The DoD T&E / S&T Program

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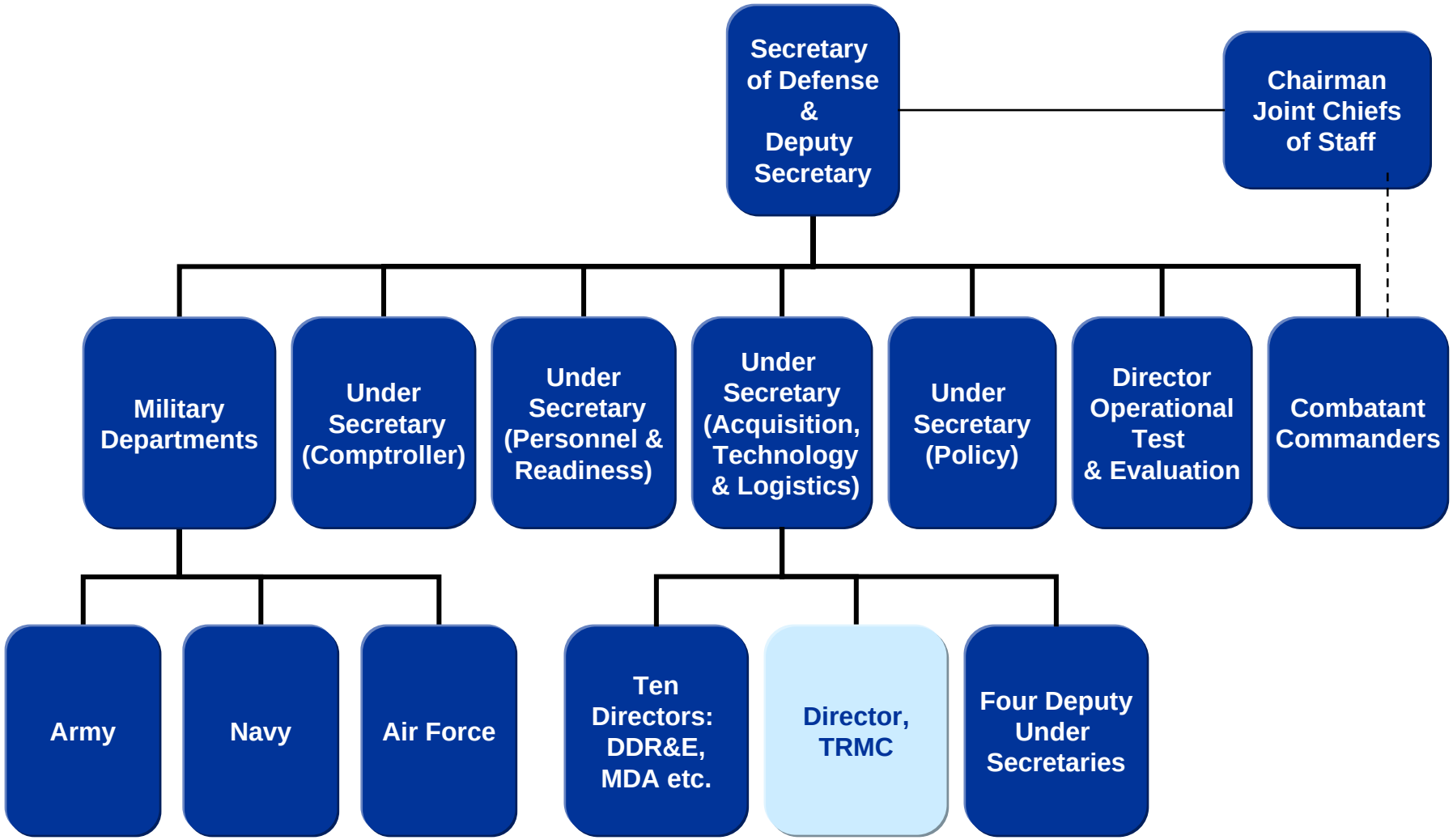
NDIA 9TH Annual Science & Engineering Technology Conference

Test Resource Management Center (TRMC)
Sec. 231, FY 2003 National Defense Authorization Act
DoD Directive 5105.71, March 8, 2004

- **DoD Field Activity**
  - **Established to ensure that the DoD T&E infrastructure is adequate to support the development and acquisition of defense systems**
- **Annually certify that the T&E budgets of the military departments and defense agencies are adequate**
- **Develop a biennial strategic plan that assesses T&E requirements for a period of ten years and identifies required T&E infrastructure investments**
- **Responsible for T&E infrastructure policy for DoD's Major Range and Test Facility Base (MRTFB)**
- **Administer three major T&E investment programs:**
  - **Joint Mission Environment Test Capability Program (JMETC)**
  - **Central Test and Evaluation Investment Program (CTEIP)**
  - **Test and Evaluation/Science and Technology (T&E/S&T) Program**

