Precision Strike Annual Review

Current and Future Testing Challenges
Precision Strike Weapons

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March 16, 2016

Overview

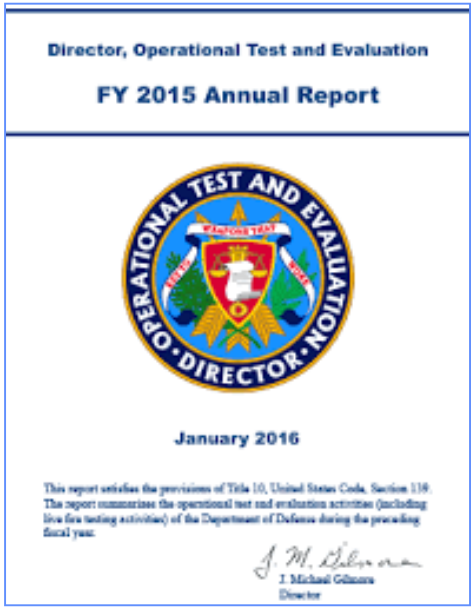
- DOT&E Role and Responsibilities
- Program Challenges
- Aging and Limited Ranges
- Hardened and Deeply Buried Target Challenges
- Modeling and Simulation
- Hypersonic Test
- OPSEC Tensions and Constraints
- Cybersecurity
- Questions

Answering Critical Questions Up Front

- **DOT&E ≠ "*Department of the Enemy*"**
- **Directorate's motto is not in fact:**
  "*We're not happy until you're not happy*"
- **Yes, precision weapons testing is increasingly more complex and challenging today and will be even more so in the future**

DOT&E's Responsibilities

- **Prescribe DoD OT&E and LFT&E policy & guidance**
- **Monitor & assess designated DoD programs on OT and LFT oversight**
  - ***DoD ACAT 1 programs; others at Director's discretion***
- **Member of Defense Acquisition Board**
- **Approve Test and Evaluation Master Plans and Operational Test Plans**


Director, Operational Test and Evaluation

FY 2015 Annual Report

January 2016

This report satisfies the provisions of Title 10, United States Code, Section 139. The report summarizes the operational test and evaluation activities (including live fire testing activities) of the Department of Defense during the preceding fiscal year.

J. Michael Gilmore
Director

DOT&E Statutory Reporting

- **Initial Operational Test and Evaluation & Live Fire Evaluation Reports**
  - **Informs SECDEF, Service Secretary, Vice Chairman Joint Chiefs of Staff, Congressional Committees (HASC, SASC, HAC, SAC)**
  - **Commonly referred to as the DOT&E "BLRIP" Beyond Low Rate Initial Production Report**
    - ➢ **Test Adequacy - operational and live fire testing**
    - ➢ **Operational Effectiveness**
    - ➢ **Operational Suitability**
    - ➢ **Survivability and Lethality**
    - ➢ ***Report required before full rate production***
- **Report annually to Congress**

DOT&E Engagement

- **Close program coordination at action officer and executive level with the Services**
- **Early fielding support to warfighters**
  - **Laser JDAM / Massive Ordnance Penetrator / LRASM / F-22 AIM-9X**

- **Supports integrated test constructs where feasible**
  - Potential for reduction in SDB II OT from DT drops
- **Experimental test design development assistance**
  - Potential for better power of analysis with fewer tests
- **Resource Enhancement Program (REP) funding**

Most of us are warfighters and want the programs to succeed

Programmatic Challenges

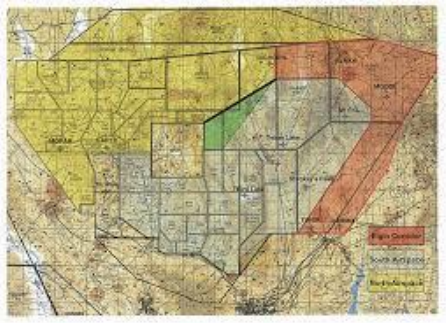
- **Acquisition*…if it were easy anyone could do it***
- **Systems increasingly complex with many interdependencies across multiple platforms and domains**
- **Almost all programs experience challenges and discovery which create delays and stress schedules**
  - **Some programs move forward with less than ideal solutions**
  - **Not all problems are discovered in DT**
- **Resources needed limited to prove capabilities and correct deficiencies are always constrained**
  - **New capabilities often require new and/or special test resources with their own development schedules and risks**



Reducing test sometimes seen as potential way to meet cost and schedule

Range Constraints & Aging Infrastructure

- **Limited opportunity to test weapons capability extremes**
  - **Range and weapons safety footprint**
  - **Tension with FAA on GPS denial/jamming/deception**
- **Range threat densities and laydowns**
  - **Not keeping pace with evolving weapons and threat capabilities Range time is expensive and limited**
- **Increased need for mobile and high fidelity targets both on land and sea**



Hardened & Deeply Buried Targets

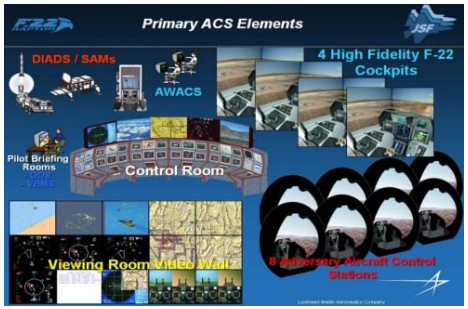
- **Evolving threat - adversaries increasingly using tunnel facilities, often in complex geology, to deny U.S. ability to strike with kinetic effects**
- **Increased adversary proliferation in tunneling technology and knowledge**
  - **HDBT construction to protect critical targets available to many more potential adversary state and non-state actors**
- **Test Sites: Require new & more HDBT tunnel test bed sites**
  - **Current test sites are limited in replicating increasing number and complexity of strategic HDBTs for all manner of testing and tactics development and validation**
  - ***Current and planned damage to existing structures, constructed in the 1990s, will render them unusable for future modification and testing***
  - **Need for future: reconfigurable sites to support different test objectives & effects**

