

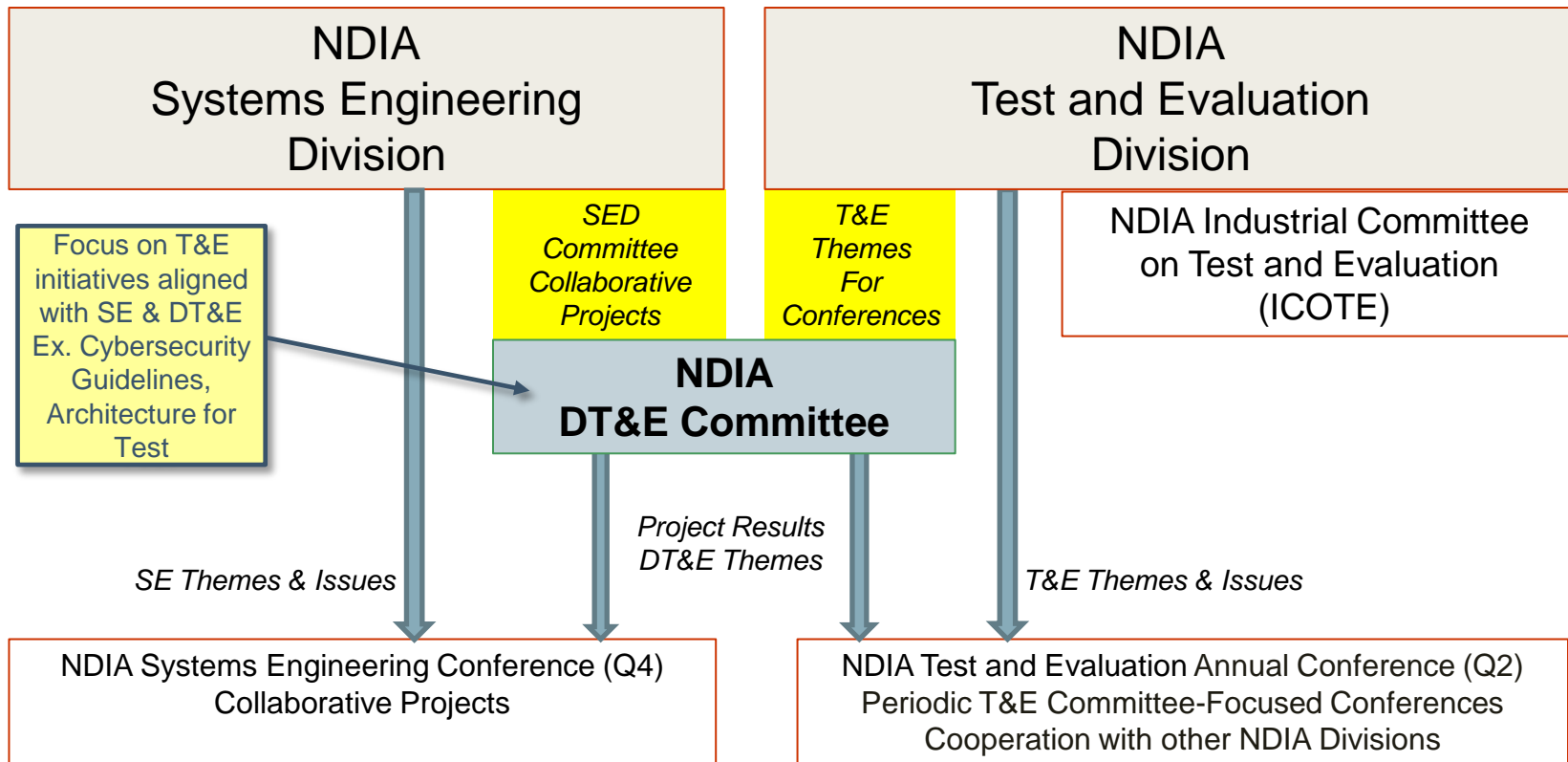
Chief Developmental Tester & Industry Test Lead Partnering for success

NDIA DT&E Committee Project Lead
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Agenda