TRMC T&E/S&T
Direct Report to USD(AT&L)



Synergy through Aligned Investment

T&E/S&T Program

Overview

- **Test & Evaluation / Science & Technology (T&E/S&T) Program started in FY 2002**
  - **Joint DDR&E / DOT&E initiative**
- **Mission**
  - **Investigate and develop new technologies required to test and evaluate our transforming military capabilities**
    - **Include any system that makes our warfighters more survivable and effective in combat**
    - **Mature test technologies from TRL 3 to 6**
- **Goal**
  - **Transition emerging technologies into test capabilities in time to verify warfighting performance**

Shaping Technology into Tomorrow's T&E Capabilities

Why a T&E/S&T Program?

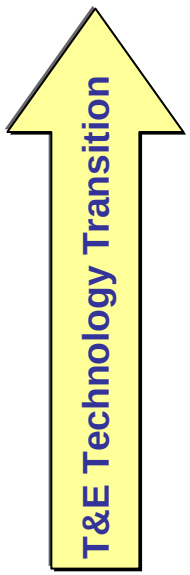
- Nanotechnology
- Biometrics
- Genetic algorithms
- Microelectromechanical systems
- Adaptive optics
- High power microwaves
- High energy lasers
- Synthetic instrumentation
- Multispectral seekers
- Autonomous systems
- Hypersonics
- Intelligent agents

T&E/S&T Program Office

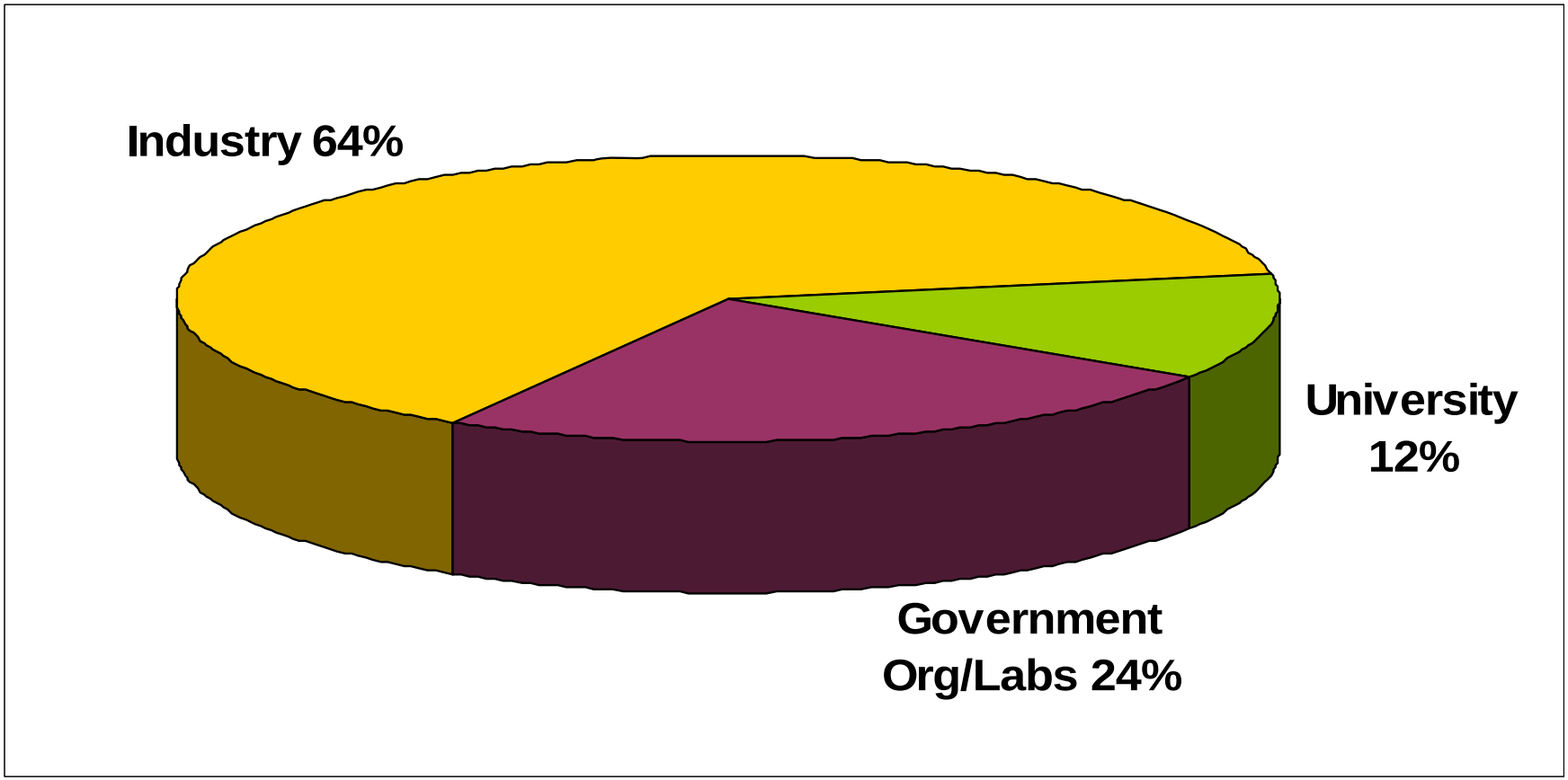
- **What We Do?**
  - Fund high risk / high pay-off T&E R&D projects
  - Foster technology transition to MRTFB and other DoD T&E field activities
- **How We Do It?**
  - Issue annual Broad Agency Announcement (BAA)
  - Tri-Service working groups draft BAAs and participate in proposal evaluation
  - Award T&E R&D projects starting at TRL3 and mature to TRL6
  - Executing Agents (EA) manage test technology Focus Areas
- **Who Do We Fund?**
  - Academia
  - Industry
  - Government laboratories
  - Teams of academia / industry / government labs

