T&E Metrics for Acquisition Phases & Decisions

Developmental Test & Evaluation
OUSD(AT&L)/Systems & Software Engineering
Purpose

• Define T&E metrics for decision points and phases across the acquisition life cycle
  – Define appropriate T&E execution and reporting measures
  – Standardize metrics to assess progress in T&E planning and execution
  – Convey value-added role of T&E
Precepts

• The purpose of T&E is to develop and deliver knowledge
  – Knowledge = actionable information
• T&E developed knowledge informs decisions to reduce risk in requiring, acquiring, and employing systems / capabilities
• T&E knowledge is used to:
  – Assess system capabilities / limitations
  – Assess program progress
  – Assess technical progress
  – Improve the product and processes
Attributes Measured

- The metrics required are related to:
  - Resources ($, people, ranges, test assets)
  - Errors / Problems (#, discovery / correction rates, criticality)
  - Process characteristics (uniqueness, complexity)
  - Project Characteristics (size, complexity, schedule)
  - Project Dynamics (Reqt chg, Sched chg, Resource chg)
## Sample Integrated Schedule

### How are you doing? How do you know?

| Fiscal Year | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 |
|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Quarter     | 1  | 2  | 3  | 4  | 1  | 2  | 3  | 4  | 1  | 2  | 3  | 4  | 1  | 2  | 3  | 4  | 1  | 2  | 3  | 4  |

### Requirements

- L/Lead
- IOC
- FOC

### Acquisition Milestones

- Technology Development
- Engineering and Manufacturing Development & Demonstration
- Production & Deployment
- Operations & Support

### Systems Engineering

- SRR
- SFR
- PDR
- CDR
- FRR
- PRR
- PDR

### Logistics Events

- ILA
- IOCSR
- MSD
- Core Capability

### Major Contract Events

- Prototype
- EMD
- IBR
- L/Lead
- Lot 1
- Lot 2
- Lot 3
- Lot 4
- FRP
- MYP

### Production

- EMDD
- LRIP
- Lot 1
- Lot 2
- Lot 3
- Lot 4
- Lot 5
- Lot 6
- Lot 7
- Lot 8
- Lot 9

### Training Systems

- Initial Trng (T&E)
- OT Training
- Flight Sim

### Test & Evaluation

- Prototype Testing
- Constructive M&S
- Virtual M&S
- SIL
- HITL
- LFTE (Components)
- LFTE (Systems)
- IT1
- IT2
- IT3
- IT4
- IT5

### DIACAP

- Phase I Definition
- IATT
- IATO
- ATO (Type Accreditation)
- Phase II Verification and Certification Testing
- Phase III Validation / Cert Tests
- Phase IV Post Accreditation

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**T&E – From Concept to Combat**
 Acquisition Life Cycle and Phases
Material Solution Analysis

- **Focus:** Assess potential materiel solutions
- **Decision Points:** MDD, ITR, ASR, TRA, MS-A
- **T&E Activity:**
  - Review AoA for evaluatability, identify discriminators
  - M&S to evaluate alternatives, sensitivity analyses
- **T&E Products:** TES
- **Measures / Metrics:**
  - T&E Strategy defined
  - CARD input

_T&E – From Concept to Combat_
Acquisition Life Cycle and Phases

Technology Development

**Focus:** Reduce technology risk, determine technologies for system integration

**Decision Points:** IBR, SFR, SRR, TRA, PDR, MS-B, EMDD RFP

**T&E Activity:**
- Risk identification & investigation
- Technology maturation, integration, & demonstration in relevant environment
Acquisition Life Cycle and Phases  
Technology Development cont.

- **T&E Products**: Technology evaluation, TEMP, CARD update
- **Measures / Metrics**:
  - T&E WIPT charter status
  - TEMP status (KPP/KSAs incorporated, design risks, resources)
  - M&S, SIL capabilities relative to desired level
  - Test point burn-down (M&S, SIL)
  - Test time vs schedule (M&S, SIL)
  - TRLs achieved
  - Risk mitigation (Initial & current risk level)
• **Focus:** Develop a system or increment of capability, reduce manufacturing risk, & ensure supportability. Also demonstrate system integration, interoperability, safety, & utility

• **Decision Points:** IBR, CDR, SVR, TRR, FCA, MS-C

• **T&E Activity:**
  - Risk reduction – System, manufacturing
  - Assess design maturity
  - Determine system capability & limitations
  - Demonstrate spec performance
  - Estimate reliability
  - Assess information assurance
  - Ensure supportability
• **T&E Products:** Developmental evaluation reports, OA, TEMP
• **Measures / Metrics:**
  – DR quantity vs time (M&S, SIL, HITL, OAR, manufacturing)
  – DR rate of discovery/correction (design & manufacturing)
  – Test point burn-down (M&S, SIL, HITL, OAR)
  – Test time vs schedule (M&S, SIL, HITL, OAR)
  – Configuration status (M&S, SIL, HITL, OAR)
  – CTP results vs thresholds
  – CTP results vs time
  – System capabilities (mission context) characterized
  – System Certifications (Interoperability, IA, Safety)
  – TRLs
Metric Examples

DEVELOPMENTAL TEST & EVALUATION
Acquisition Life Cycle and Phases
Production & Deployment

- **Focus:** Achieve an operational capability
- **Decision Points:** PCA, OTRR, PRR, FRP, IOC
- **T&E Activity:**
  - Operational effectiveness & suitability
  - Vulnerability / Lethality
  - Production acceptance & Manufacturing process control
  - Deficiency correction
  - Reliability
Acquisition Life Cycle and Phases
Production & Deployment cont.

- **T&E Products**: Developmental evaluation report, AOTR, IOT&E report (BLRIP), LFT&E report, TEMP
- **Measures / Metrics**:
  - DR rate of discovery/correction (design & manufacturing)
  - Test point burn-down (OAR)
  - Test time vs schedule (OAR)
  - TOV&V (O-level, I-level, D-level)
  - System Certifications (Interoperability, IA, Safety)
  - MRLs
  - Configuration status (M&S, OAR, Trainers)
  - Operational Effectiveness & Operational Suitability
  - Survivability, Vulnerability, & Lethality
  - System capabilities (mission context) characterized
• **Focus:** Sustain the system
• **Decision Points:** ISR, FOC
• **T&E Activity:**
  – Assess availability, reliability, maintainability
  – Identification of new capabilities, improved supportability
• **T&E Products:** Deficiency Reports, TTP updates
• **Measures / Metrics:**
  – DR discovery & resolution
  – Operating time (periodic & cumulative)
Summary

- Product of T&E is knowledge for decisions across the life cycle
- Value of T&E – informed decisions (acquisition & operational)
- No single set of metrics applicable to all decisions or phases
- Metrics assess how well T&E is:
  - Planning
  - Executing
  - Evaluating
  - Reporting
Next Steps

• Engage with T&E and program management communities
• Continue to develop & evolve metrics
• Request your inputs to make the metrics meaningful & useful
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Visit our website:
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Contact us to provide feedback and share your experience
Back-up
Metric Examples

DEVELOPMENTAL TEST & EVALUATION

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