- **Origin of project (NDIA DT&E Committee)**
- **Project Overview**
- **Strategy to align Industry with new Chief Development Tester & Initiatives**
- **DASD(DT&E) Shift Left initiative**
- **Critical interactions and acquisition timeline**
- **Examples of excellence**
- **Recommendations**
- **Next Steps – Future Work**

DT&E Committee Structure



SE – T&E Collaborate on Projects together

Chief Developmental Tester Project

**TITLE 10, UNITED STATES CODE
 ARMED FORCES**

Subtitle A, General Military Law (§§ 101-3000)
 Subtitle B, Army (§§ 3001-5000)
 Subtitle C, Navy & Marine Corps (§§ 5001-8000)
 Subtitle D, Air Force (§§ 8001-10000)
 Subtitle E, Reserve Components (§§ 10001-end)



Title 10, Section 139b

The Secretary of Defense shall require that each major defense acquisition program be supported by—

“(A) a **chief developmental tester**; and

“(B) a governmental test agency, serving as **lead developmental test and evaluation organization** for the program.

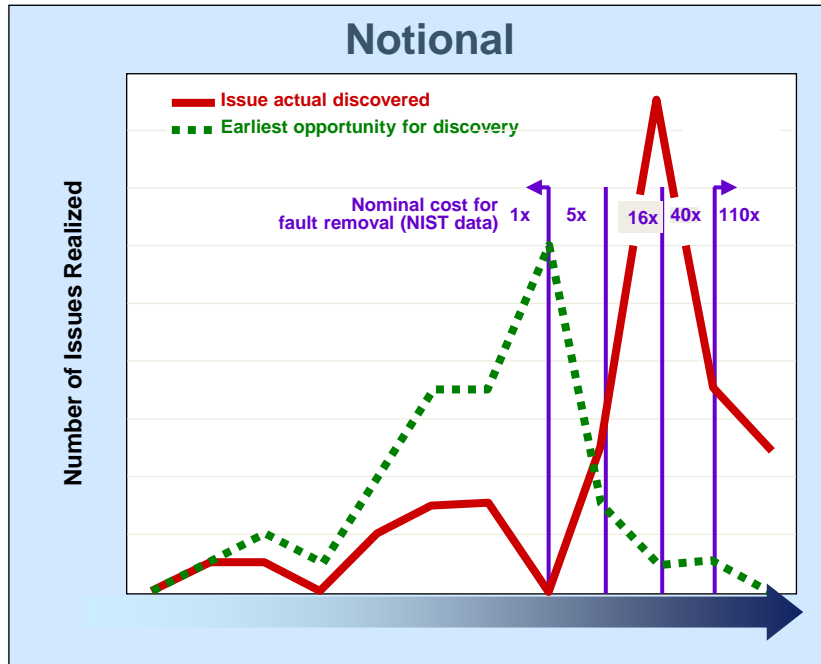
Goal: Propose a model for industry interaction throughout the phases of a development program with an emphasis on "Shift Left".

CDT Project team

Joe Manas (Lead)	– Raytheon	Brendan Rhatigan	– Lockheed Martin
Sandi Gianotas	– Boeing (BTE)	Steve Scukanec	– Northrop Grumman
Tom Simms	– DASD(DT&E)	Paul Alfieri	– DAU
Joe Wascavage	– NAVAIR	Dr. Bram Lillard	– OT&E