Technology Readiness Level

TRL 9	Actual system 'flight proven' through successful mission operations
TRL 8	Actual system completed and 'flight qualified' through test and demonstration
TRL 7	System prototype demonstration in an operational environment
TRL 6	System/subsystem model or prototype demonstration in a relevant environment
TRL 5	Component and/or breadboard validation in relevant environment
TRL 4	Component and/or breadboard validation in laboratory environment
TRL 3	Analytical and experimental critical function and/or characteristic proof of concept
TRL 2	Technology concept and/or application formulated
TRL 1	Basic principles observed and reported

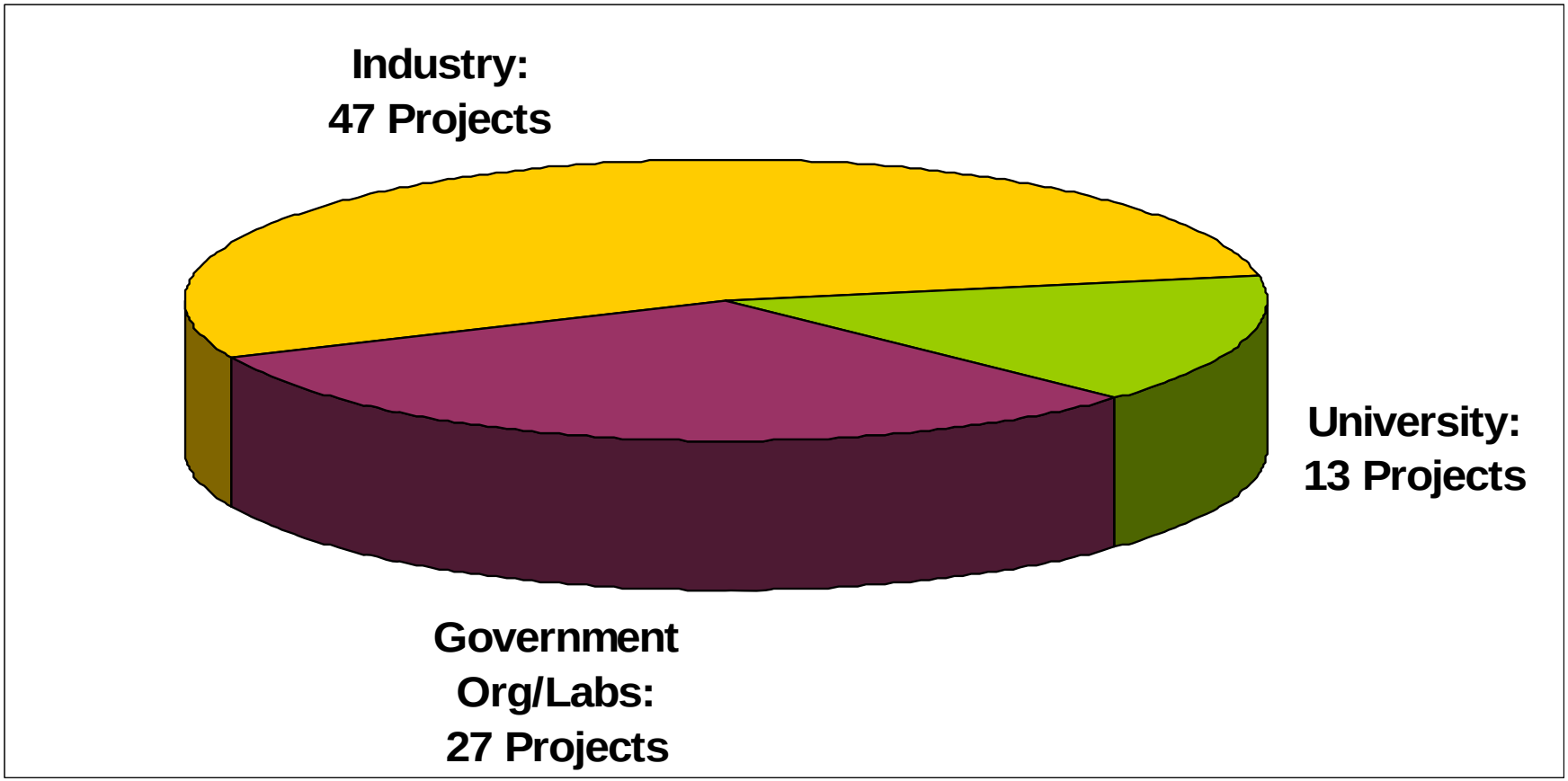


FY 2008 Funding Distribution



Note: numbers apply only to FY08 funding profile

FY 2008 Project Distribution



Note: numbers apply only to FY08 funding profile

FY08 T&E/S&T Focus Areas

