs may indicate how quickly DE evolves operationally
- Cyberspace
- Convergence with or divergence towards other domains and sciences
  - Nano
  - Robotics
  - Bio

# Messages to Industry

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- Contractors are doing a good job developing technology and addressing capability gaps
- Make the dumb weapons smart and the smart weapons cheap
- Don't try to add capability when it's not needed
- Emphasize realistic cost estimates



***Thank You***