Opportunity for Improvement on Developmental Programs

The Cost

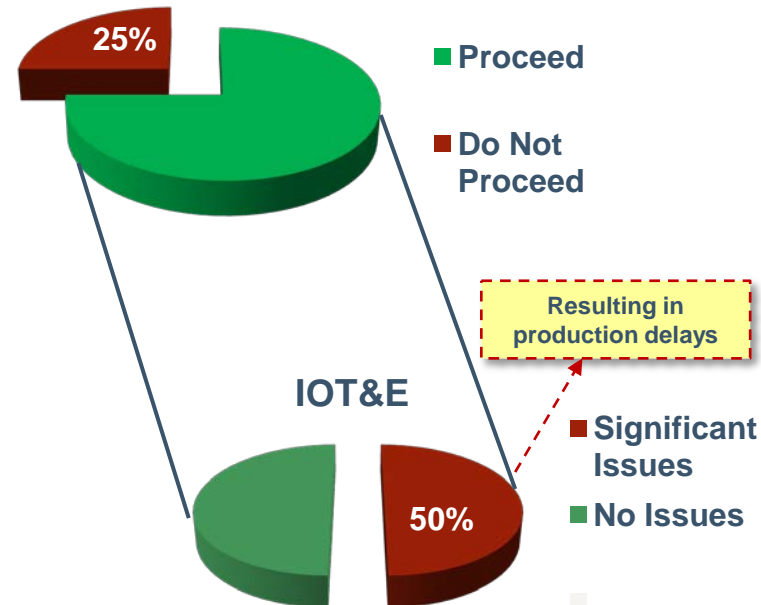


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Late discoveries are considerably more costly!

The Impact

DT&E Assessments recommending to proceed to IOT&E (2012 DT&E Annual Report)



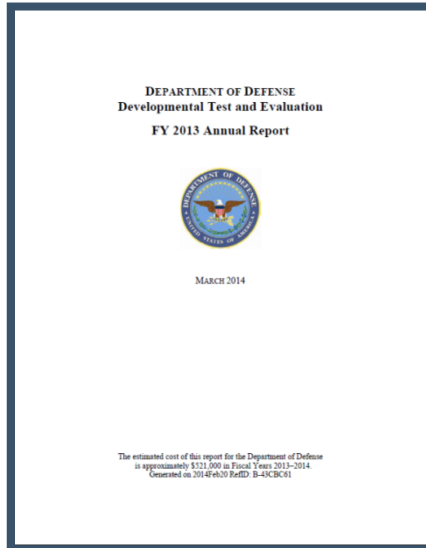
Only 41% (5 of 12) programs made it to & through a successful IOT&E

Strategy To Improve

- **Comprehensive DT&E activities, earlier in the development process, better inform technical, acquisition, and programmatic decisions.**
- **Early and often interaction and coordination between Government (Chief Developmental Tester) and Industry (Industry Test Lead) is critical in the early identification of problems, validating fixes, and ensuring technology is mature well before committing to production.**
 - **Populate the Developmental Evaluation Framework (DEF)**
 - Determine the Technical and Programmatic decisions to be informed by T&E
 - Evaluations: How will the system be evaluated?
 - Tests/Modeling & Simulation (M&S): How will test and M&S events provide data for these evaluations?
 - What resources are required to execute tests, M&S and conduct evaluations?
 - **Earlier start on Reliability Growth Planning**
 - **Earlier Cybersecurity Testing**
- ***“...the real benefit of an effectively structured test program is in the cost avoidance it can provide by discovering problems as early as possible.”***

(Mr. Frank Kendall, USD(AT&L), March 2013, ITEA Journal)

DASD(DT&E) Initiatives



DT&E FY 2013 Annual Report

“Shift Left” (started in 2012)

- Find and Fix Problems **EARLY!**
- Three focus areas:
 - Earlier Mission Context
 - Earlier Interoperability Testing
 - Earlier Cybersecurity Testing
- Currently, the initiative is also focusing on:
 - System performance
 - Reliability

This is key!

Developmental Evaluation Framework

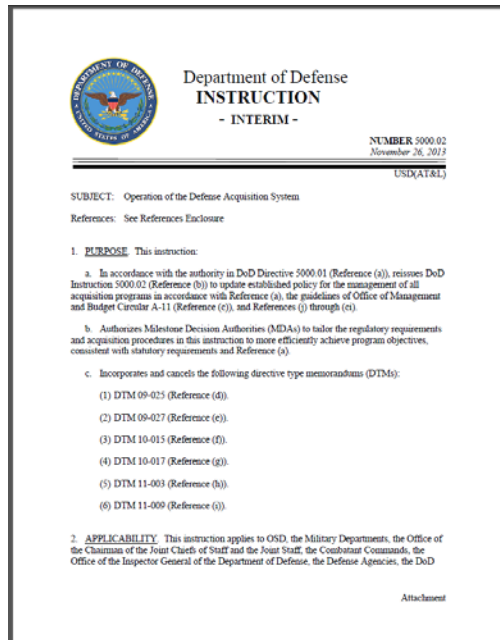
- Provides the roadmap to obtain developmental data
- Knowledge gained from testing provides information for technical, programmatic, and acquisition decisions.
- Aids programs in determining how to structure a test program.
 - Shows correlation/mapping test events, resources, and decisions.