- **Directed Energy Test (DET) –** On-board and off-board technologies to assess performance of high energy laser and high power microwave weapon systems

- **Hypersonic Test (HST) –** Technologies to provide high fidelity environments, M&S and instrumentation for testing of air breathing hypersonic vehicle propulsion and flight systems

- **Multi-Spectral Test (MST) –** Technologies to enable real-time, realistic T&E of multi-spectral and hyperspectral seekers and sensors through scene injection and projection

- **Non-Intrusive Instrumentation (NII) –** Technologies for non intrusive sensors, data storage, and power sources to provide continuous, non-obtrusive T&E

FY08 T&E/S&T Focus Areas (cont.)

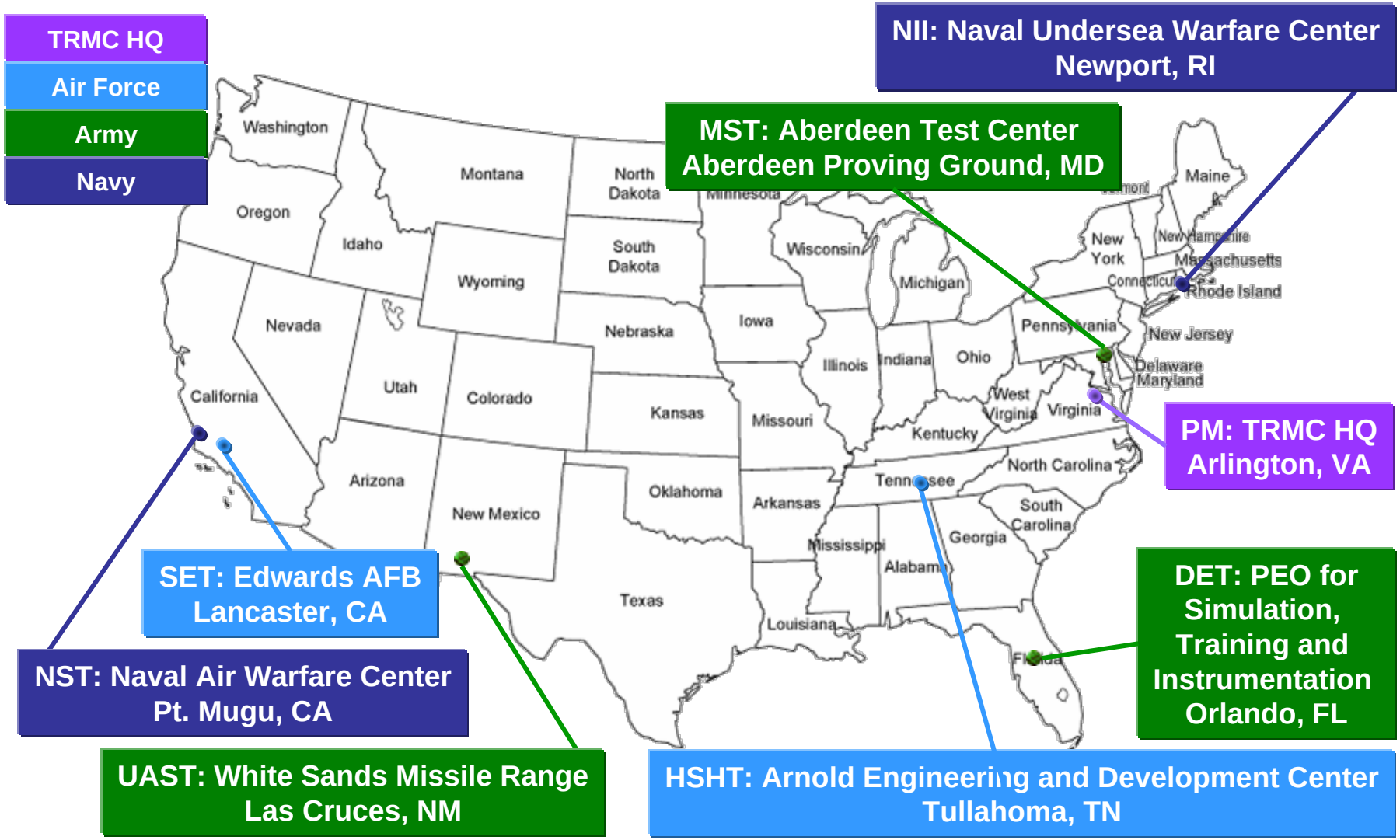
- **Netcentric Systems Test (NST) –** Technologies to measure and assess the performance of the physical, information and cognitive domains of Joint, integrated architectures

