



Lockheed Martin Tackles the Latest AFRL MADO Challenge with Phoenix Integration

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Lockheed Martin Aeronautics

Advanced Development Projects

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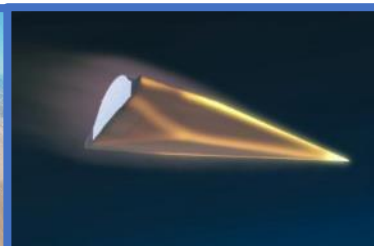
INTEGRATION, EXPLORATION, and MBSE
ModelCenter®: The Framework for Model Based Engineering



LM Aero ADP - What We Do



- Prototyping and Winning New Programs and Special Mission Aircraft
- Leveraging Investments in Game Changing Technologies
- Improvements & Derivatives of Existing Products



Supplier Technology Key to Success



Advancing Relationship



- Started Pre-Model Center 1.0
- Basic Analysis Server
- Wrapping FORTRAN codes
- File Wrappers

EXPEDITE

MC 12

MC 11.2.2

MC 10.2

Robustness
Performance
Stability

Speed!
Robustness
Graphics

MC 9.3

MC 8.0

MC 7.0

Maturation
Features (CL)

MC 6.0

Maturation
Features (DE)

MC 5.0

Plug-ins
Features (DE)

MC 4.0

XML, Scripts
Databases,
VC

MC 3.0

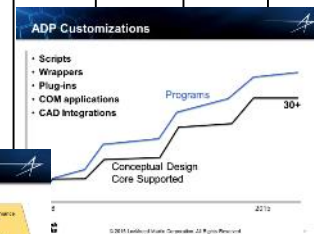
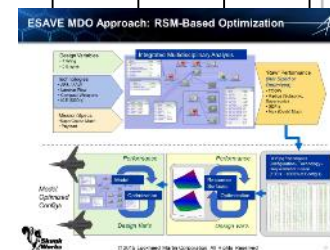
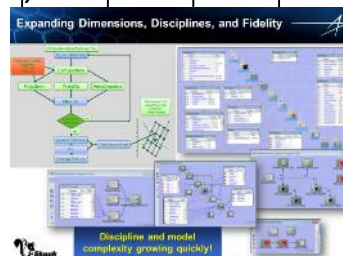
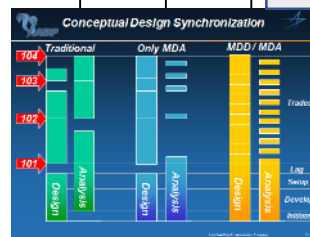
Throughput
Scalability