Early DT&E activities inform technical, programmatic, and acquisition decisions

DODI 5000.02 (Enclosure 4)

Test and Evaluation Master Plan (TEMP) includes a Developmental Evaluation Framework (“T&E Roadmap”)

- Knowledge gained from testing provides information for technical, programmatic, and acquisition decisions.

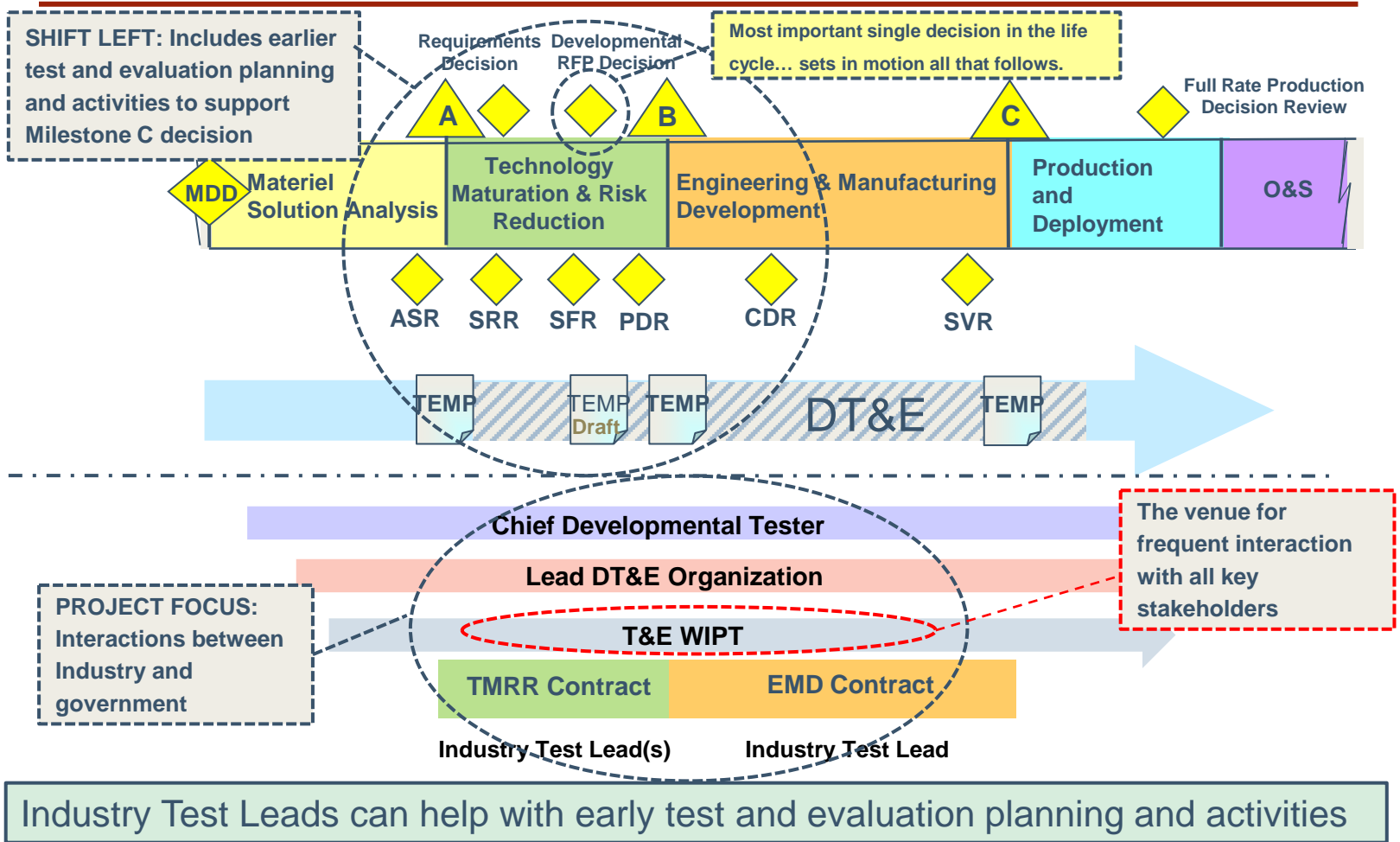


Developmental Evaluation Framework:

- Identifies key data that contributes to assessing progress on:
 - Key Performance Parameters
 - Critical Technical Parameters
 - Key System Attributes
 - Interoperability requirements
 - Cybersecurity requirements
 - Reliability growth
 - Maintainability attributes
 - Developmental test objectives
 - Others as needed
- Show the correlation/mapping between:
 - Test events
 - Key resources
 - Decisions supported

The TEMP is the Program Managers primary planning and management tool for all test and evaluation activities.

T&E in Acquisition Lifecycle



CDT/ITL Descriptions

Chief Developmental Tester

Is a key leader in the program office, provides advice and recommendations based on test results to the program manager to inform technical, acquisition, and programmatic decisions. Chairs the T&E WIPT.