- **Spectrum Efficient Technology (SET) –** Technologies to enable more efficient use of legacy telemetry bands and expand into non-traditional areas of the RF spectrum and the optical spectrum

- **Unmanned Autonomous Systems Test (UAST) –** Technologies for T&E of unmanned systems ranging from full tele-operation to totally autonomous, learning performance

111 active projects

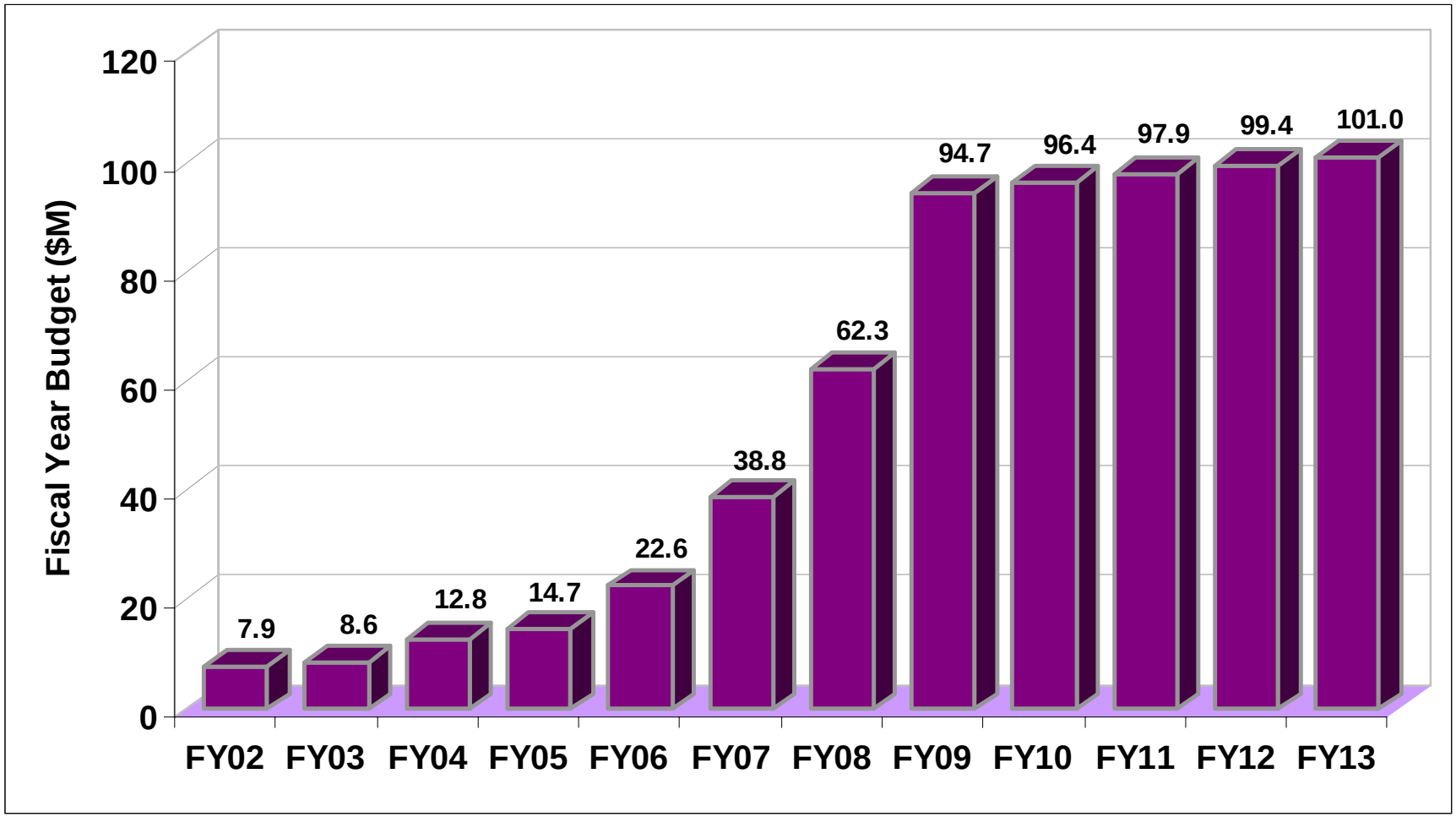
T&E/S&T Program Management



Working Groups

Army	AMRDEC	IEW
	AMSAA	NVESD
	ARL	OTC
	ATC	PEO STRI
	ATEC	RDEC
	ATTC	RTTC
	HELSTF	TRADOC
Navy	NAVAIR	NAWC
	NAVSEA	NUWC
	NRL	SPAWAR
Air Force	AEDC	AFRL
	AFEWES	AFWDC
	AFFTC	46th TW
	AFOTEC	452nd FLTS
DoD	DDR&E	JCS
	DISA / JITC	JFCOM
	DOT&E	

T&E/S&T Program Annual Budget



T&E/S&T Program
Project Selection Process

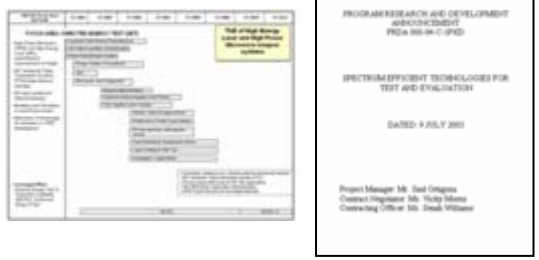
Drivers

Solicitations are issued through http://www.fedbizopps.gov

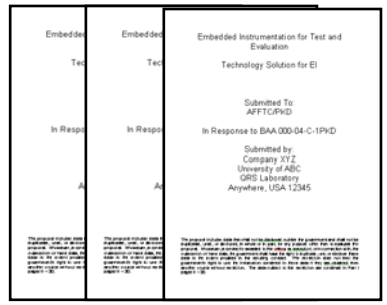
Tri-Service Focus Area Working Group

- Executing Agent
- T&E Community Reps
- S&T Community Reps
- Subject Matter Experts

