Adopting a New Perspective on T&E to Accelerate Digital Acquisitions

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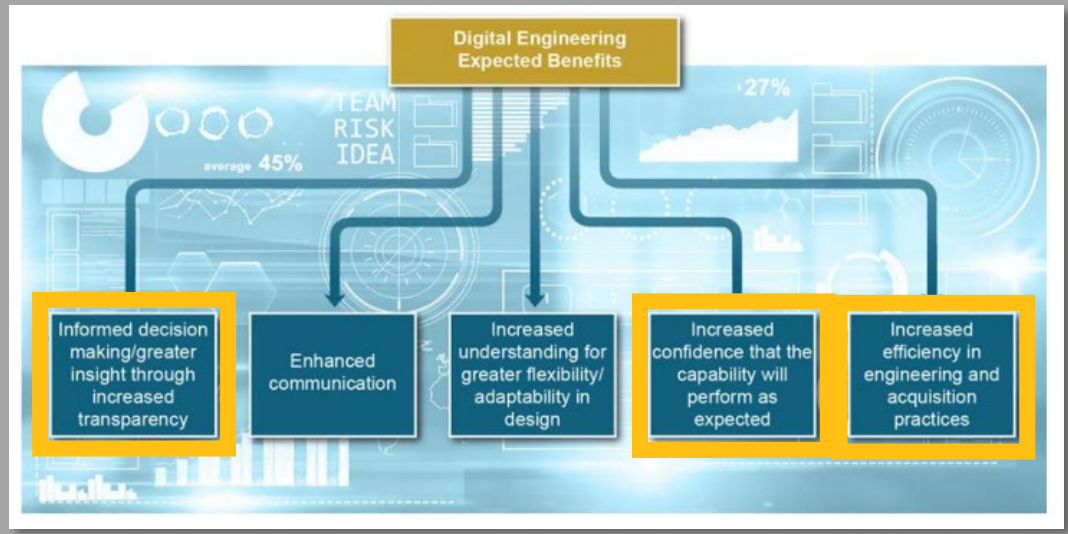
Overview

The promise of integrating digital engineering in defense acquisitions is to deliver improved capabilities to our warfighters faster. While integrated environments with digital models that define system requirements and design are key enablers to this reality, when physics-based effects models are not mature, it can lead to poor design choices and undiscovered flaws. We must be focused on grounding these digital twins in truth to find design issues early and avoid schedule delays.

The key to developing trustworthy digital twins and models comes from understanding and applying test data strategically through intentional, progressing model verification, validation, and accreditation. When the role of test and evaluation shifts from a discrete event to a continuous evaluation that supports the entire lifecycle, programs can leverage that flow of data to build robust models, make informed design decisions, and identify and resolve design issues early.

Digital Engineering and Model Quality



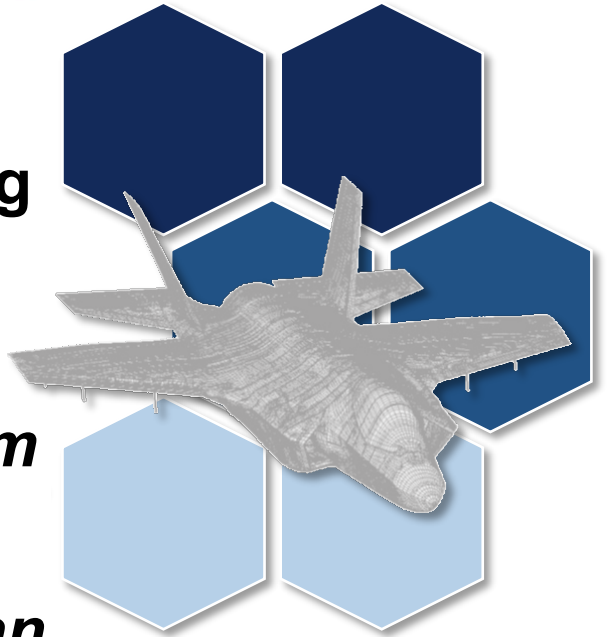
Source: DoD Digital Engineering Strategy

A key enabler of successful digital engineering is robust, decision-quality models