Highly qualified professional that possesses knowledge, skills, and ability to develop and execute a comprehensive and efficient test and evaluation program

Brings the technical education, test and evaluation experience, leadership, and cross-functional insight necessary to guide the technical management, program execution, and business management efforts associated with test and evaluation and defining test requirements.

Industry Test Lead

Industry counter part to the Chief Developmental Tester and is a member of the Government T&E WIPT. Currently, has many names, (Test Architect, Test Manager, Chief Validation Engineer, etc).

Highly qualified professional that possesses knowledge, skills, and ability to plan and coordinates all Contractor T&E activities during development.

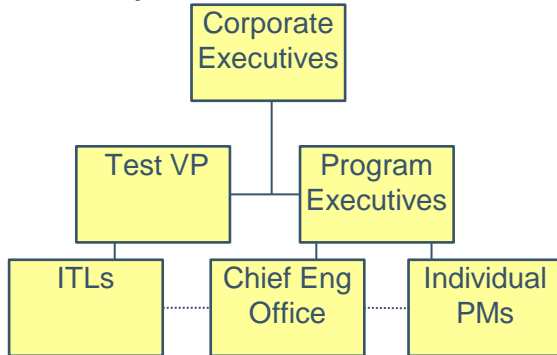
Brings the technical education, test and evaluation experience, leadership, and cross-functional insight necessary to guide the contractor test program

Operates at a level above the Contractor IPTs and provides guidance across all the Contractor IPTs (similar to that of a Chief Engineer). Works with and provides feedback based on test results to design engineers or product teams during development.

