# Department of Defense Cybersecurity T&E Guidebook Update and Cyber Table Tops

**ITEA Cybersecurity Workshop, 7 March 2018**

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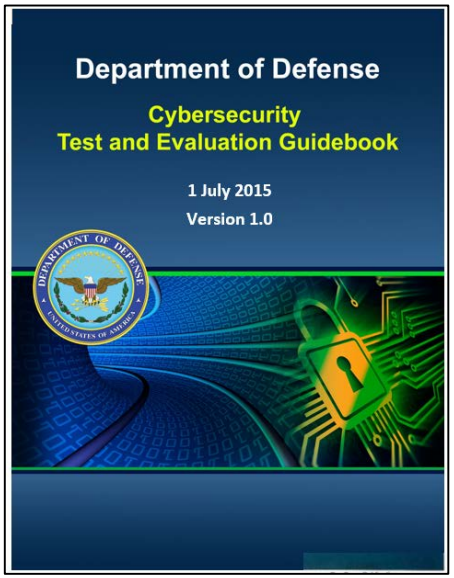
# Requirements, Policy and Guidance BLUF

- **Joint Staff, J6 System Survivability KPP including a Cyber Survivability Endorsement updated January 2017**
- **DoDI 5000.02 added Enclosure 14 updated January 2017**
- **DOT&E Cybersecurity OT&E Memo August 2014 now under review**
- **DoD Cybersecurity T&E Guidebook update in progress**
- **OSD Cyber Table Tops (CTTs) Guidebook in development**

