



Electronic Warfare Infrastructure Improvement Program (EWIIP)



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Central Test & Evaluation Investment Program (CTEIP)



Mission: Develop or Improve Major Test Capabilities that have Multi-Service Utility

• Established in FY91 by Congress with 6.4 RDT&E funds

➤ **Long-Term Multi-Service Investments**

➤ **Near-Term Investments**

Joint Improvement & Modernization (JIM)

JIM-Core

- 3-5 year requirement horizon
- EMD of major test capabilities
- Must address multi-service need
- Development, not procurement
- Services & Agencies budget for O&M over life-cycle
- \$110-120M/year

JIM-EW

- Special DoD area of emphasis
- EMD of electronic warfare (EW) test capabilities
- Focus is on assessing performance of aircraft against complex new threats.
- Service budget for life-cycle O&M.
- Total cost/schedule is TBD

Resource Enhancement Project (REP)

- 1-2 year requirement horizon
- EMD of instrumentation needed to address an emergent requirement
- Must address OT shortfalls
- Coordinated with DOT&E
- \$18 -20M/year

Threat Systems Project (TSP)

- 1-2 year horizon
- Address shortfalls in threat systems representation
- Coordinated with DOT&E
- \$3-5M/year

Bi-annual Multi-Service T&E Reliance Nomination Process

Multiple DoD EW studies

Annual review of near term OT requirements

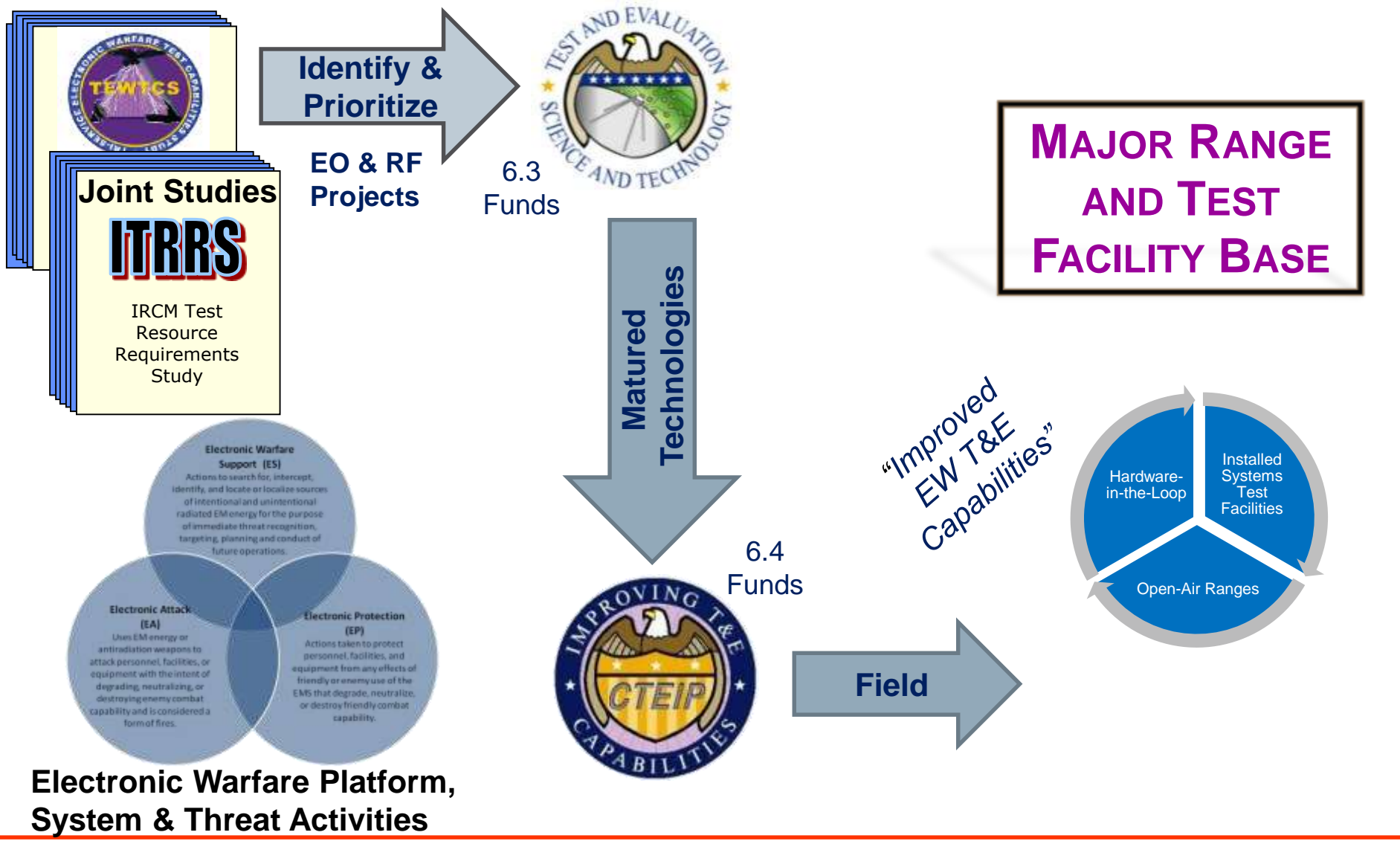
Annual review of threat needs

Requirements Drivers

19 JIM, 6 EW, 13 REP, 11 TSP = 49 Projects



Electronic Warfare Test Capabilities Development





EW Test Capability Needs



- **Both ground facility and open-air range investments**
 - Phased T&E approach, i.e., SIL, HWIL, ISTF, OAR supports development process
 - Chamber environment provides cost-effective early discovery and insight
 - Open air flight tests support full end-to-end performance in single and multi-ship operations
- **Data correlation between testing in each of EW test domains**
 - Best supported by standard/common M&S representation of the physical mission environment and threat environment (e.g., Threat Modeling and Analysis Program (TMAP) models, fly-out models, signature models)
- **Adequate (realistic) representation of existing and emerging threat**
 - DoD threat resources must be upgraded to accurately replicate the characteristics of modern Chinese/Russian threats in quantities that reflect the density and C3 attributes of a robust Integrated Air Defense System (IADS)