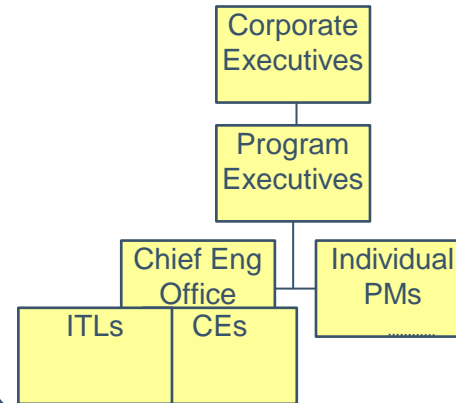
T&E is a Technical Discipline

Potential Industry Organization Models

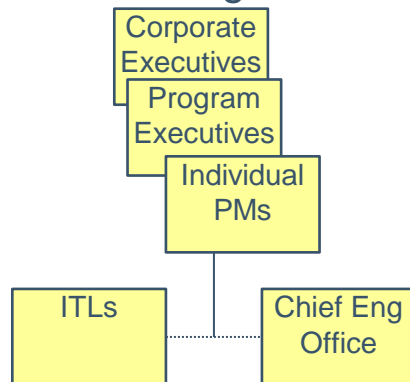
Corporate T&E Executive



ITL Part of CE Office



ITLs at Program Level

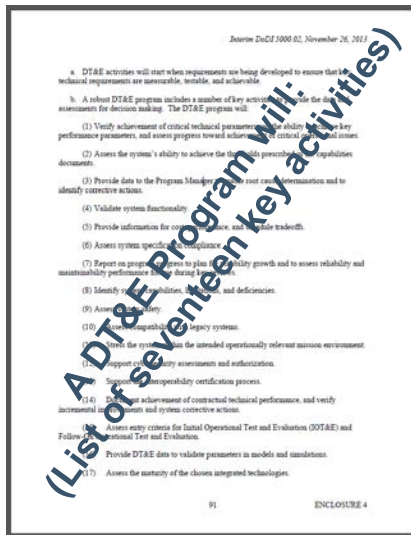


- Currently most organizations are set up with ITL as part of the CE office (if an ITL exists)
- “Shift Left” Initiative calls more for ITL to move out of the CE office and report direct to the program manager
- T&E has most independence in the Corporate Model
 - This model does not exist in most companies, transformational

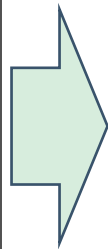


DODI 5000.02

Enclosure (4): A robust DT&E program includes a number of key activities to provide the data for decision making.



Enclosure 4



DT&E Program
 Chief
 Developmental
 Tester



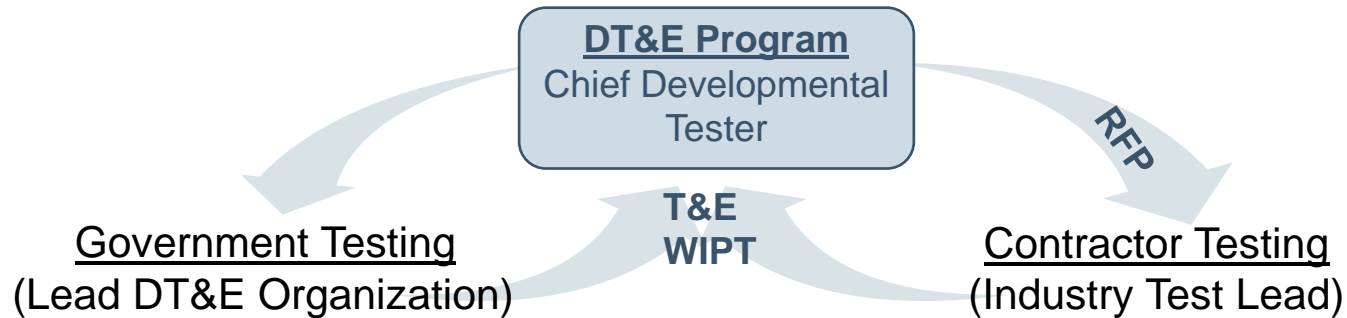
**Contractor Testing
 (Industry Test Lead)**



**Government Testing
 (Lead DT&E Organization)**

The TEMP is the Program Managers primary planning and management tool for all test and evaluation activities.

DT&E Program



- Provides technical expertise on T&E issues
- Conducts DT&E activities as directed by the Chief Developmental Tester
- Supports certification and accreditation activities, when feasible
- Assists the Chief Developmental Tester :
 - Provide oversight of contractors
 - Reach technically informed, objective judgments about contractor and government T&E planning and results

- Provides technical expertise on T&E issues
- Plans out the strategy and implementation of the integrated test campaign
 - M&S to HWIL to ground test to field test\
- Manages enterprise resources to achieve results
- Works with DT&E organization on collaborations
- Conducts DT&E activities, as stated in the contract
- Supports government testing, when directed
- Assist the Chief Developmental Tester:
 - Participate in T&E working groups
 - Use Evaluation Framework to guide integrated test planning
 - Contribute to test strategy that yields cost effective test event plans

