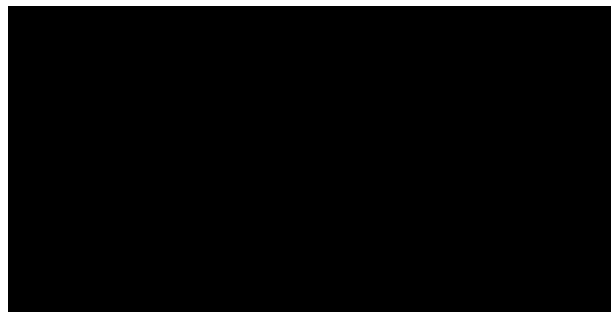
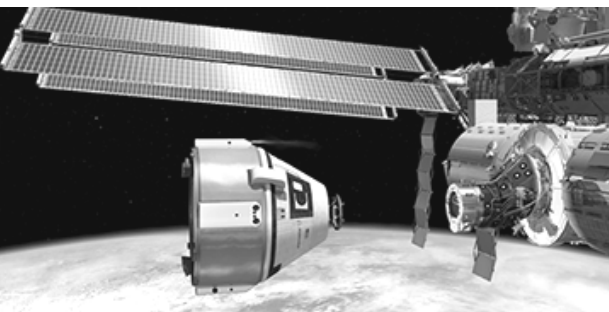
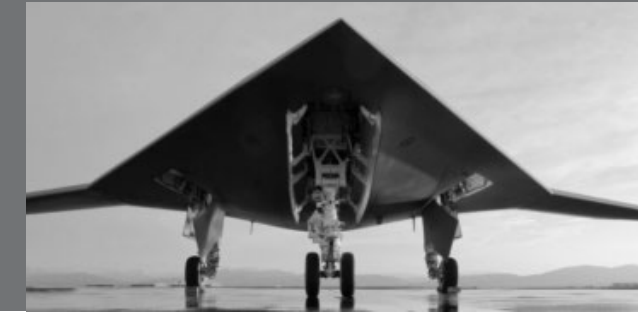




The Digital Engineering (R)evolution: Model-Based Engineering (MBE) and Next-Generation Systems Design

Embedded Tech Trends, January 2025



INDUSTRY 4.0
MODELING &
SIMULATION

DIGITAL ENGINEERING

MBSE
AI/ML

MOSA

DIGITAL
THREAD

SHORTER
DEVELOPMENT

MBE

DODI 5000.97

DIGITAL
TRANSFORMATION

DEFECT REDUCTION

DIGITAL
TWIN

INDUSTRY 5.0



B-21 Raider



7 years from Contract award to First test flight !



DoD INSTRUCTION 5000.97

DIGITAL ENGINEERING

Originating Component:	Office of the Under Secretary of Defense for Research and Engineering
Effective:	December 21, 2023
Releasability:	Cleared for public release. Available on the Directives Division Website at https://www.esd.whs.mil/DD/ .
Incorporates and Cancels:	Department of Defense Directive 5000.59, "DoD Modeling and Simulation (M&S) Management," August 8, 2007, as amended
Approved by:	Heidi Shyu, Under Secretary of Defense for Research and Engineering

Purpose: In accordance with the authority in DoD Directive 5137.02, this issuance establishes policy, assigns responsibilities, and provides procedures for implementing and using digital engineering in the development and sustainment of defense systems.

Digital Engineering Benefits (Development Phase)

1. Development Cycle Time Reduction

- No test-fix-test (-fix-test...)

2. Better quality & Lower cost

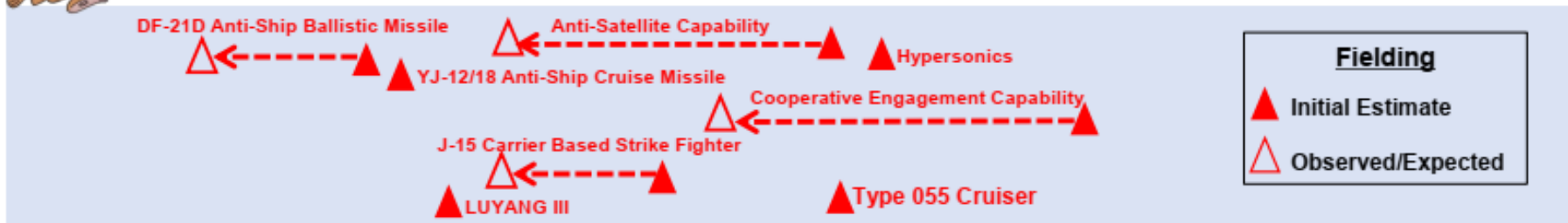
- Earlier defect discovery & reduction in Digital Twins

