A Framework for Enhancing Forward-looking Capability Delivery Metrics

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Disclaimer

The views and opinions expressed in this presentation are those of the author and do not reflect the policy of the Department of Defense.
Motivation for this Presentation

• DoD has been in transition since 2003 from *REQUIREMENTS* to *CAPABILITIES-BASED* planning

• The state of the transition includes
  – JCIDS and a revised 5000
  – Testing in a Joint Environment Roadmap in 2004
  – Revitalized Joint Test and Evaluation (JT&E) Program in 2005
  – Development of Joint Capability Areas
  – Several recent articles on Capability Test & Evaluation

• Yet the ability to predict a timely delivery of capability to the warfighter is the subject of the *Weapons Systems Acquisition Reform Act of 2009*

• One conclusion is that our risk management process has neither embraced capabilities nor developed risk metrics for delivery of capabilities
Definitions Related to Capability

• Capability
  – The ability to achieve a desired effect under specified standards and conditions through a combination of means and ways across the DOMLPF to perform a set of tasks to execute a specific course of action

• Joint Capability Area (JCA)
  – Collection of like DoD capabilities functionally grouped to support capability analysis, capability portfolio management and …….

• Capabilities-Based Assessment (CBA)
  – Study that identifies the capabilities (and operational performance criteria) required to successfully execute missions

• Capability-based planning (CBP)
  – An overarching framework for planning under uncertainty that provides capabilities suitable for a wide range of modern-day challenges and circumstances while working within an economic framework that necessitates choice
Capabilities-based Planning Framework
Adapted from DAU Course Material
Implications of Delivering Capability

The ability to achieve a desired effect under specified standards and conditions through a combination of means and ways across the DOTMLPF to perform a set of tasks to execute a specific course of action.
The 5000 Model for Delivering Capability

Delivers the M in DOTMLPF

= Decision Point  △ = Milestone Review
A Notional Model for Delivering Capability

Establishes Gap, Needed Capability
And MOEs that define need fulfillment

Materiel (M)
Develop System Requirements
Acquire System
DT&E / OA / IOT&E / Certs

Supporting Capabilities
(DOTLPF)
For Current Capability Gap
Process and Cultural Change Management

Delivered Capability

CBA
MDD
A
B
C
FRPD
IOC
FOC
FRC

Often Seen Model for Joint Capability Delivery

Establishes Gap, Needed Capability And MOEs that define need fulfillment

Supporting Capabilities
(DOTLPF)
For Current Capability Gap
Process and Cultural Change Management

Delivered Capability

Materiel (M)
Develop System Requirements
Acquire System
DT&E / OA / IOT&E / Certs
The Capability Development and Delivery Metric of Interest

WSARA 2009  sec. 103.c: Performance Assessments

The extent to which the predicted cost, schedule and performance is likely to result in the timely delivery of a level of capability to the warfighter that is consistent with the level of resources to be expended and provides superior value to alternative approaches that may be available to meet the same military requirement.
Analytical Approach

Defining success as the timely delivery of a level of capability (such as an increment) to the warfighter, then

\[ P(\text{success}) = F(\text{P that each DOTMLPF element meets Schedule and Performance}) \]

Simplifying with assumptions that each DOTMLPF element is:
• independent
• accomplished in series
• equal in importance
• has a known schedule, performance probability distribution

\[ P(\text{success}) = P_D \cdot P_O \cdot P_T \cdot P_M \cdot P_L \cdot P_P \cdot P_F \]

Of course this is a gross oversimplification and removing these assumptions will produce a significantly more complex, albeit more robust model.
Current DAS Predictive Approach

• For programs operating within their APBs, the key predictors for successful delivery of capability are T&E, certifications and post implementation review (PIR)
  – DT&E estimates the system’s military utility when introduced
  – IOT&E translates measures of effectiveness (MOEs) into critical operational issues and predicts suitability and effectiveness when introduced
  – PIR verifies the ICD MOEs and collects customer satisfaction prior to FOC
Post Implementation Review (PIR) Defined

An analysis of an investment or acquired system that is part of a capability portfolio, operating in its intended environment, using data collected from various sources to answer the question:

Did we get what we needed, and if not what to do about it?
System and Capability Verification

- Platform Readiness Assessments
- COCOM Exercise results
- User Satisfaction Surveys
- Annual CFO Report Input
- Mission Readiness Assessments
- ROI Computation
- War Games
- etc

PIR: Post Implementation Review
ICD: Initial Capabilities Document
CDD: Capability Development Document
CPD: Capability Production Document
MOE: Measure of Effectiveness
Notional Model for Enhancing Forward-looking Schedule and Performance Predictors

1. Clean Control Signal
2. Short Term Feedback
3. Longer Term Feedback

DOTLPF
M
DT/IOT

PIR
Tasks MOEs
1. Clean Control Signal  (Problematic but doable)