- **Expanded/improved distributed test capability**
 - Makes best use of limited high value test resources
 - E.g., JMETC, JDIGS Block A/B, JRAC-OAR, Joint IO Range



Electronic Warfare Test Resource Enhancement Program



- **POM14 Issue Paper addressed previous test capability shortfalls and resource requirements**
- **The Department directed CTEIP to administer development of the key capability upgrades:**
 - Integrated Technical Evaluation and Analysis of Multiple Source Intelligence
 - SIL/ISTF Next-Gen Electronic Warfare Environments
 - Open Emitters and Closed Loop Threat Simulators
 - Threat IADS Upgrades
- **POM15 Issue Paper addressed additional test capability shortfalls and resource requirements:**
 - NEWEG upgrade at the BAF
 - ADTRA upgrade at the BAF



Open-Air Range (OAR) Initiatives



Radar Signal Emulator (RSE) Open Loop Emitter Project



Description

Develops & fields high fidelity S,C-Band, radar threat signal emulators

- Re-programmable, re-locatable
- AESA - GaN technology
- 14-18 systems (Buy to Budget)
- Initial deployment - NTTR for F-35 IOT&E
- Deployable to other ranges after 2018/2019 time frame

Current Status

- CEA Technologies (Australia) is fabricating array tiles for (2) prototype systems
- General Dynamics "Prime Mover" support vehicle PDR - May 2015
- First delivery to NTTR in Mar-May 2016

CTEIP Actions

- Transition from risk reduction prototypes to full-scale development/procurement via government to government PA
- Complete study of alternative (RSE) O&S business models



Advanced Anti-Air Threat Simulator, Block B (AATS-B)



Description

Closed-loop, transportable, surrogate for C-band WESTPAC SAM shooter

- Design based on Navy's fixed site design AATS to be fielded at ECR
- PESA space-fed antenna
- Search, track, and missile fly-out
- (2) AATS-B units to be fielded at NTTR

Current Status

- Antenna System "Above Decks" PDR completed at GTRI, Jan 2015
- Receiver/Processor "Below Decks" PDR completed at EWA, Feb 2015

CTEIP Actions

- Work with Navy to consolidate/streamline AATS program management
- Explore opportunities to compress AATS-B "event driven" development schedule
- Preserve design options to expand from single to multi-threat capability