3. More innovation

- What-if analyses bolstered by AI & ML

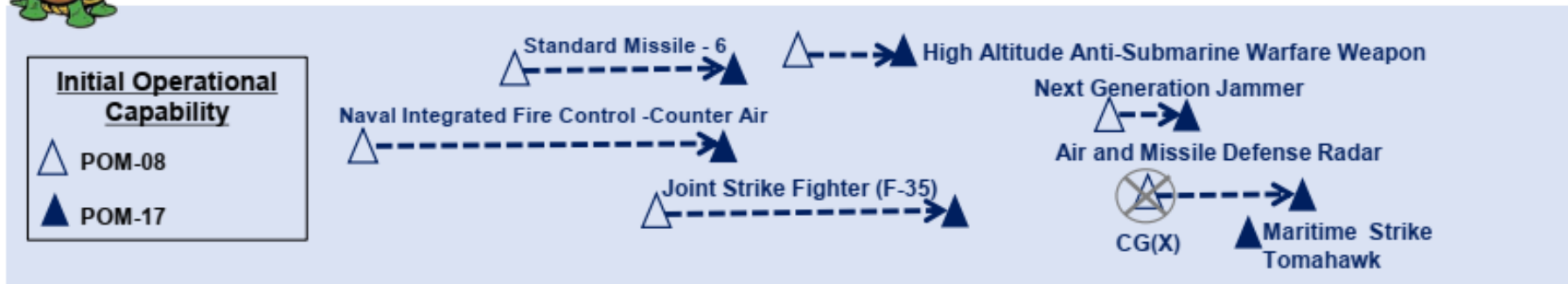


USN vs PLA(N) Capability Fielding Trends



How? Acquiring Designs – No DOD 5000 – No Bureaucratic Process Requirements

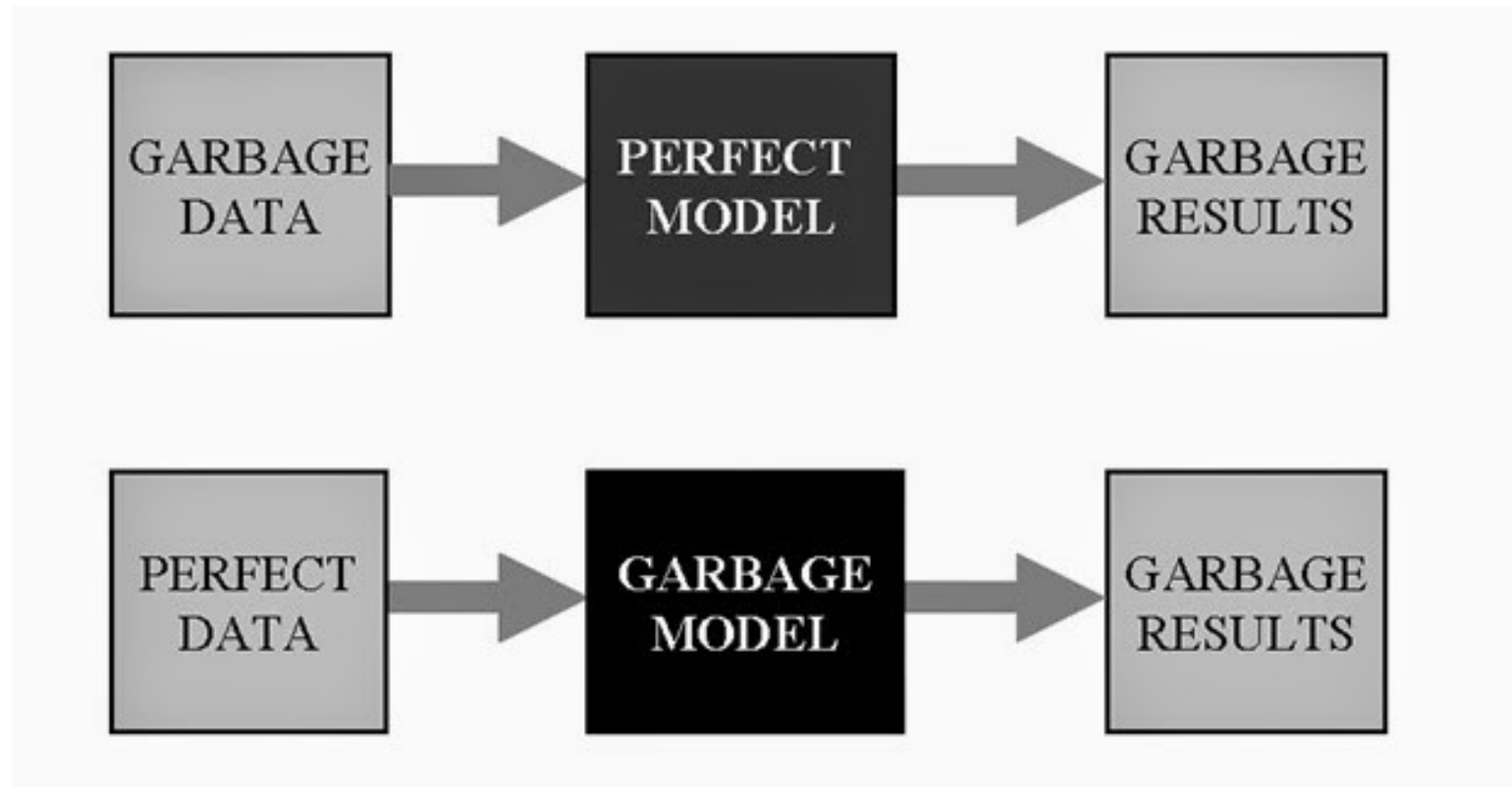
We're Slower!