![Graph showing MOE & DOTLPF Deficiency Trends as % of CBA Document Population Dec 05 - Aug09](image)

- Deficient Documents as % of Population

- Month
2. Short Term Feedback

User Needs

Technology Opportunities & Resources

Material Solution Analysis

Technology Development

Engineering and Manufacturing Development & Demonstration

Production & Deployment

Operations & Support

Pre-Systems Acquisition

Systems Acquisition

Sustainment

Materiel Development Decision

Post-CDR Assessment

LRIP/IOT&E

FRP Decision Review

DOT&E OA IOT&E
3. Longer Term Feedback in 5000 (DAG Ch 7.9)

User Needs

Technology Opportunities & Resources

A

Materiel Solution Analysis

B

Technology Development

C

Engineering and Manufacturing Development & Demonstration

IOC

Production & Deployment

LRIP/IOT&E

PIR

Post-CDR Assessment

FRP Decision Review

Post Implementation Review (PIR)
 capability needs satisfaction & benefits analysis

Pre-Systems Acquisition

Systems Acquisition

Sustainment

Operations & Support

k
3. Longer Term Capability Delivery Feedback

Establishes Gap, Needed Capability And MOEs that Define Need Fulfillment

(MMDD) A B C FRPD IOC

Supporting Capabilities

(DOTLPF)
For Current Capability Gap
Process and Cultural Change Management

Material (M)
Develop System Requirements
Acquire System
DT&E / OA / IOT&E / Certs

Increment
Increment

Needed Capability
PIR FOC

CBA

Feedback (DOTLPF) For Current Capability Gap Process and Cultural Change Management

Establishes Gap, Needed Capability And MOEs that Define Need Fulfillment
First Steps for Predictor Enhancement

• DAG Chapter 9.9.10

• DoD Instruction 5000.02 requires that PIRs be conducted for MAIS and MDAP programs in order to collect and report outcome-based performance information. The T&E community will participate in the planning, execution, analysis, and reporting of PIRs, whose results will be used to confirm the performance of the deployed systems and possibly to improve the test planning and execution for follow-on increments or similar systems.
Vision for Continuous Predictor Enhancement

Adapted from Testing in a Joint Environment Roadmap
Backup
Abstract

• The Weapon Systems Acquisition Reform Act of 2009 includes a Performance Assessment requirement to evaluate the extent to which current metrics are likely to predict a timely delivery of a level of capability to the warfighter that is consistent with the level of resources to be expended and provides superior value to alternative approaches that may be available to meet the same military requirement.

• Development of forward-looking metrics is a long standing quest within the Department and remains in the forefront of Congressional interest. The author discusses the implication of predicting capability performance vice system performance and offers a control system framework for enhancing the quality of such forward looking metrics. The key elements of the framework are a clean input signal, a short term predictive feedback loop and a long term feedback loop to continually improve the predictive metric.
DODD 8115.01  IT Portfolio Management

• 4.4. All authorities addressed in Section 5 of this Directive shall manage DoD portfolios by performing the following core functions:

• 4.4.1. Analysis. Links portfolio objectives to Enterprise vision, mission, goals, objectives, and priorities; develops quantifiable outcome-based performance measures; identifies capability gaps, opportunities, and redundancies; identifies risks; and provides for continuous process improvement.

• 4.4.2. Selection. Identifies and selects the best mix of IT investments to strengthen and achieve capability goals and objectives for the portfolio and demonstrates the impact of alternative IT investment strategies and funding levels.

• 4.4.3. Control. Ensures a portfolio is managed and monitored using established quantifiable outcome-based performance measures. Portfolios are monitored and evaluated against portfolio performance measures to determine whether to recommend continuation, modification, or termination of individual investments within the portfolio.

• 4.4.4. Evaluation. Measures actual contributions of the portfolio against established outcome-based performance measures to determine improved capability as well as to support adjustments to the mix of portfolio investments, as necessary.
DODD 8115.01 IT Portfolio Management

- Analyze
- Select
- Control
- Evaluate

Flow:
1. Needs → Portfolio Guidance
2. Current Capability
3. Current Options
4. Outcome-based Performance Measures
5. Investments
6. Realized Investments
7. PIR Policy, Best Practices
8. Results
9. Gaps, Recommended Changes

- PIR Policy,
  - Best Practices

Key Terms:
- Capabilities
- Portfolio
- Guidance
- Needs
- Outcome-based Performance Measures
- Investments
- Realized Investments
- PIR Policy
- Best Practices
European EFQM Model
ARTICLES AND REPORTS

• Steven Hutchison, A Capability Focused T&E Framework, Defense AT&L: Jan-Feb 2009


• Hutchison-Lorenzo-Bryan, Capability Test Methodology and Joint Battlespace Dynamic Deconfliction, Defense AT&L: Jan-Feb 2009