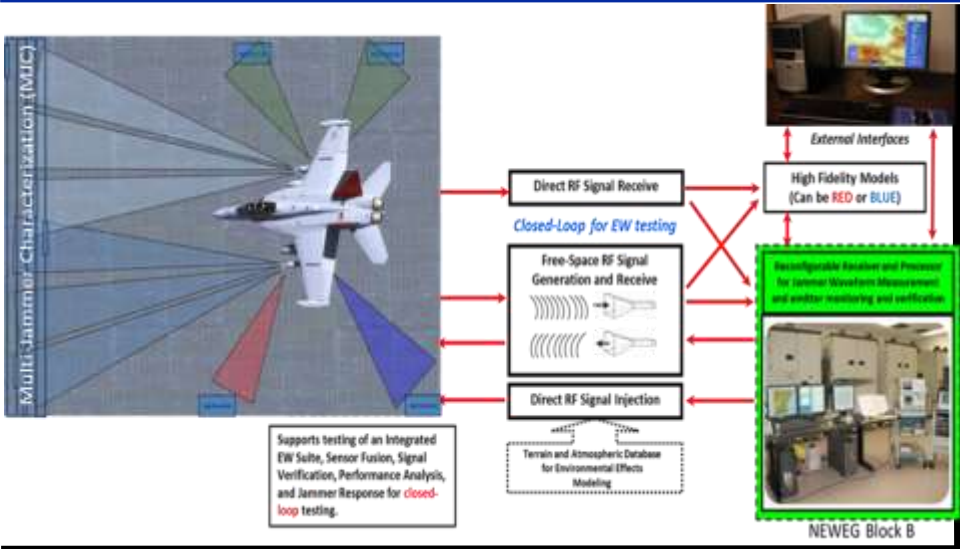


Ground Test Facility Improvements



NEWEG Block B

Next-Gen Electronic Warfare Environment Generator



Description

High-fidelity EW signal generation, modular, open architecture, scalable, reconfigurable,

- Direct-inject at ACETEF, BAF, ECSEL
- Free-space chamber radiating configuration at BAF and ACETEF
- Automated EWIRDB interface

Current Status

- SSC subsystem CDR completed Dec 2014
- DGEN PDR completed Feb 2015
- MAA subsystem PDR completed Apr 2015
- RFGEN SRR/SDR completed May 2015

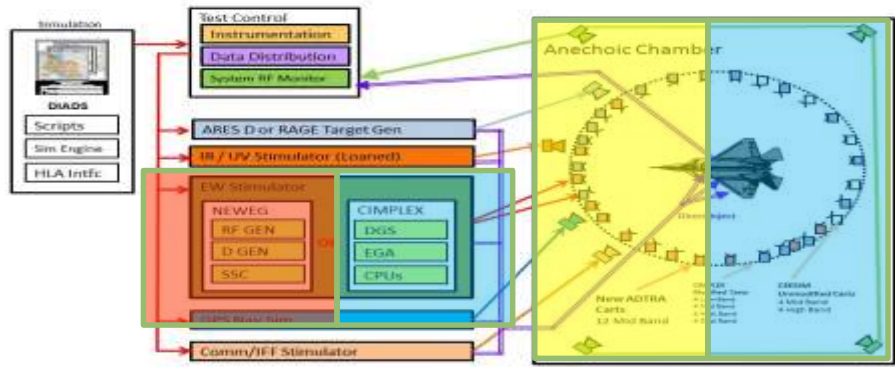
CTEIP Actions

- Explore legacy system configurations that will enable the Department to expand use of standard EWIRDB threat signal waveform descriptions



CIMPLEX/ADTRA/NEWEG (C-A-N) Time-Phased BAF Upgrade Approach

CIMPLEX
(2017)



NEWEG
(2020 / 2021)



ADTRA
(2019)



Upgrades to existing CEESIM Threat Simulator Capability

- Improved test fidelity
- Upgrades to accommodate higher density scenarios
- Upgraded Control Computers (CC), Digital Generation System (DGS) and Advanced Pulse Generator (APG – RF Source)

Addresses B-2 DMS BAF test capability shortfalls

- Delivers 12 new MB channels (6 dual-channel carts)

New CIMPLEX carts will be compatible to use w/ NEWEG

Develops dynamic RF transmission equipment for free space anechoic facilities to address current shortfalls:

- Real-time pulse-to-pulse control of polarization, beamwidth, Beam pointing angles
- Sufficient effective radiated power
- Uniform illumination of the SUT across the entire frequency range
- Ability to rapidly setup and change antenna configurations