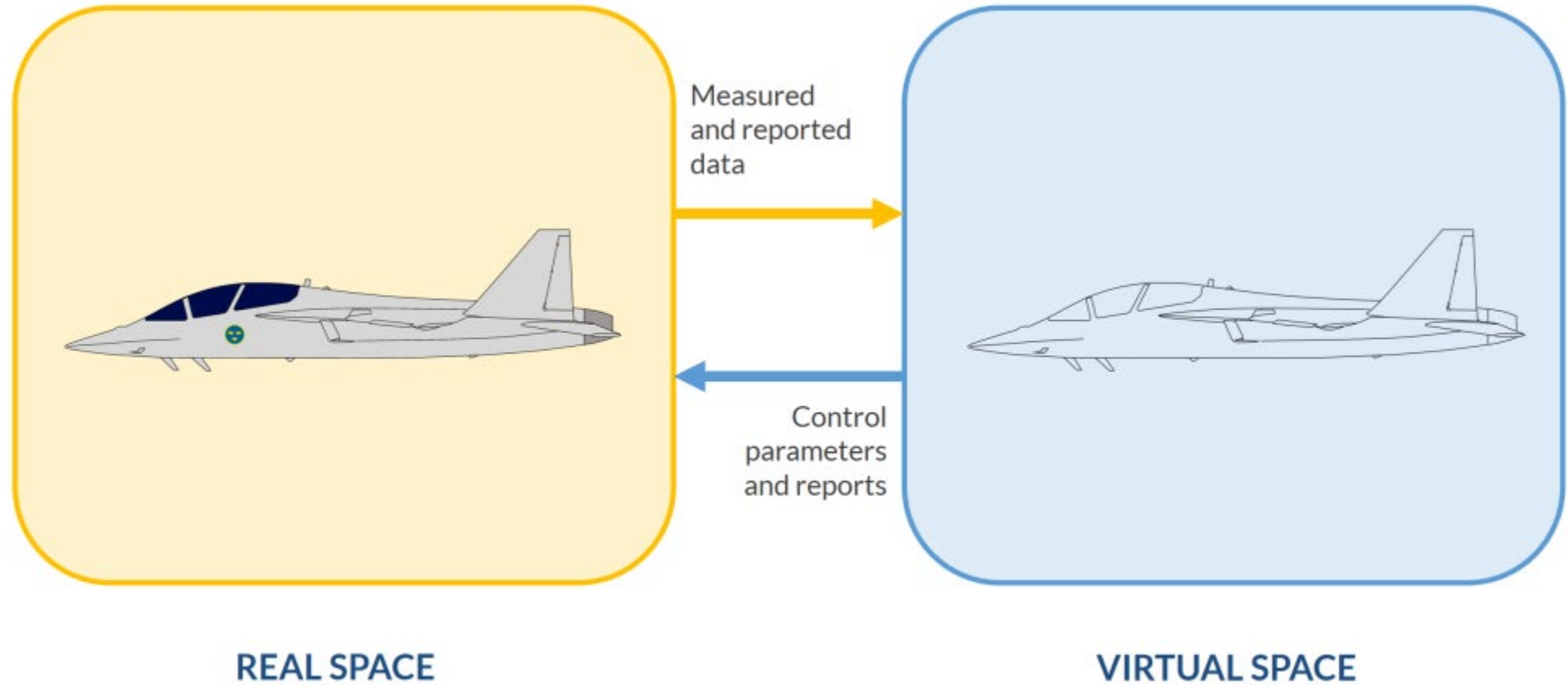
Open Source Information

USN Warfighting Advantage Against PLA(N) has