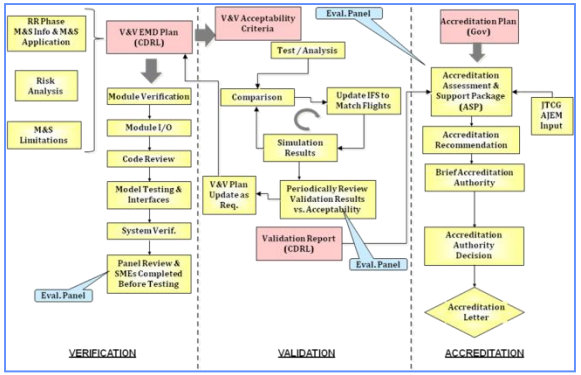
Hardened & Deeply Buried Targets

- **Live testing versus representative targets required to demonstrate weapon effects and validate modeling**
  - **Effects of larger weapons such as the MOP have proven difficult to scale reliably**
  - **Modeling of the complex effects of blast in these complex structures has sometimes been inconsistent; must be tethered to test data to ensure confidence in critical strike capability**
- **Near future requires critical investment and testing of new Hard Target Weapons to hold more complex tunnel and deeply buried facilities at risk**
  - **Limited Massive Ordnance Penetrator quantity and carriage capability**
  - **No 5,000lb weapon capability currently for F-35**

Modeling and Simulation (M&S)

- **Limitations in practicality and feasibility of open air testing drives increased use of M&S**
  - **Increasingly relevant**
  - **Must be verified/validated**
  - **Must be used appropriately**
- **M&S development usually concurrent with weapons development**
  - **Subject to many of the same cost and schedule challenges**
- **No unified level of effort to develop comprehensive threat environments**





M&S increasingly invaluable; but must be properly verified, validated , accredited, and employed

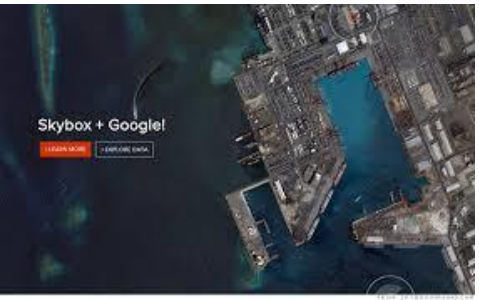
Hypersonic Test

- **Hypersonic weapons are here**
  - **China conducted a sixth test of its hypersonic maneuvering strike vehicle, the DF-ZF (previously designated the WU-14), in November 2015**
  - **Russia and French companies are collaborating on a hypersonic strike capability**
- **Current U.S. hypersonic T&E infrastructure is inadequate**
  - **Gaps in: ground test capability, test assets for lethality, sensor integration; guidance, navigation, and controls.**
  - **Testing is required for development of both offensive & defensive system capabilities**
- **The President's Budget includes a $350 million investment FY17-21 as part of the Central Test and Evaluation Investment Development (CTEIP)**
  - **Opportunity to narrow the gap for hypersonic T&E infrastructure**

Hypersonic weapon development, test, and evaluation are required to prevent loss of US advantage

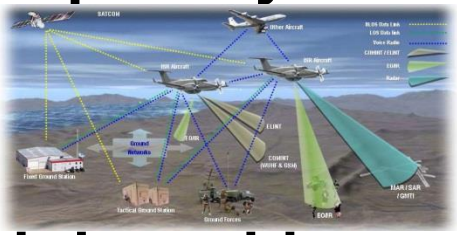
OPSEC Tensions and Constraints

- **Adversary and commercial satellite overhead coverage increasingly available and capable**
  - **Limited windows for transmission of signals or sight sensitive test without risk of overhead collection methods**
  - **Commercial imagery, to include full motion video, now available from companies like Skybox with increased resolution**
- **Increased tension between open air testing of capability versus protecting nature of capability**
  - **Signals transmission & replication of adversary signals**
  - **Construction of representative test sites**

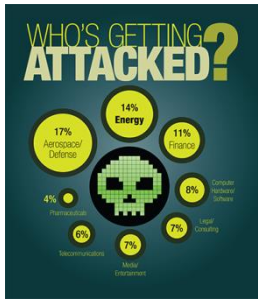


Cybersecurity

- **Cyber adversaries have demonstrated capability to penetrate systems and cause damage**



- **Increasing net-enabled nature of warfighting adds new vulnerabilities along with new weapons capability**
  - **Mission planning systems <u>required</u> for employment and create opportunity for weapon penetration**
  - **In-flight target updates and semi-autonomous weapons capabilities create unique cyber attack possibilities**
  - **Cross domain systems introduce risk from outside**



- **Special Access and Nuclear certified platforms create unique challenges in cybersecurity testing**
- **DOT&E requires Cooperative and Adversarial Testing**
  - **Red Cybersecurity testing teams limited in number**

Testing of cybersecurity is difficult but absolutely essential

Summary

- **Weapons development and testing isn't getting any easier – complexity demands complex test venues and means of proving capabilities**
- **Current and future weapons programs face many challenges to test programs**
- **Test infrastructure requires renewed investments**
- **Modeling and Simulation will become more important to test, but must be properly VV&A'd and tethered to appropriate open air test points**
- **Cyberspace offers potential asymmetric advantages to adversaries - must be countered**

Questions / Comments