Free-space and direct-inject high-fidelity EW signal generation at the BAF

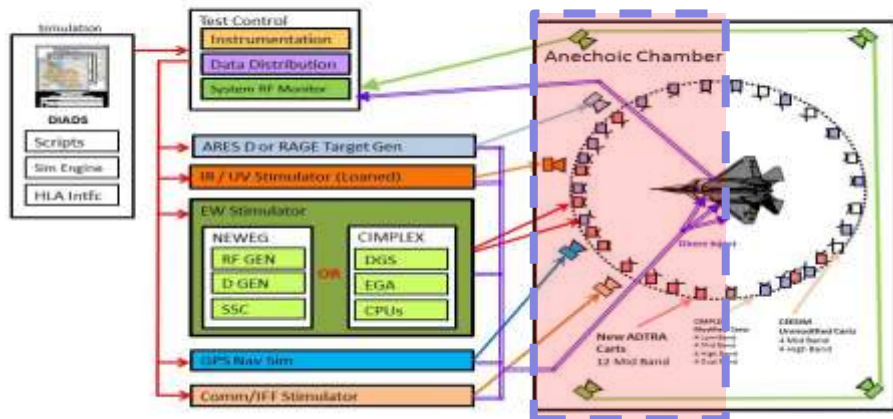
Delta capability beyond CIMPLEX

- Direct import of EWIRDB threats
- Wider frequency range, higher IBW, better signal fidelity
- Real time jammer characterization and analysis

Will use ADTRA and CIMPLEX/CEESIM RF carts



Advanced Dynamic Transmit Array (ADTRA)



Description

Delivers 12 RF transmit carts for dense & diverse threat environment at the BAF

- Replaces Horn Antennas with AESA technology
- Replicates RF threats in power, bandwidth, dynamic beam pattern and polarization
- Interoperable with NEWEG and legacy CEESIM

Current Status

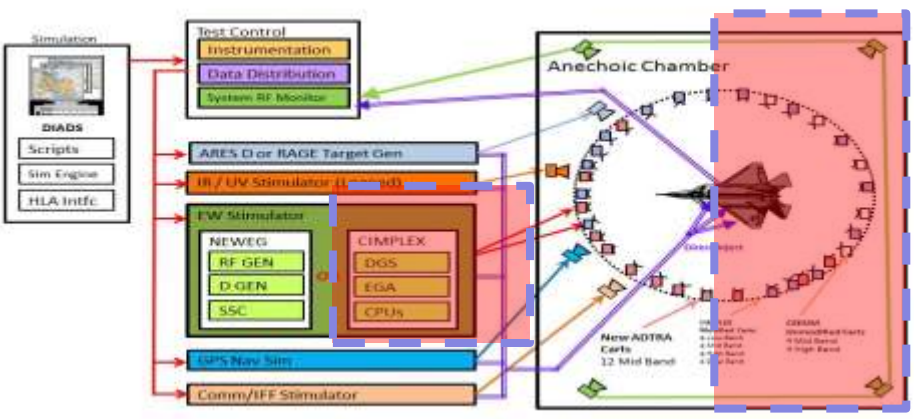
- ADTRA Phase 1 Approval April 2015
- Contract award in process
- PDR Scheduled in Sept 2015

CTEIP Actions

- Update funding profiles to reflect post award contractor cost estimates
- Reassess technical design risk after contract award and PDR



CEESIM Improvement and Modernization Lifecycle Extension (CIMPLEX)



Description

- Upgrades existing CEESIM Transmit Carts to accommodate higher density scenarios
 - Bridge capability to meet near-term test customer needs
 - Upgrades Control Computers (CC), Digital Generation System (DGS)
 - Adds Advanced Pulse Generator (APG – RF Source)

Current Status

- PDR completed - Feb 2015
- CTEIP cost share agreement - Mar 2015
- Contract award – June/July 2015

CTEIP Actions

- Assess feasibility of Pulse Descriptor Word (PDW) translating interface between NEWEG DGEN and NG Amherst’s APG radio frequency generation hardware