Steadily Eroded

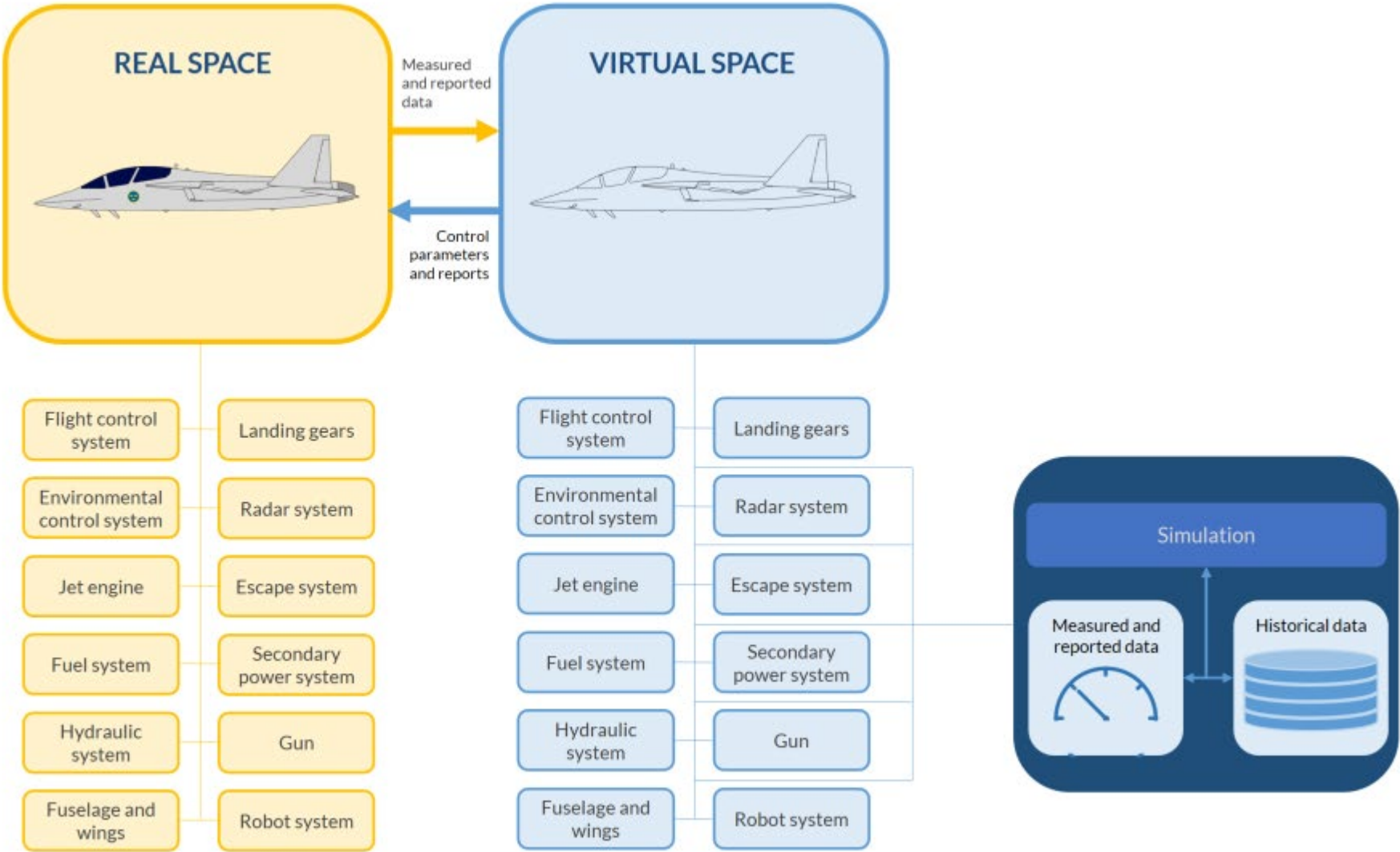
Modeling & Simulation – “Garbage In, Garbage Out”