Background

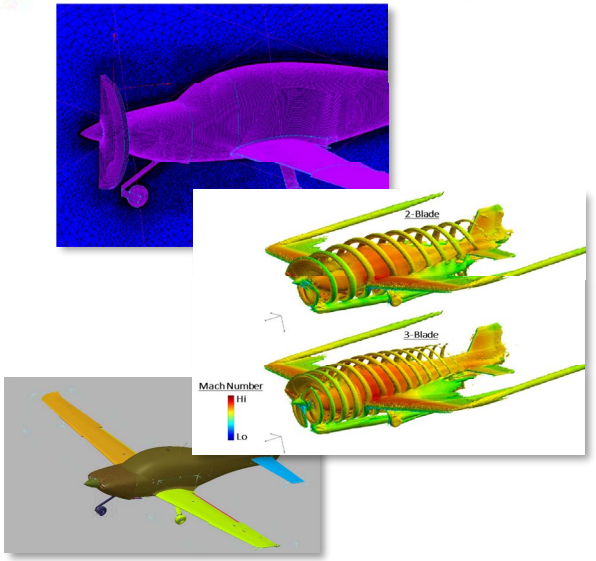
Whether a program is managed traditionally or using digital engineering principles:

- ***Late discovery of design issues can cause significant acquisition program delays***
- ***Immature models and lack of data can contribute to uninformed decisions***



Increase Model Quality with VV&A

- **High-quality models are achieved through *anchoring models in truth* via verification, validation, and accreditation (VV&A)**
- ***Test* is the source of *independent data* to anchor models in truth**



Test & Evaluation supports VV&A emphasis through a *Model-Test-Validate* process

Model-Test-Validate Cycle

MODEL

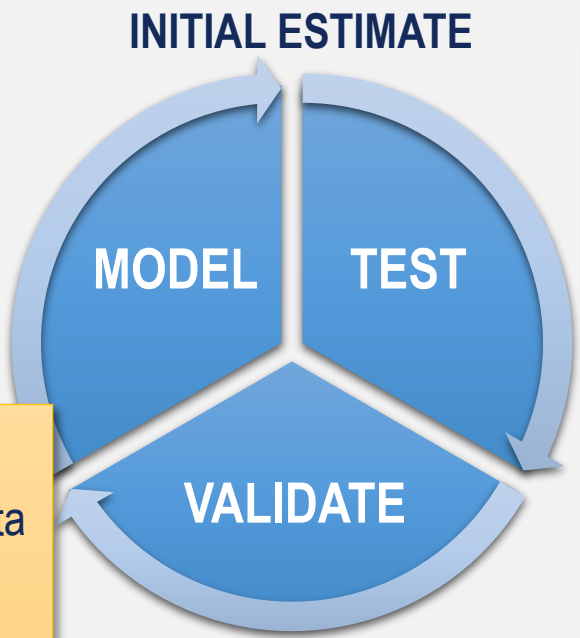
Predict system performance and characteristics

Iterations allow refinement of system design

VALIDATE

Validate models with limited test data

Updated models can be used to refine the design or support other M&S requirements



TEST

Demonstrate system performance and characteristics

Planners use models to help optimize the test campaign

Adapted from Bjorkman, E., Grigaliunas, J. "Test and Evaluation: Where the Rubber Meets the Road in Digital Engineering," Defense Acquisition Magazine, November-December 2021

T&E: Continuous Evaluation

PAST: T&E as *Specification Verification*

- Test is discrete phase
- T&E provides final specification assessment in report
- Goal is to assess system against specifications

FUTURE: T&E as *Continuous Evaluation*

- Test is continuous throughout lifecycle
- T&E provides data and analysis results regularly
- Goal is to mature capability and its models

Continuous Evaluation and VV&A

Transform *data…*

Evaluate Model

- Identify areas of:
  - *Uncertainty*
  - *Lack of data*
  - *Complexity*

Align Testing

- Test objective & conditions driven by VV&A needs
- Deficiencies reported

Analyze & Adjudicate

- Analysts leverage advanced techniques to model behavior
- Analysts support comparison and model adjudication

…into *knowledge* and *action…*

…*throughout* the lifecycle

Resource for a VV&A Focus

- *Proactively resource VV&A through roadmaps to define:*
  - **Models needed**
  - **How each model will be used**
  - **Fidelity needed in VV&A**
  - **Method to incrementally growth model reliability, leveraging the entirety of the test enterprise's capability and data**
  - **Data rights**
- *VV&A roadmaps feed TEMP strategy and test requirements*

Make model VV&A a focus, not an afterthought

Summary

- ***Realizing the speed promised by digital engineering relies on decision-quality models to reduce risk***
- ***Intentional VV&A using a continuous model-test-validate cycle is crucial to driving model reliability***
- ***Early test involvement supports a robust VV&A strategy that leverages a vast network of capabilities along with advanced data & analytics expertise***

Contact

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