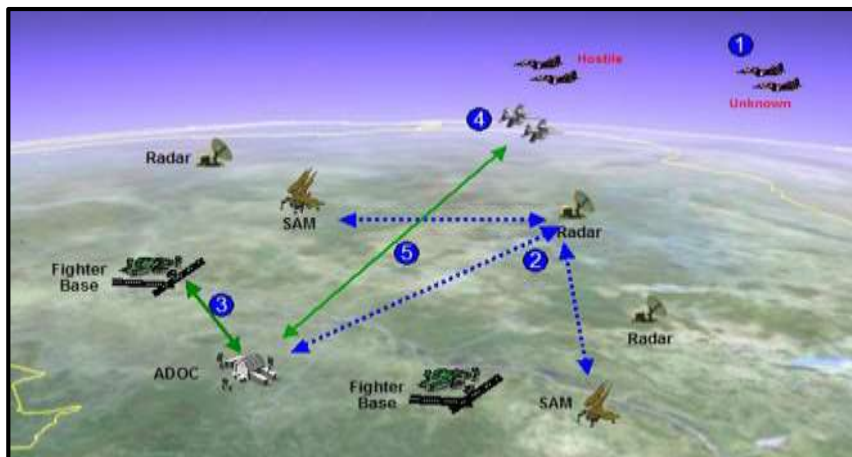


EW Intelligence/Analysis Initiatives



IADS Enhancements

Integrated Air Defense System (IADS)



Capabilities

- Provides realistic IADS Command, Control and Communications for OAR & M&S environments
 - Upgrades DIADS baseline with IC-validated Command Post models
 - Fields threat IADS C3 upgrades at ECR
- Work scope tailored to deliver incremental upgrades each year

Current Status

- IADS Enhancements V&V meeting, March 2015 at COMOPTEVFOR, Norfolk, VA
- Increment #1 PMR completed at DIA/MISIC, April 2015

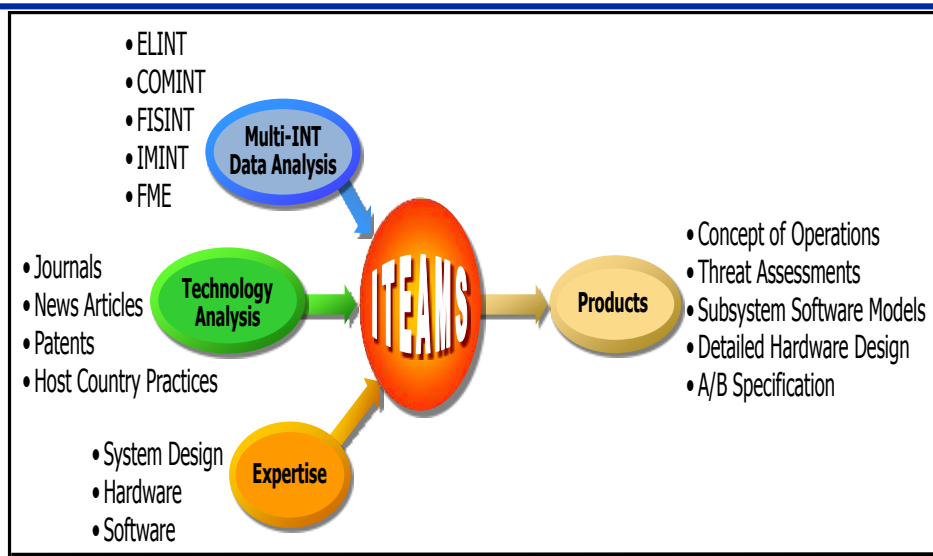
CTEIP Actions

- Align development effort with rapidly evolving C4 threat definition-highest T&E priorities and best intelligence
- Tightly couple with ongoing ITEAMS
- Ensure validation reports contain full disclosure of any intel source data uncertainty and T&E end-use limitations



ITEAMS

Integrated Technical Evaluation and Analysis of Multiple Sources



Capabilities

- Characterize technology /techniques used by threat foreign material developing countries
- Produce detailed designs supporting threat simulator development efforts
- Develop TMAP “authoritative intelligence baseline” models
- ITEAMS support other CTEIP projects like IADS for OT and enhanced IADS

Current Status

- CMR SAM Threat analysis will complete in July 2015
- CLR SAM (Refresh) will complete in December 2015
- CLR-CP (C2) will complete in December 2015
- HLCP (CP) will begin in September 2015

CTEIP Actions

- Ensure ITEAMS funding priorities are aligned with T&E requirements



Summary



- Current DoD capabilities are not adequate to support future testing of “Blue” EW-SUTs against advanced radar threats
- USD(AT&L) has developed a balanced investment strategy to address highest-priority SIL, ISTF, and OAR shortfalls
 - The Department programmed approximately \$450M into the CTEIP budget to fund these developments (FY14 through FY18)
 - Will substantially improve our ability to develop and field advanced technology EW capabilities FY17-20 and beyond
- As part of its MRTFB stewardship role, the TRMC is continuously engaged with the Services and S&TI Centers to identify & resolve other EW test resource shortfalls