Modeling Accuracy (Digital Twin)



Modeling Accuracy (System Models)



Office of the Secretary of the Navy
1000 Navy Pentagon
Washington, DC 20350-1000

Office of the Secretary of the Army
101 Army Pentagon
Washington, DC 20310-0101

Office of the Secretary of the Air Force
1670 Air Force Pentagon
Washington, DC 20330-1670

December 17, 2024

MEMORANDUM FOR SERVICE ACQUISITION EXECUTIVES AND PROGRAM EXECUTIVE OFFICERS

SUBJECT: Modular Open Systems Approach for Department of Defense Weapon Systems

Department of Defense (DoD) Armed Forces face rapidly evolving threats across the world. The dynamic and rapid change of adversary capabilities observed in current conflicts necessitates a critical warfighting capacity to integrate advanced capabilities to counter and maintain a warfighting advantage. To meet this threat, Modular Open Systems Approach (MOSA) shall be implemented and promulgated among the Military Services to facilitate rapid transition and sharing of advanced warfighting capability to keep pace with the dynamic warfighting threat.

For several years, the Services have successfully developed, demonstrated, and validated data standards and Open Systems Architecture (OSA) through a cooperative partnership with industry and academia. This work has resulted in the establishment of Open Systems/Universal Command and Control Interface (OMS/UCI), Sensor Open Systems Architecture (SOSA), Agile Mission Suite Government Reference Architecture (AMS GRA), Weapons Open Systems Architecture (WOSA), Future Airborne Capability Environment (FACE) and Vehicular Integration for C4ISR/EW Interoperability (VICTORY), among other standards.

Congress has made significant changes in Title 10 U.S.C. regarding MOSA, adding three new sections:

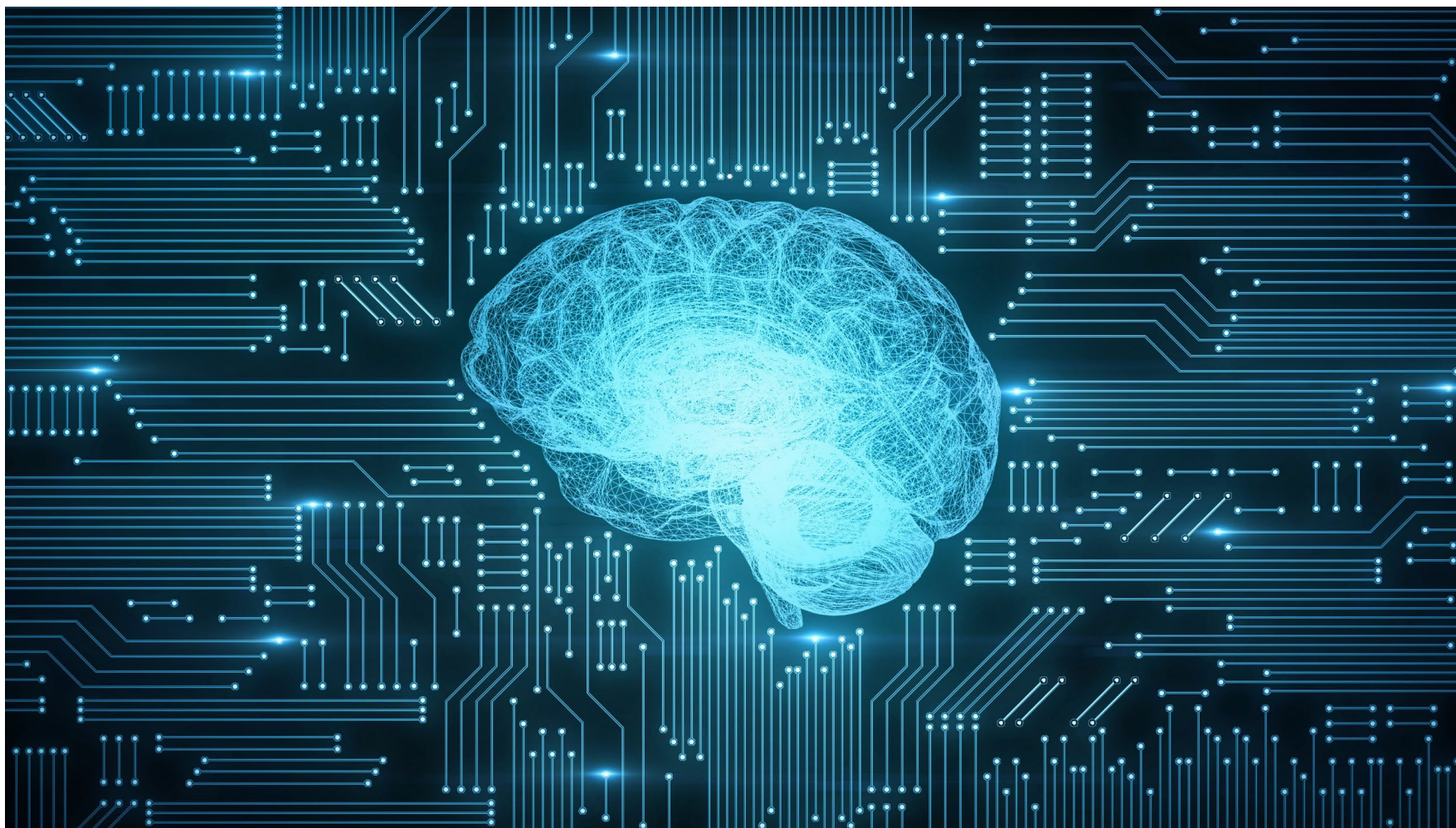
- Section 4401 requires MOSA in major defense acquisition programs [MDAPs],
- Section 4402 requires the implementation of MOSA in program capability development and acquisition weapon system design, to include verification of MOSA requirements, and
- Section 4403 relates to ensuring the availability of major system interface standards and support for MOSA in defense acquisition.

The Department needs to review and formalize updated MOSA policy and guidance to remain consistent with the language and spirit of MOSA as mandated in Title 10 U.S.C.

In addition, although DoD guidance focuses on using common standards as a key to implement MOSA, the Department must expand the guidance to ensure it aligns with the



evolving statutory language. We direct all DoD acquisition officers commit to all five MOSA pillars: (1) **employing a modular design**, (2) **designating modular interfaces**, (3) **leveraging consensus-based open standards**, (4) **establishing enabling environments**, and (5) **certifying conformance**.



Digital Engineering – Let's Fly !



Crawl



Walk



Run



Fly



Ivan Straznicky
CTO, Technical Fellow