

Critical MBE Themes that Enable a Collaborative Government-Industry Digital Engineering Process throughout the DOD Acquisitions Lifecycle



“The Voice of American Aerospace and Defense”

April 2018 NIST MBE Summit
Dr. Peter Pan

Outline

1. Customer Concerns and Problem Statement
2. OSDSE SET main themes and focus areas
3. Practical high level use-case
4. Summary and Conclusion

Voice of the Customer: Need for MBSE in Acquisitions



Agile and Rapidly Evolving Threats & Requirements

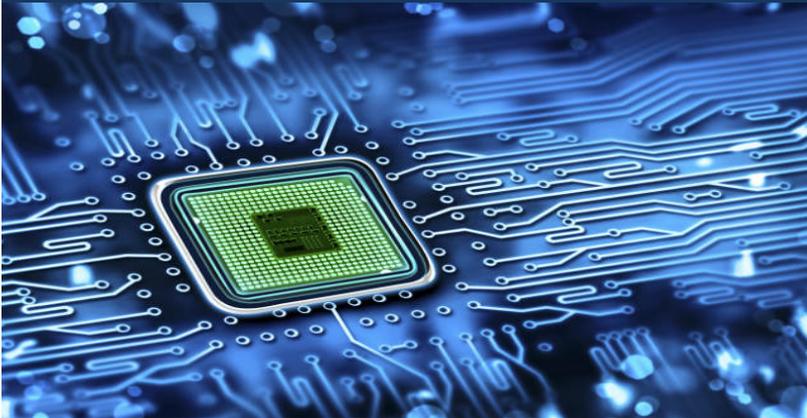
Cyber Threats



Swarm & AI Logic



Multi-Function and Spectrum Agility



Anti-Access Areal Denial



Complexity Growth of Modern & Future Systems of Systems

Historical (and Continuous) trend toward *more and more Costly & Complex Systems* (red bold = greater than 5 years IOC time) :

(Years to First Use from Contractor Selection)

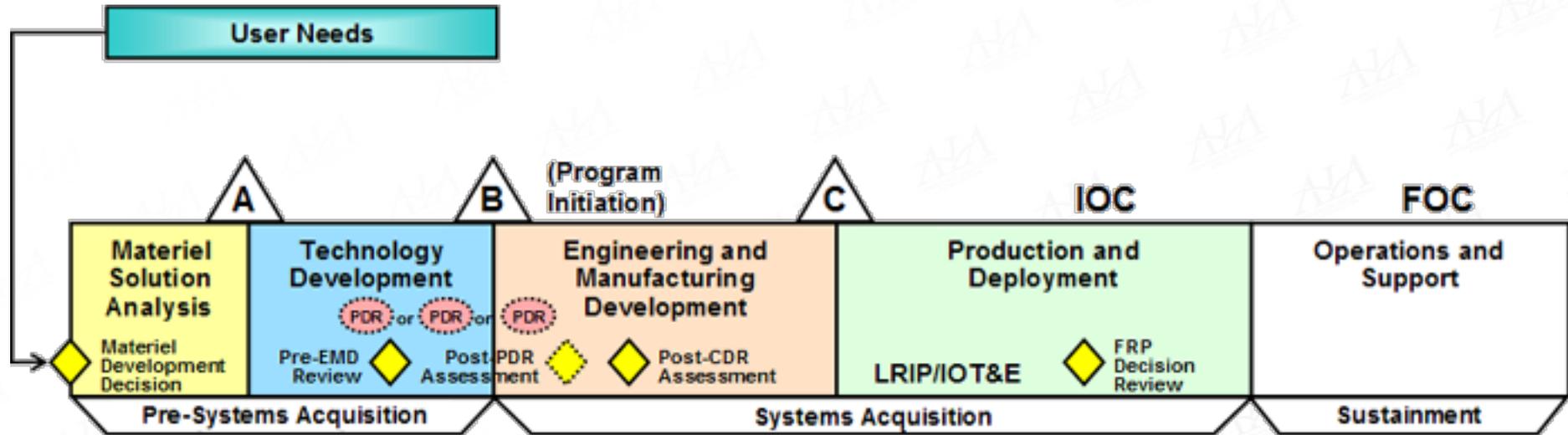
Past (pre-1980)