# DOD CYBERSECURITY TEST AND EVALUATION GUIDEBOOK UPDATE

# DoD Cybersecurity T&E Guidebook

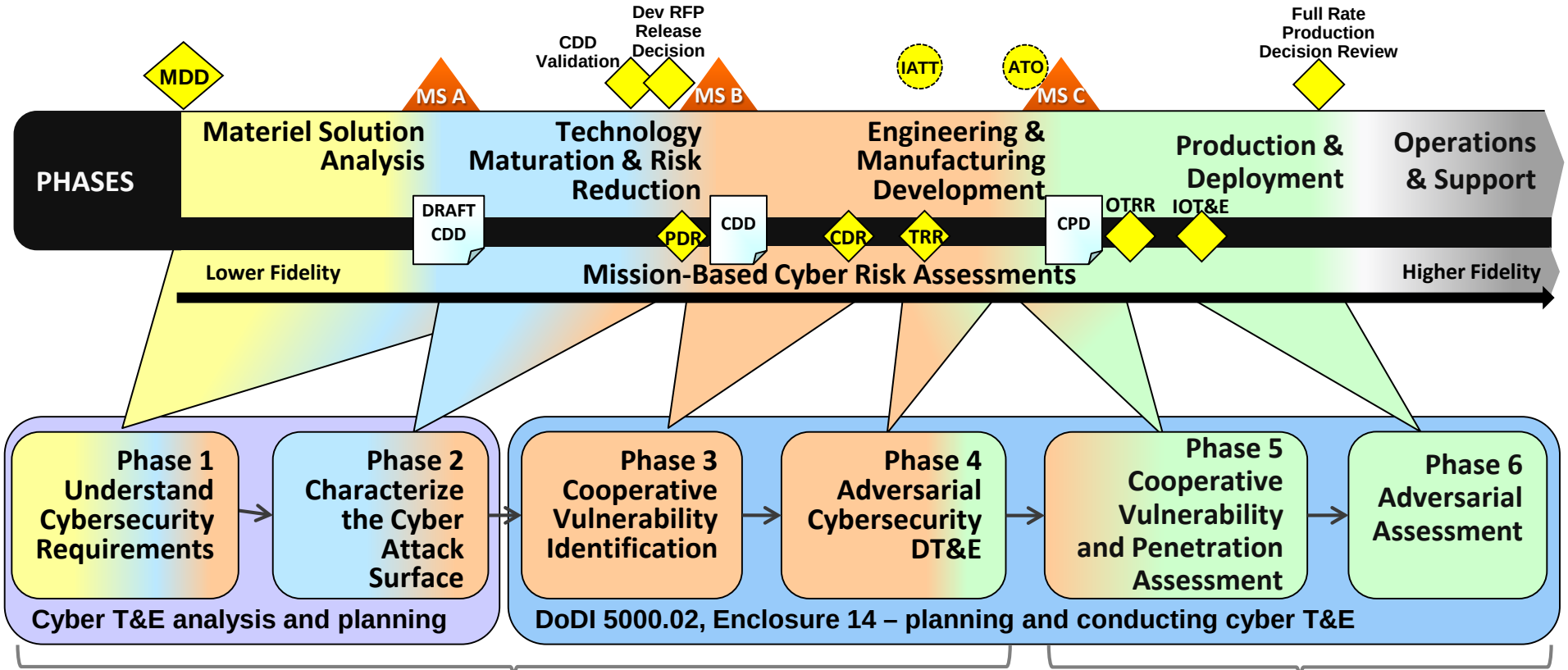



- **Version 1.0 – July 2015**
- **Version 2.0 published February 2018**
- **Describes each phase, inputs, outputs, tasks**
- **Addresses RMF integration**
- **Update includes new appendices**
  - Phase 1-6 Quick Look
  - Cyber Threat Assessments (FOUO document)
  - Tailoring the Phases
  - Considerations for Cybersecurity Measures (FOUO document)
    - SS KPP and Cyber Survivability Attributes
  - Cybersecurity Test Considerations for Non-IP Systems (FOUO document)
  - Mission-Based Cyber Risk Assessments (CTTs) (FOUO document)
  - Cybersecurity T&E Contract Language Considerations
  - Software Assurance Testing
- **FOUO appendices will be published separately**

# DoD Cybersecurity T&E Guidebook Update Objectives

- ✓ **Align with DODI 5000.02 Enclosure 14 release**
  - *Cybersecurity In The Defense Acquisition System*
- ✓ **Promote mission-impact based analysis and assessment methods**
  - Data driven
- ✓ **Encourage tighter integration with functional T&E**
  - Assessment of cyber resilience within mission system context
- ✓ **Promote practitioner best practices**
  - Include “from the trenches” test activities – what works, what doesn’t
  - What tests and data from DT can inform Protect, Detect, React, Restore and improve adversarial assessment results during OT
  - Offer sanitized, real world examples whenever possible
- ✓ **Document a distinct value proposition for cyber DT&E**
  - Short introductory summary in Chapter 3 – overview of phases and concepts
  - “Role of Cybersecurity Developmental Testing”

# Cybersecurity T&E Process




## DT&E Phases

The goal of cybersecurity DT&E is to identify issues before MS C that are related to resilience of military capabilities from cyber threats. Early discovery of system vulnerabilities can facilitate remediation and reduce impact on cost, schedule, and performance.