MC 2.0

Performance
Integration Opt

MC 1.0

Phoenix Integration
Software Releases



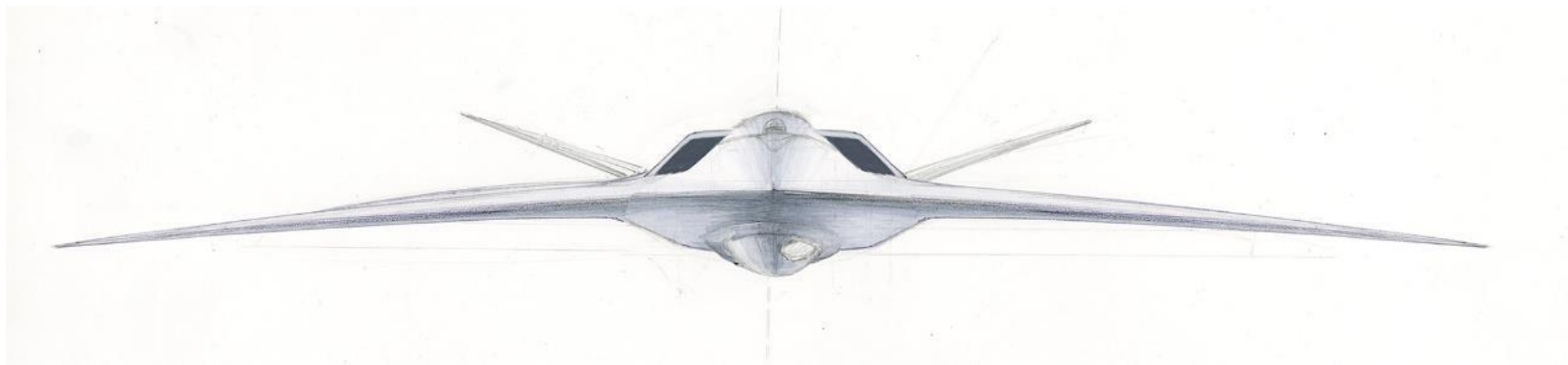


EXPEDITE Goals



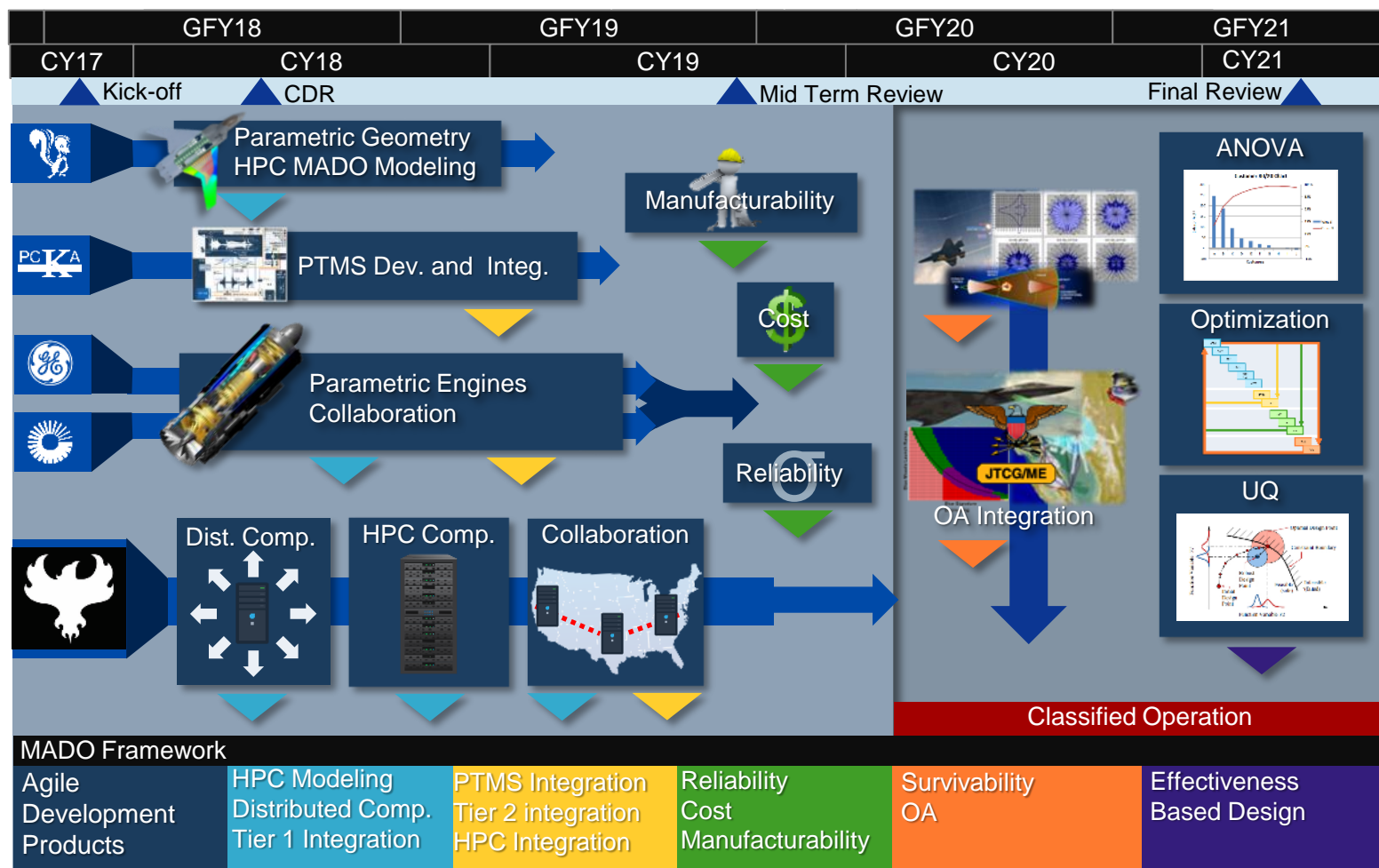
EXPanded MADO for **E**ffectiveness-based **Des**ign **TE**chnologies