Needs/Requirements



Roadmaps and Solicitations



Proposals

Source Selection Evaluation Team

- Working Group
- Subject Matter Expert
- Contracting Reps

Recommendations

Executing Agent

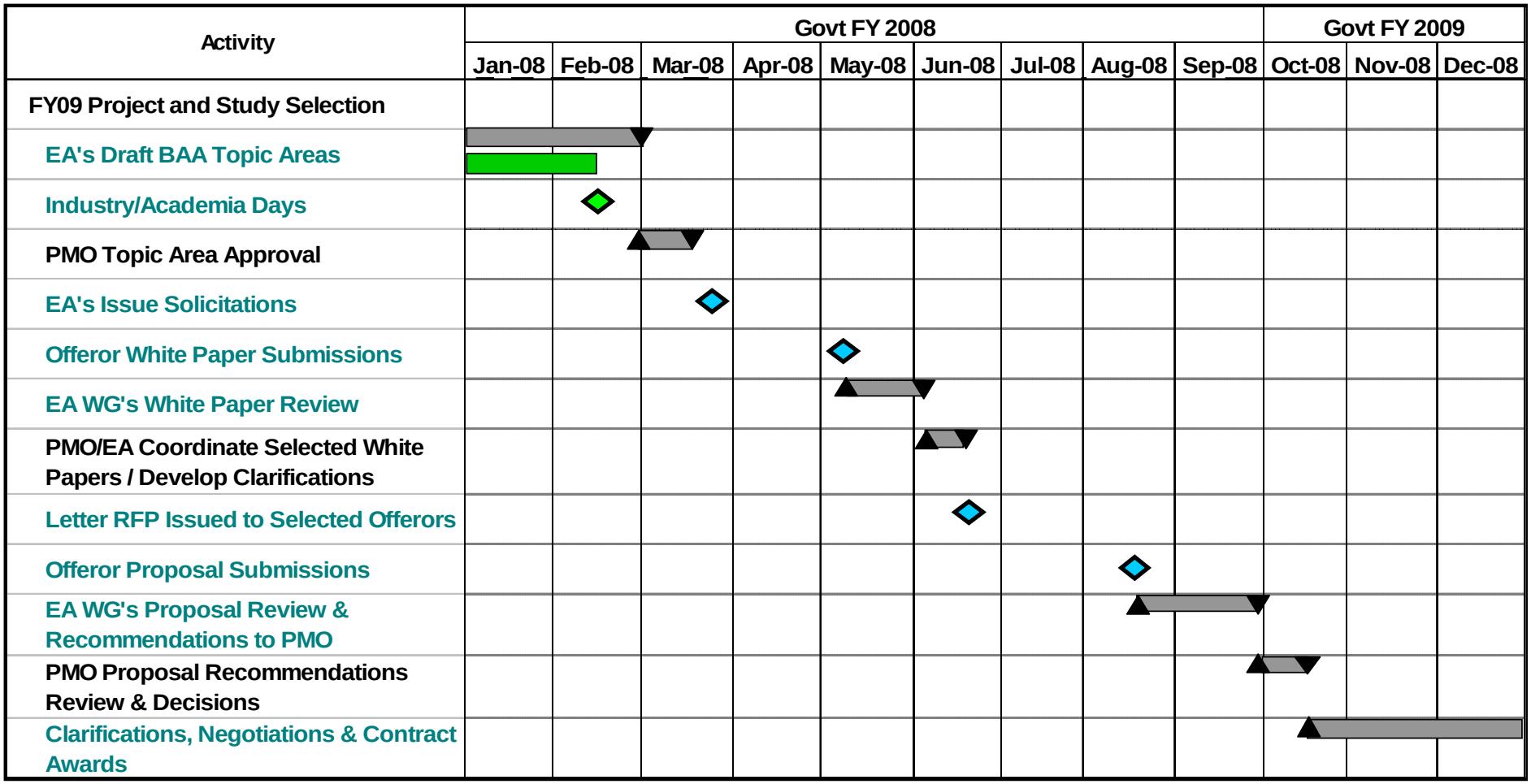
Final Selections

Program Manager

Funding Decision

Focus Area Execution

BAA Schedule

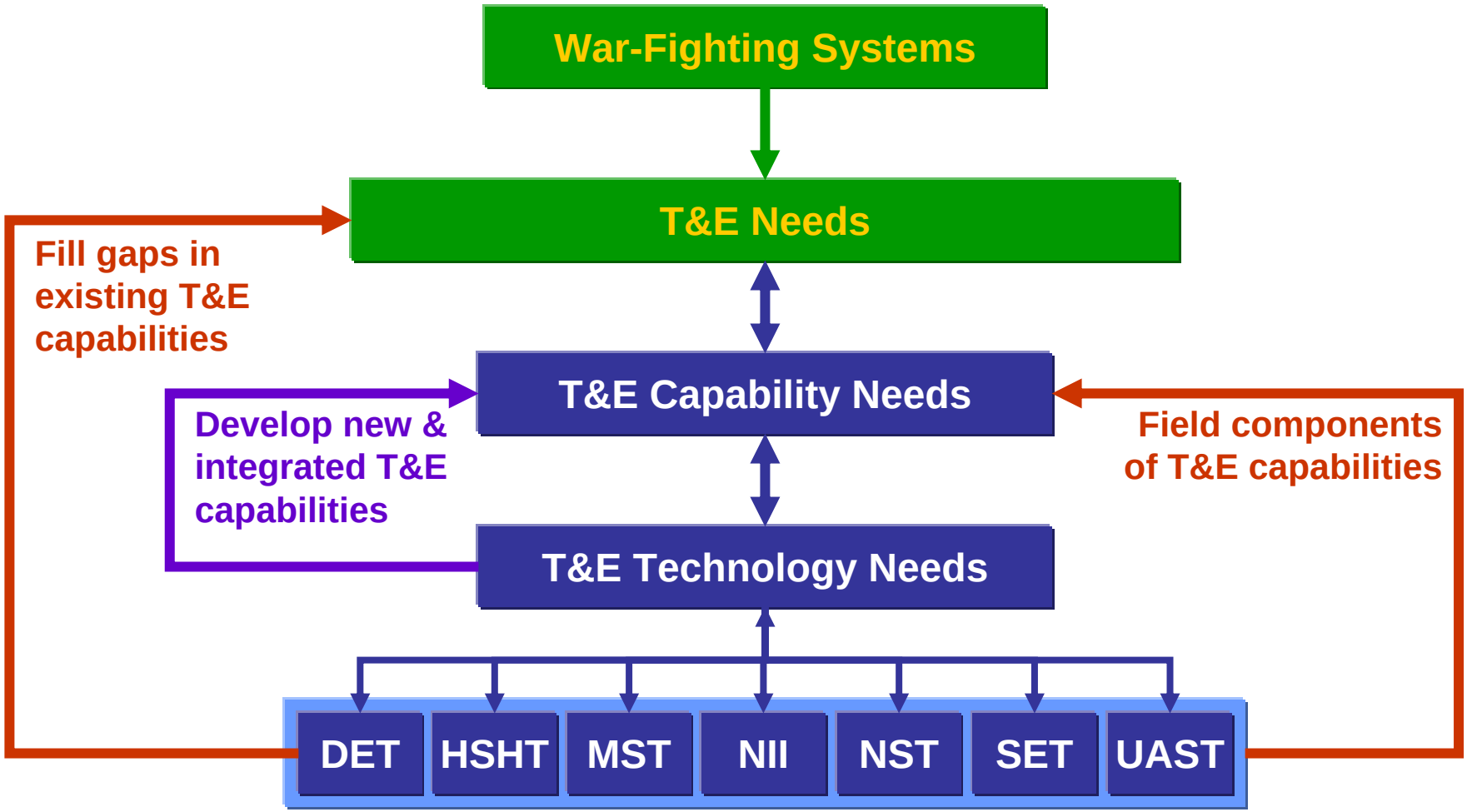


BAA – Broad Agency Announcement
EA – Executing Agent
WG – Working Group
PMO – Program Management Office
RFP – Request for Proposal
FY – Fiscal Year

The Proposal — Key Criteria

- Meets a T&E Need
- Requires S&T work
- High Risk / High Payoff
- Broad application (more than one DoD test activity)
- High potential for transition to development of a test capability

Technology Development Framework



Partnerships

- **Partnerships between universities, industry & DoD laboratories**
  - **Form the best research teams possible**
- **Collaborate to pursue bigger opportunities**
  - **Leverage each others' core competencies**
  - **Share resources**
- **Increase transition opportunities through increased involvement in the T&E/S&T Program**

Success Stories

- **In-Situ Pressure Measurement**
  - **Transitioned to the hypersonic HyFly program which is sponsored by the Office of Naval Research and the Defense Advanced Research Projects Agency**