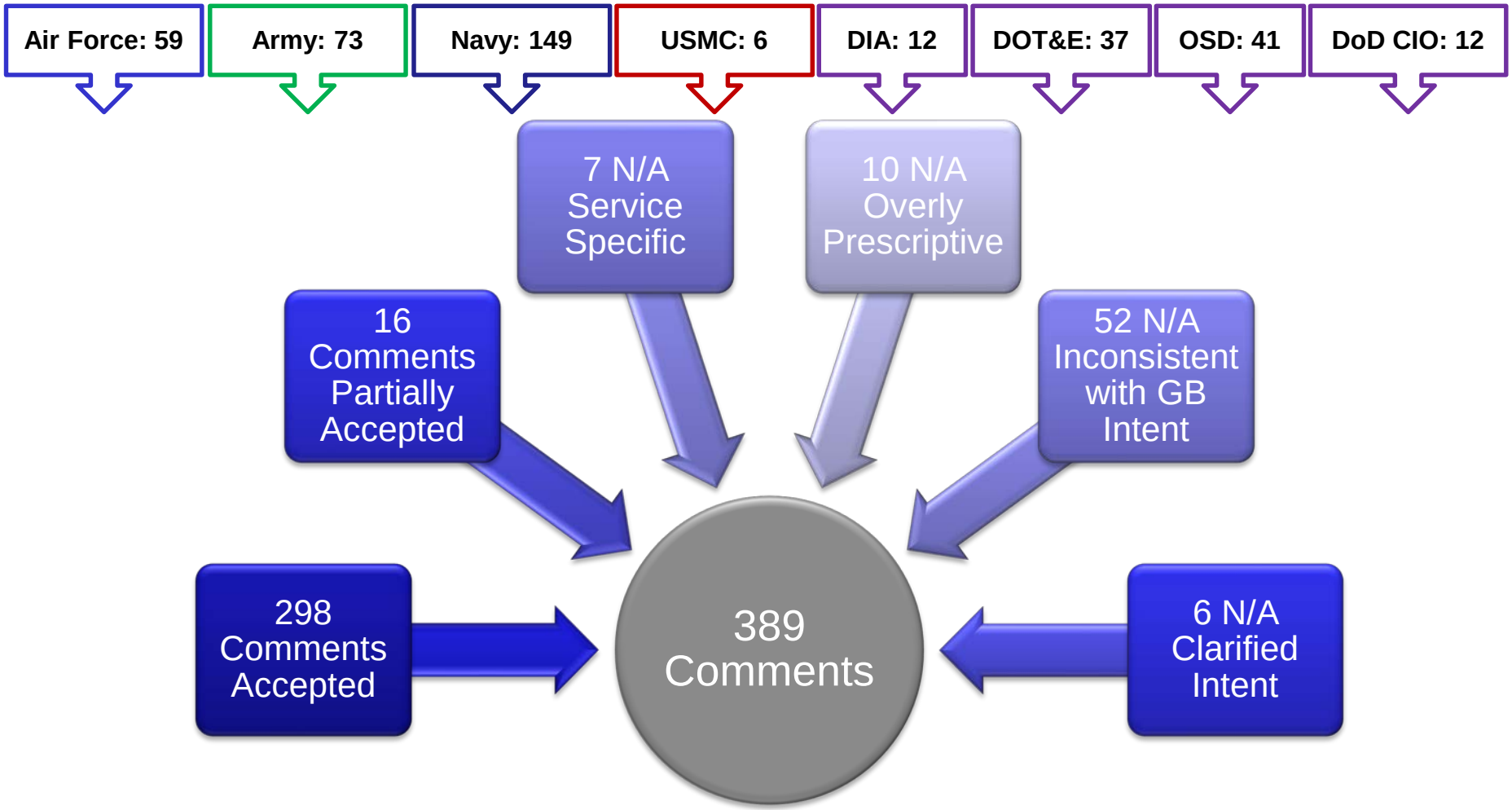
## OT&E Phases

Operational cybersecurity testing supports the evaluation system effectiveness and suitability (and survivability)

# Guidebook Collaboration

- **Beginning in November 2017, Guidebook 2.0 was distributed for review by Services and Components**
- **39 reviewers received the draft for review, most submitted comments, many shared with others**
  - In the end, 37 individuals submitted comments
- **389 comments received**
  - High quality, thoughtful comments
  - All comments were reviewed and adjudicated by the Guidebook Core Team
  - 80% of comments were accepted or partially accepted
  - Rejected comments
    - Service Specific: Comment not incorporated because it was not applicable to all Services
    - Overly Prescriptive: Comment not incorporated because it provided too much detail on "How" to perform a task or limited the flexibility any Service-specific methods
    - Inconsistent with Intent: Comment not incorporated because it was not applicable to the purpose of the Guidebook or was out of scope (e.g., not T&E specific)
    - Clarified Intent: Comment not incorporated but the applicable text was modified to clarify the misunderstanding that led to the comment