- Manhattan Project
 - **2.5 years**
- Defense Support Program
 - **5.5 years**
- Intercontinental Ballistic Missile
 - **3.5 years**
- Apollo
 - **8 years**
- F-104
 - **5 years**
- SR-71
 - **3 years**

Present (Post-1990)

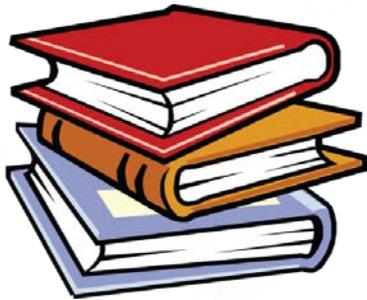
- Future Imagery Architecture-Optical
 - **13 years**
- Space Based Infrared Systems/Boost ISR System
 - **>20 years**
- B-2 bomber
 - **11 years**
- JSF (F-35)
 - **~13 years (still TBD)**
- F-22
 - **14 years**

Traditional Acquisition Approaches Unable to Keep Up with Future Needs

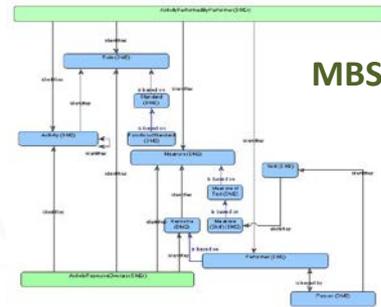
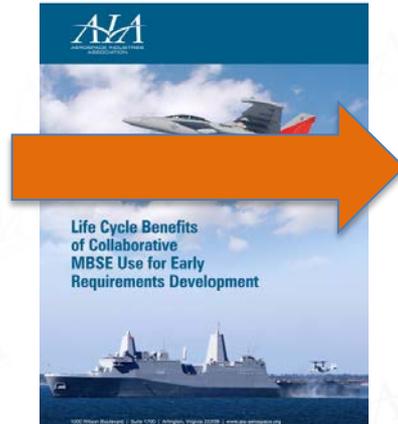


Future Systems too Complex & Expensive to Acquire & Develop via Traditional Doc-Centric Approaches

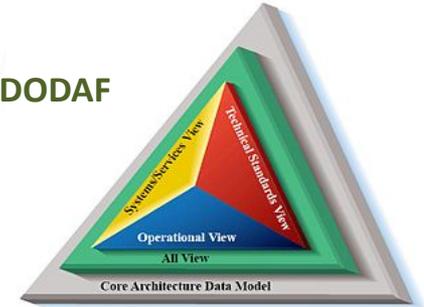
Solution: Transition to a Collaborative MBSE CONOPs Framework



Past



MBSE DODAF



Future

Project Description

The objective of the MBSE team out of AIA is to develop a cross industry whitepaper that strategically explores and highlights key areas on what a potential government-industry collaborative MBSE CONOPS/environment would encompass. The whitepaper will also outline for key government stakeholders AIA's perspectives on the best course moving forwards.

Key Team Members:

Team Leads and Represented Companies:

- Peter Pan
- Guy Babineau
- Jonathan Backhaus
- Arif Dhanidina
- Tamara Hambrick
- Muhammad F Islam