- **Tactical-Report Generation Test Bed**
  - **Transitioned to the CTEIP Interoperability Test and Evaluation Capability (InterTEC) program and to Joint Forces Command for automated netcentric test planning and scenario development**
- **Steerable Beam, Directional Antenna Concepts**
  - **Transitioned technology to the CTEIP integrated Network Enhanced Telemetry (iNET)**

Success Stories (cont.)

- **Heat Flux Sensor**
  - **Transitioned to Arnold Engineering Development Center for aerothermal measurements by miniaturized heat flux sensors at high temperatures—used in the Shuttle Return-to-Fly Program**
- **Directed Energy Data Acquisition Transformation**
  - **Transitioned to Naval Surface Warfare Center, Dahlgren for conducting T&E of High Power Microwave Systems**
- **Multi-Spectral Stimulator Injection Test Method**
  - **Transitioned to U.S. Army Redstone Technical Test Center Future Force/Future Combat Systems for hardware-in-the-loop testing of multispectral systems**

Summary

- Only DoD S&T program for T&E
- Tri-Service participations
- Focus on transition
- Partnerships
  - Government labs / ranges
  - Industry
  - academia

Questions?

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Back Up

T&E Needs

The R&D project:

- **Addresses the T&E requirements**
- **Fills known T&E gaps**
- **Articulates how the above are to be achieved**

Example: T&E Need

Ground test facilities generally use combustion processes to create representative flight conditions for hypersonic engine testing. The effects of vitiates on the engine performance is not well known. Ground test facilities need a clean air test capability to more realistically simulate actual flight conditions to accurately predict engine performance in flight.

S&T Challenges

The R&D project:

- **Develops new test & evaluation capabilities that do not currently exist**
- **Utilizes /develops beyond state-of-the-art technologies that can be high-risk**
- **Pushes technology to new limits**

Example: S&T Challenges

- Develop resistively heated elements to routinely operate between 2200 to 2400 Kelvin (4535 to 4927 deg F)
- Develop electrical interface materials that can maintain high current (60 Amp or greater) electrical and mechanical connection at extreme temperatures
- Develop element materials and shapes that can withstand temporal temperature cooling gradients of at least a thousand degrees a minute and maintain air seal to prevent internal cooling air from leaking into external airflow and cooling it