INDUSTRY EXAMPLES

Industry Survey Template

Best Practice Title:	<i>{type title here}</i>											
Program Phase: (check one)	<i>Technology Maturation and Risk Reduction (TMRR)</i>	<input type="checkbox"/>	<i>Engineering, Manufacturing, and Development (EMD)</i>	<input type="checkbox"/>								
Test Strategy Themes: (check all that apply)	<i>Operationally Relevant Testing</i>	<input type="checkbox"/>	<i>STAT Methods Used</i>	<input type="checkbox"/>	<i>Driving Affordability</i>	<input type="checkbox"/>	<i>Early T&E "Shift Left"</i>	<input type="checkbox"/>	<i>Transition to Milestone C</i>	<input type="checkbox"/>	<i>Reliability Growth</i>	<input type="checkbox"/>

- Describe an instance on a program where the new Chief Developmental Tester) and the
 -
- Name of the contractor role:
 -
- Why the contractor role emerged:
 -
- What were the benefits of having this role:
 -
- Who were the advocates for the role:
 -
- Who were the opponents of the role:
 -
- Recommended interaction with Chief Developmental Tester:
 -

Industry Test Lead Results:

- Achieves Integrated Testing
- Promotes Operationally Relevant Testing
- Enables Statistical Test Optimization
- Implements "Shift Left"
- Improves Affordability
- Focuses on Reliability

Industry Examples: Test Strategy Excellence Themes

- **Shift Left Implementation**

- Earlier mission context in – using M&S and L/V/C concepts
- More effective interoperability and cyber testing
- Mission info captured with minimum number of scenarios
- Promotes operationally relevant testing
- Cost-effective test program execution with coordinated test activity
- Risk based definition of test events
- More emphasis on suitability/logistics early in test
- Test planning focus on evaluation and informing decisions
- Proactive work-arounds to potential problems

- **Developmental Evaluation Framework**

- DT scenarios defined to evaluate system in mission context
- Define the data defined to be collected and evaluated during the contractor, government DT&E, and Integrated Testing
 - Maximize data obtained and shared
- Optimize test program and the number of test events required – use statistics to validate
- Focus on capabilities, performance, cybersecurity, interoperability, and reliability to avoid “verification by exhaustion”
 - Identify potential sources of data to support reliability growth curves
 - Identify effective techniques for cyber testing

Industry Examples: Why Industry Lead Role Emerged

- **Program schedule and budget challenges**
 - Make sure test program had no overlapping/duplicate efforts
 - Acquisition challenges resulted in significant test events being deferred to later stages of the programs and later contracts
- **System complexity**
 - Ensure verification events lead to customer acceptance
 - Mitigate stove-piped verification planned within each sub-system test program
- **Limited test asset availability**
 - Testing needed to be coordinated with minimal damage to system assets
 - Test facility also used for development – development priorities not aligned with test team capability needs

RECOMMENDATIONS

Recommendations for mechanization

- **Industry:**

- Understand the benefits of an effectively structure T&E program.
- Include test and evaluation in the corporate management structure.
 - Realize the value of having an Industry Test Lead and their contributions to the company's overall mission and goals.
- Establish an organizational culture that provides a career path for Test and Evaluation professionals
- Define Roles & Responsibilities between
 - Industry Test Lead / Chief Engineer / Test IPT Lead
- Continued collaboration w/ DASD(DT&E) regarding process and infrastructure to support effective test strategies.

- **Government:**

- Identify Industry Test Lead in RFP (Key Personnel Clause)
- Structure RFP to include specific interactions between Chief Developmental Tester and Industry Test Lead

Next Steps – Future Work

- **Revisit and revise 2008 NDIA DT&E committee conducted study titled “DT&E Support to Acquisition.”**
 - Since the study was conducted in 2008, there has been updates to policy and new legislation (e.g. WSARA, Integrated Testing definition, updates to DOD Instruction 5000.02, etc.) which implemented some of the findings.
 - Review findings and identify new/remaining gaps and/or areas for improvement.
- Recommending that case studies be conducted for best practices (pilots)
 - CDT – ITL Developmental Evaluation Framework Implementation