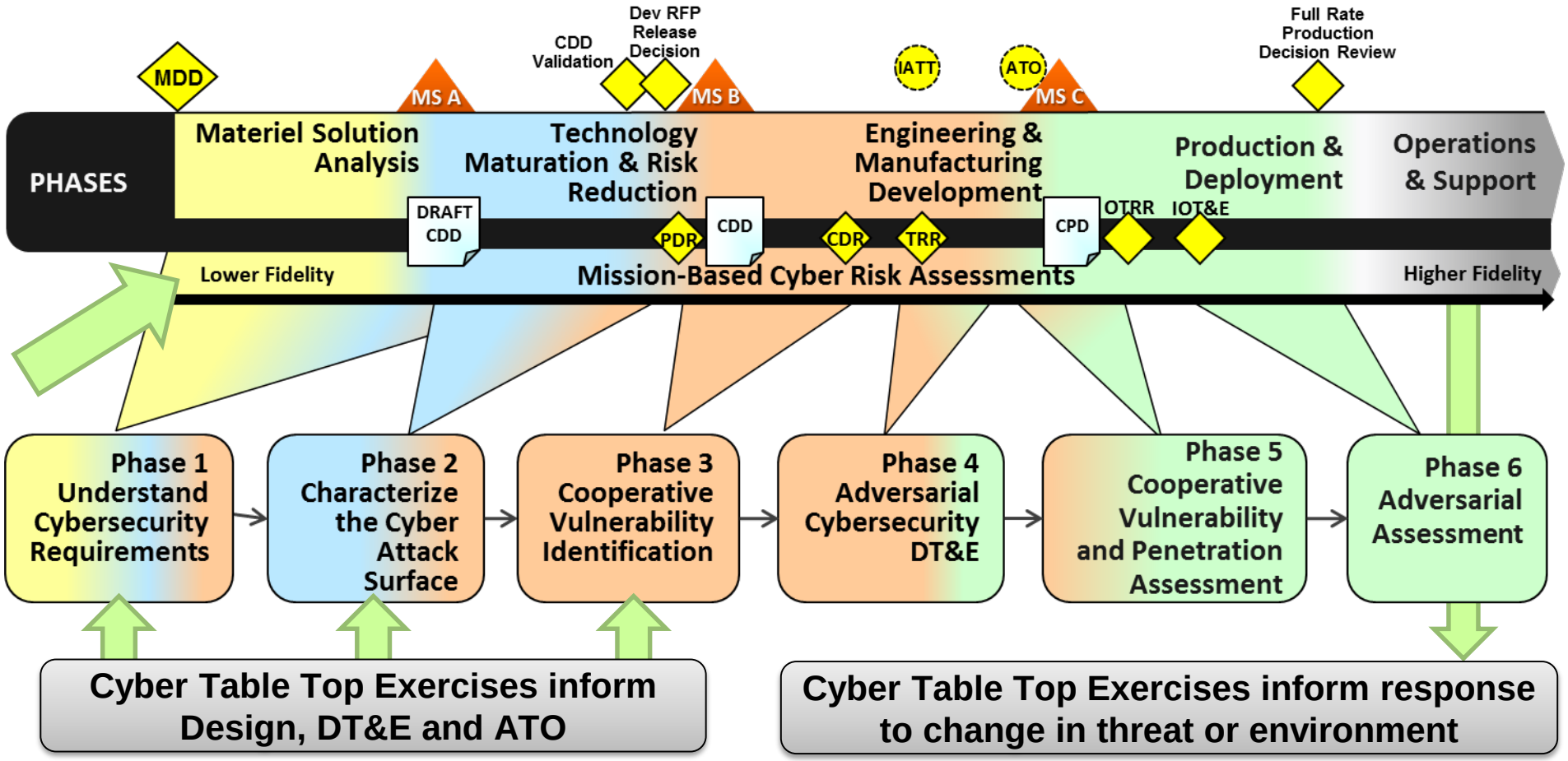
# Comments Recap



# CYBER TABLE TOPS

# Cyber Table Tops (CTTs)

- **One of many mission-based cyber risk assessment methodologies aligned to National Institute of Standards (NIST) guidance for conducting information system risk assessments**



# Bottom Line Up Front

- **Some programs find it difficult and confusing to negotiate the policy and processes for developing their requirements and strategy for cyber T&E**
- **The Cyber Table Top (CTT) Wargame Exercise is one way to identify credible vulnerabilities and develop actionable requirements that can be used to design efficient T&E**
  - Need to 'right size' testing
  - To identify what's most important
- **CTTs are mission based risk assessments that align to the NIST 800-30 Risk Assessment Guide and can inform each step of the Risk Management Framework in addition to cyber T&E**

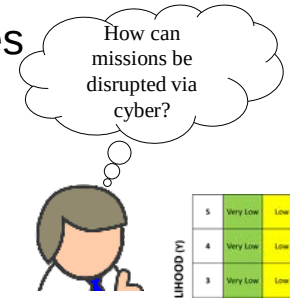
**You can't test to 100%**

- **What are the significant vulnerabilities?**
- **What are the acceptable risks?**
- **How do you develop a plan?**

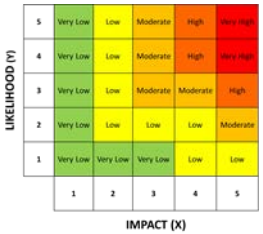
# Cyber Table Top (CTT): What, Why?

- **What is a CTT?**
  - Low technology, low cost, intellectually intensive exercise to introduce and explore the effects of cyber offensive operations on the capability of a System, SoS or FoS to execute a mission

- **Why is it used?**
  - Identify potential threat vectors, risks associated with threat vectors, and potential threats from boundary systems
  - Categorize cyber threat consequence by likelihood and impact within the assessed mission context
  - Inform mitigations analysis, engineering, testing and design activities