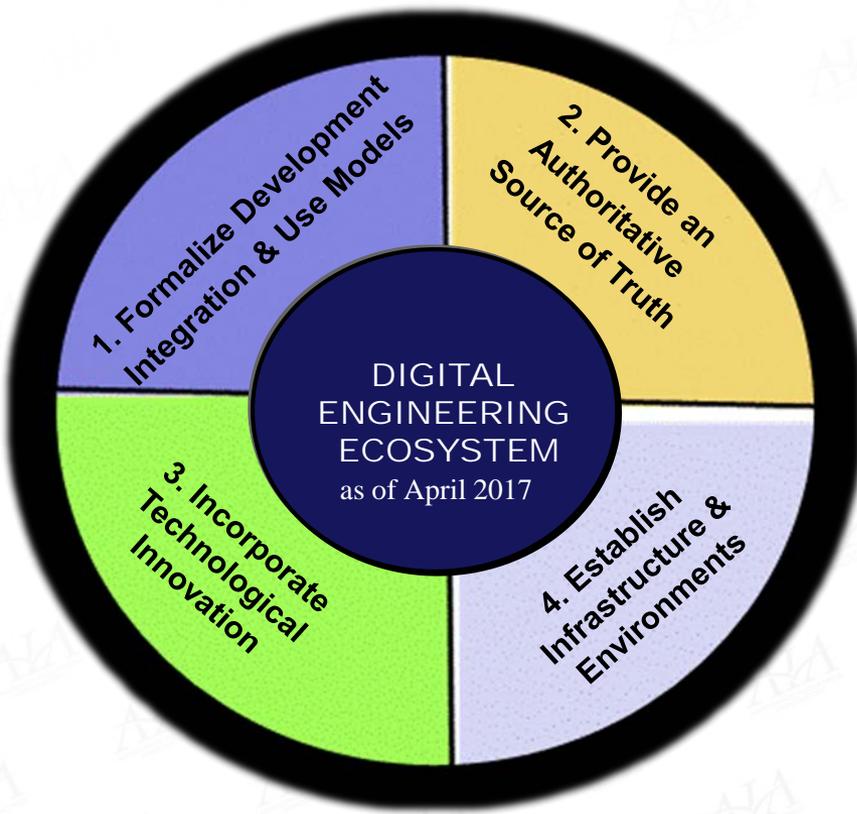


Enabling a Collaborative Digital MBSE CONOPS Framework: Customer Challenges and Key Themes



Overview of Strategic Themes & Focus Areas from OSD

Government ODASD (SE) Digital Engineering Ecosystem Goals:



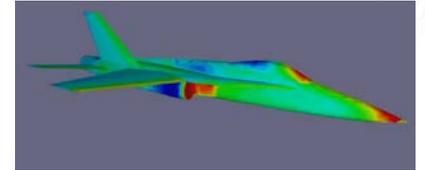
5. Transform Culture / Workforce

Themes to be covered in AIA MBSE II White Paper:

- **Facilitate** Ownership of Technical Baseline through an MBSE Collaborative CONOPs
- **Collaborate** to understand & manage IP and Data Boundaries
- **Expose** points or states throughout acquisition lifecycle for MBSE
- **Shift** the government and industry culture to the new Model Centric paradigm

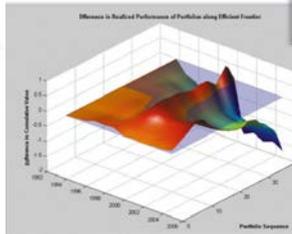
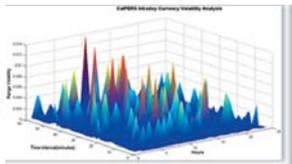
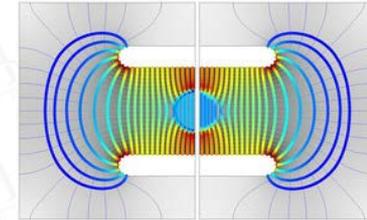
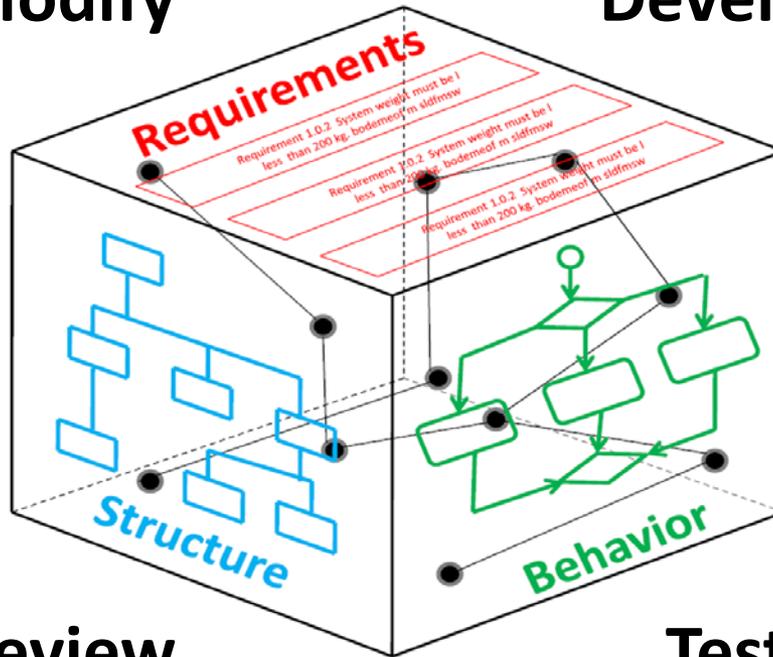