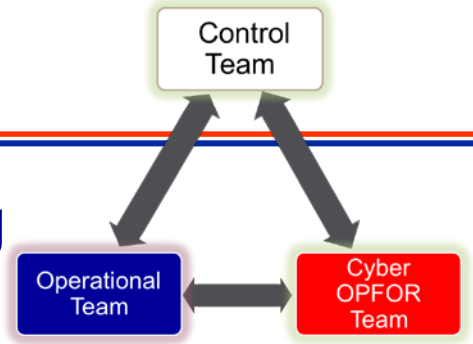



- **What does it produce?**
  - Cybersecurity risk matrices based on posited mission effects
  - Initial categorization of families of threats into three categories
    - Threats that **must** be mitigated to assure mission performance
    - Threats that require additional analysis prior to developing mitigation strategies
    - Threats that are assessed to be low risk/impact and may be accepted
  - Recommendations for actionable steps to increase resistant and resilience to cyber attacks




**Candidate cyber attacks are logically plausible based on technical data provided; they are NOT proven-to-work, tested, hands-on attacks**

# CTT: How?




- Seminar of two teams of SMEs with opposing missions and a Leadership Team
- **Operational Team Mission**: Step through how to use the system within a mission scenario
- **Opposing Forces (OPFOR) Team Mission**: Step through cyber attack missions
- **Control Team Mission**: Leadership: create, conduct, analyze, and out brief the CTT
- **Operational and OPFOR Teams** collaborate and work through the assumptions, consequences, workarounds to successful threat attacks and determine how that relates to mission success
- Data collected during CTT feeds into post exercise analysis, cybersecurity risk matrices, and next step recommendations

# Purpose of the CTT

- **Provide PMs, engineers and testers with actionable information on high priority/high impact cyber threats**
- **Identify specific high-value follow-on analysis and testing to verify and quantify actual risks**

- **Actionable information**
  - Potential vulnerabilities
  - Demonstrated means of exploitation
  - Assessment of the mission impacts
- **Prioritize**
  - Attack surfaces that are most exploitable
  - Attack methods that, if successful, could be the most harmful to mission

**Disciplined approach to bridge the gap between the Information Technology and Warfighter viewpoints**

# CTT Benefits

- **Pragmatic, affordable method** to implement elements of the cybersecurity T&E phases
- **Generate actionable information** on high priority/high mission impact cyber threats
- **Define specific high-value follow-on analysis and testing** to verify and quantify actual risks
- Provide the Program Manager's engineering and test team **opportunities for risk reduction throughout the life cycle**
- **Reduce the likelihood and cost** of cyber vulnerability discovery during operational testing and deployment
- **Socialize the concepts of cybersecurity** for program office and operators, bridging the gaps between systems engineering, testing, and operating

# CTT Process

## OSD CTT Guidebook in Development

**Approximate average execution time (varies depending on team experience and scope of evaluation)**

30 – 60 days | 3-5 days | 30 – 90 days | Varies

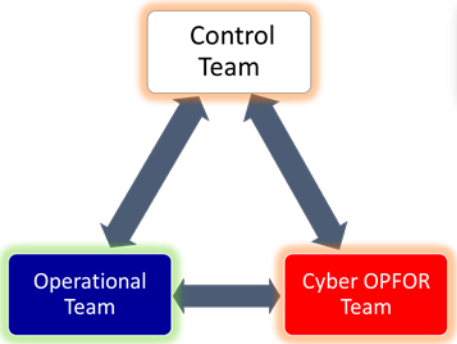
**Exercise Preparation**

- Operational Mission & Scenario Development
- Logistics Personnel Planning
- Cyber Mission Development & Reconnaissance

Control Team

**Exercise Execution**

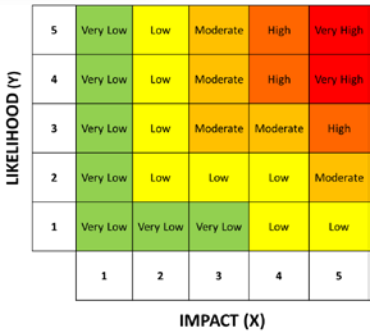
- Team Mission Development and Execution
- Data Collection and Review




**Post Exercise Analysis**

- Likelihood and Impact Assessment
- Cybersecurity Risk Matrix

Control/Analysis Team




**Reporting**

- Must Test
- Accept Risk
- Further Analysis
- Mitigation

# Examples of Realized Benefits of the CTT

- Identified multiple cyber threats that were tested and analyzed in Developmental and Operational Test (DT/OT)
- Identified a significant cyber threat one year before it was identified as a high-priority “in the wild” threat impacting numerous systems
- Produced a risk assessment consistent with a Risk Assessment Report (RAR) – at a much lower cost and clearer mission impact!
- Outbrief of CTT results to PM resulted in directive to execute tests and support briefings to DOT&E
- On average, CTTs document 60 attacks where at least 25% are high or very high risk


# Questions

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