Expose Concrete Points Along System Development Lifecycle



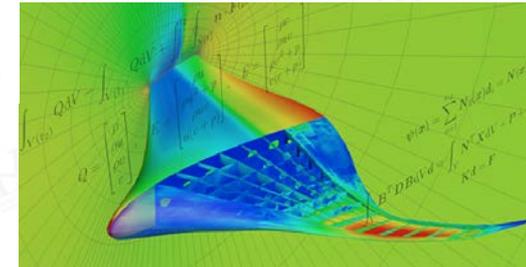
Modify

Develop



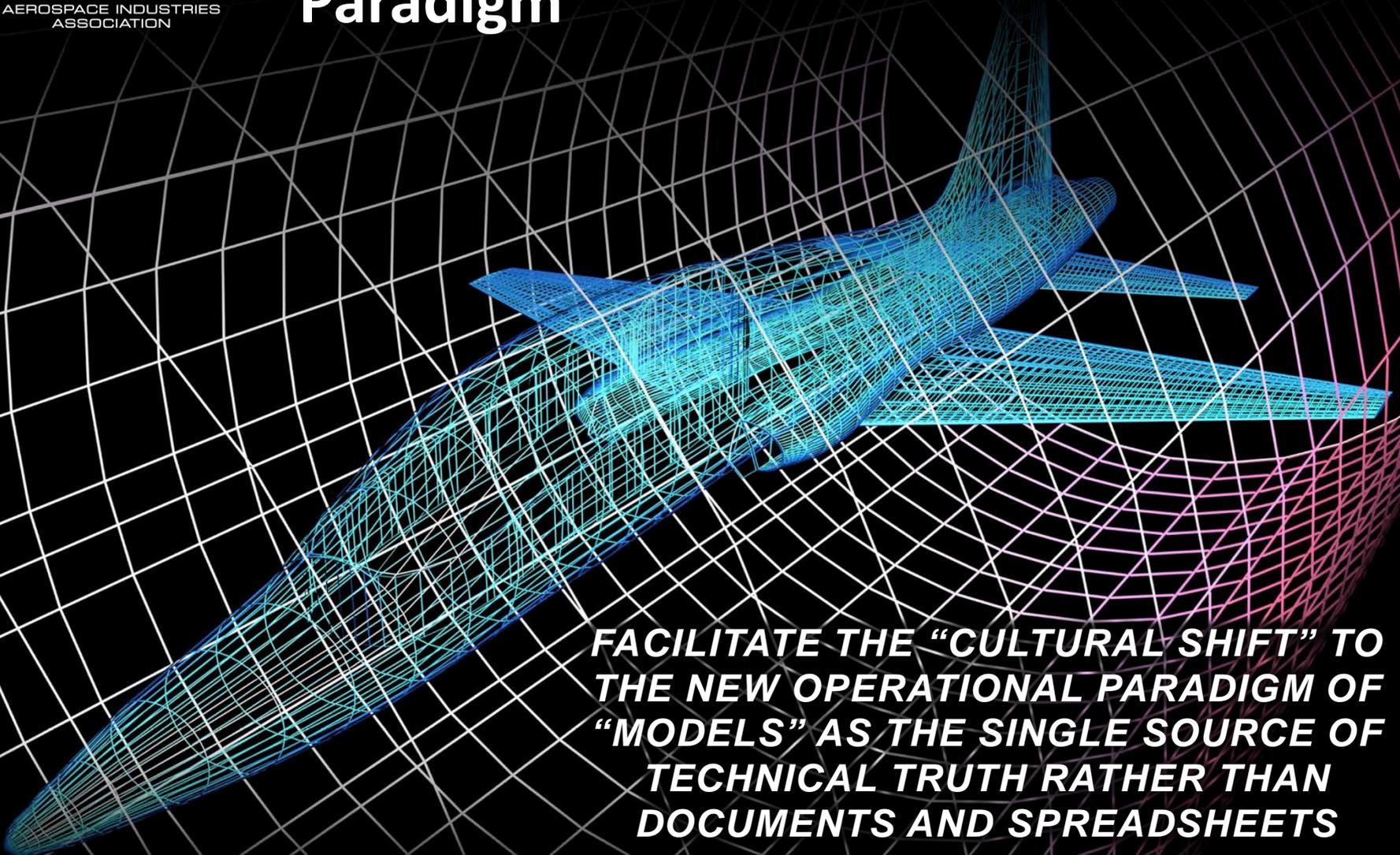
Review

Test





Culture Shift to the New Operational Paradigm

A wireframe model of a fighter jet is centered in the image. The model is composed of a dense network of thin, light blue lines that define the aircraft's structure, including its wings, fuselage, and tail. The jet is oriented diagonally, pointing towards the bottom left. The background is a dark, grid-like pattern of white lines that create a sense of depth and perspective, resembling a wireframe sphere or a complex geometric structure. The overall aesthetic is technical and futuristic.

FACILITATE THE “CULTURAL SHIFT” TO THE NEW OPERATIONAL PARADIGM OF “MODELS” AS THE SINGLE SOURCE OF TECHNICAL TRUTH RATHER THAN DOCUMENTS AND SPREADSHEETS

High Level Use Case



High Level Use Case: RFI for “System X”

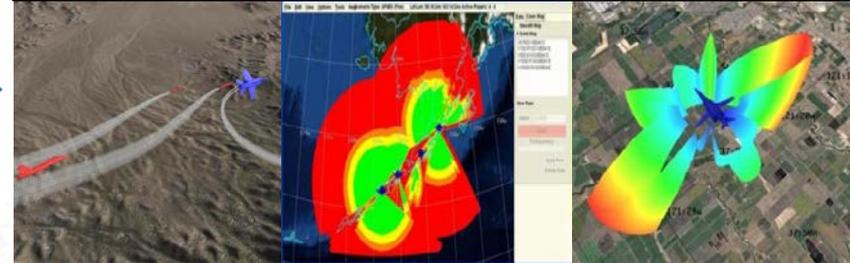
Government

Need Determined via Models & Simulations



Industry

RFI in the form of Evaluation Models & Data Driven KSAs



Industries responds via solutions in the form of model(s), include feedback to government model



Government team can then evaluate and reissue as an RFP to proceed in a similar way



Government

Novel Adversary Techniques demand change in requirements



Existing Digital Artifacts used to evaluate impact to Design, Cost, Risk, and Schedule

Industry

KSA changes in the form of linked Models and Digital artifacts



Multiple Solutions and Configurations enable efficient trade space optimization

Collaborative Digital Environment is Agile and Iterative, able to respond to change

Concluding Thoughts and Summary





Summary & Concluding Thoughts

- Multitude of challenges and roadblocks that industry and government must work together to overcome
- Potential benefits and rewards for such a MBSE collaboration environment would far outweigh the initial work/invested needed at the front end.
- AIA MBSE whitepaper strategically explores and highlights key areas on what a potential government-industry collaborative MBSE CONOPS/environment would encompass

Shifting from a document centric to model centric process to acquire, develop, and field weapon systems is the right way to go

End

Additional Topics for Discussion?



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