- 42 month, \$6.8M CRAD with the AFRL RQVC Multi-Disciplinary Science and Technology Center (MSTC) which seeks to advance the state of the art of aircraft conceptual design
- High level EXPEDITE technical goals include:
 - Expand the conceptual design process to integrate signature management and operational analysis to develop design methods for effectiveness based
 - Unifying multidisciplinary design teams that collaborate across geographic distances.
 - Bringing time-domain design models into a computationally efficient MADO design framework



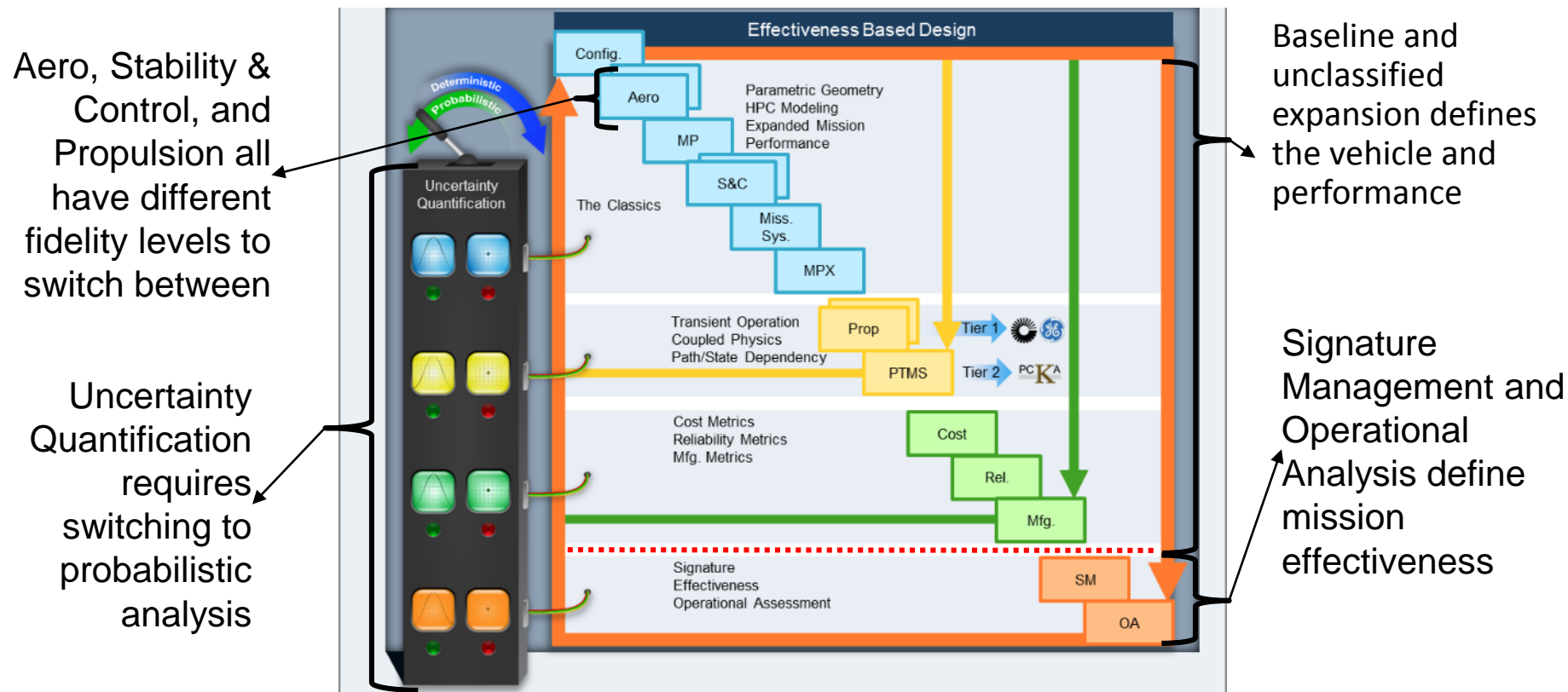


High Level Program Roadmap



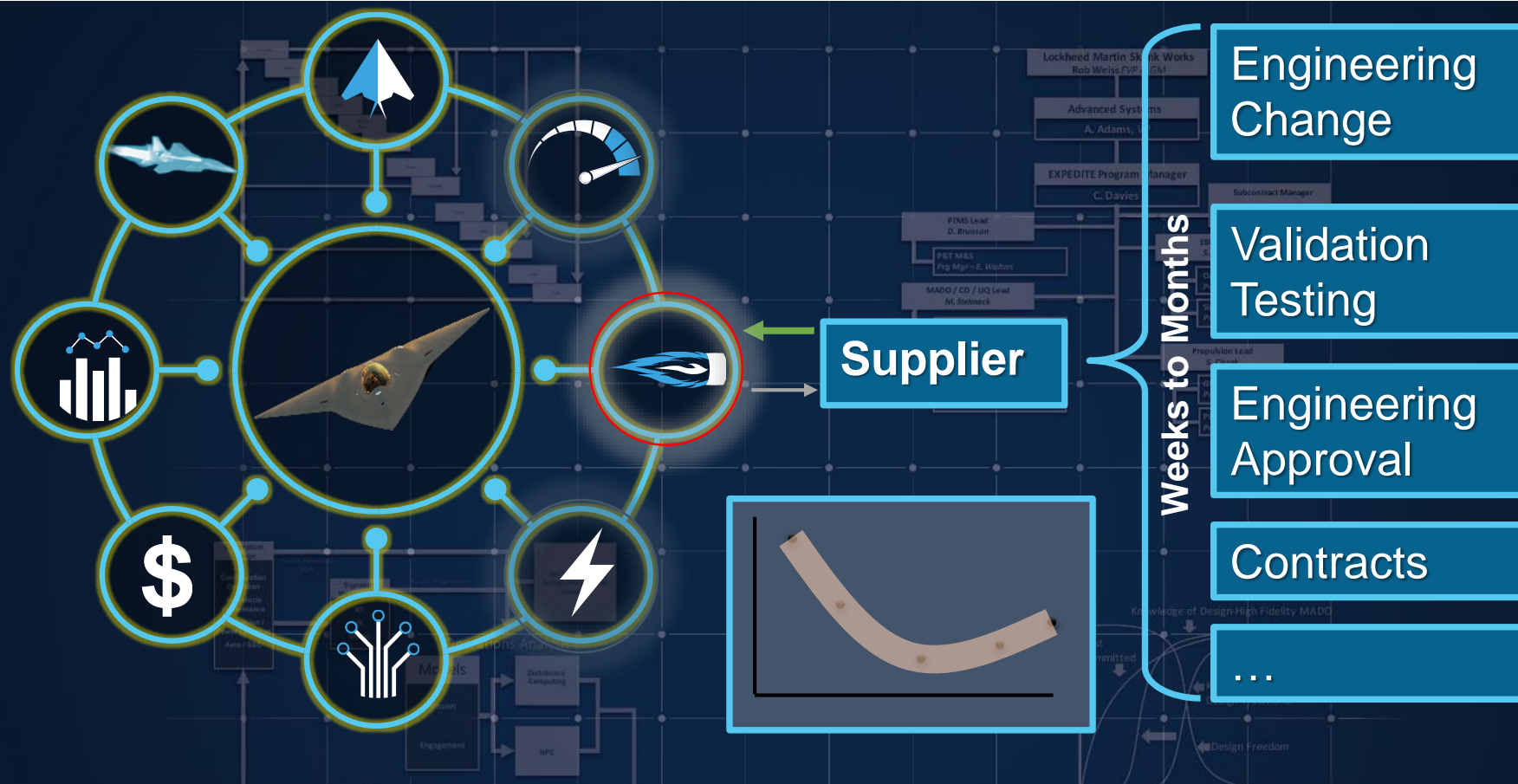


Technical Approach Overview





Conceptual Design Reality

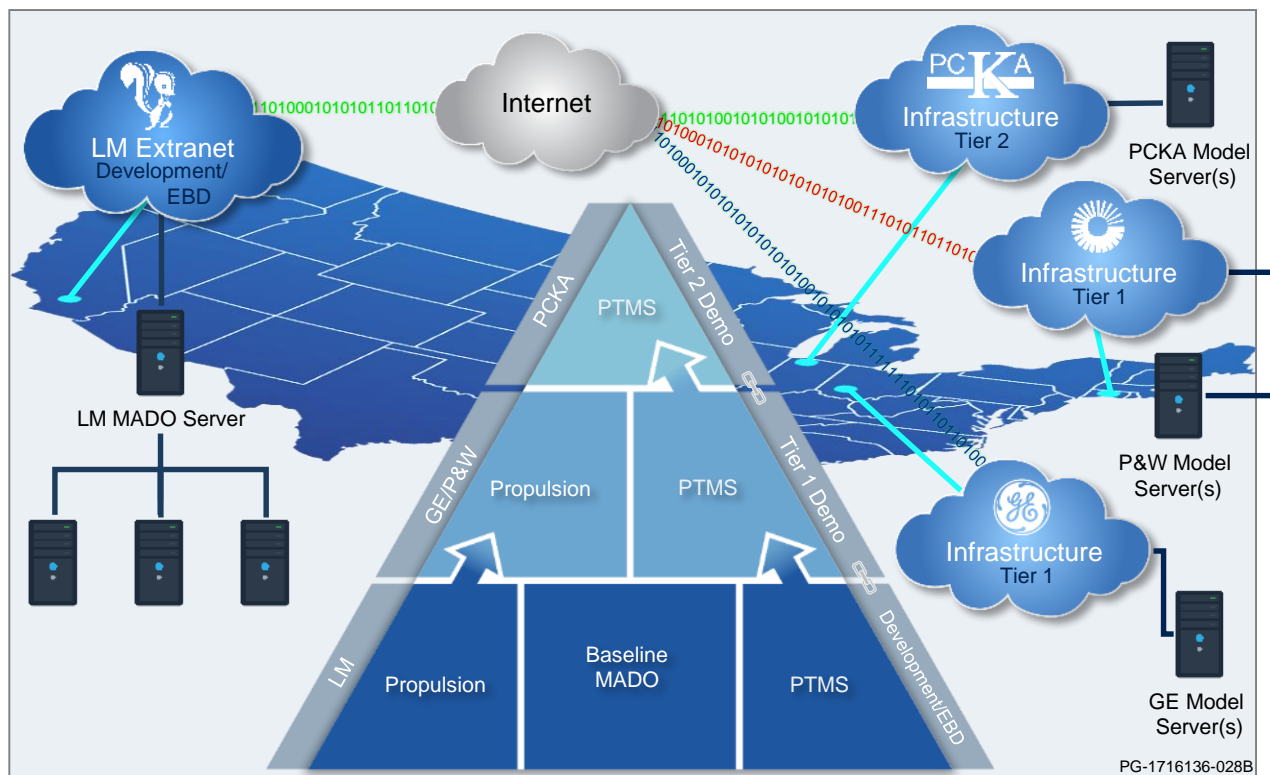




EXPEDITE



Geographically Distributed MDO





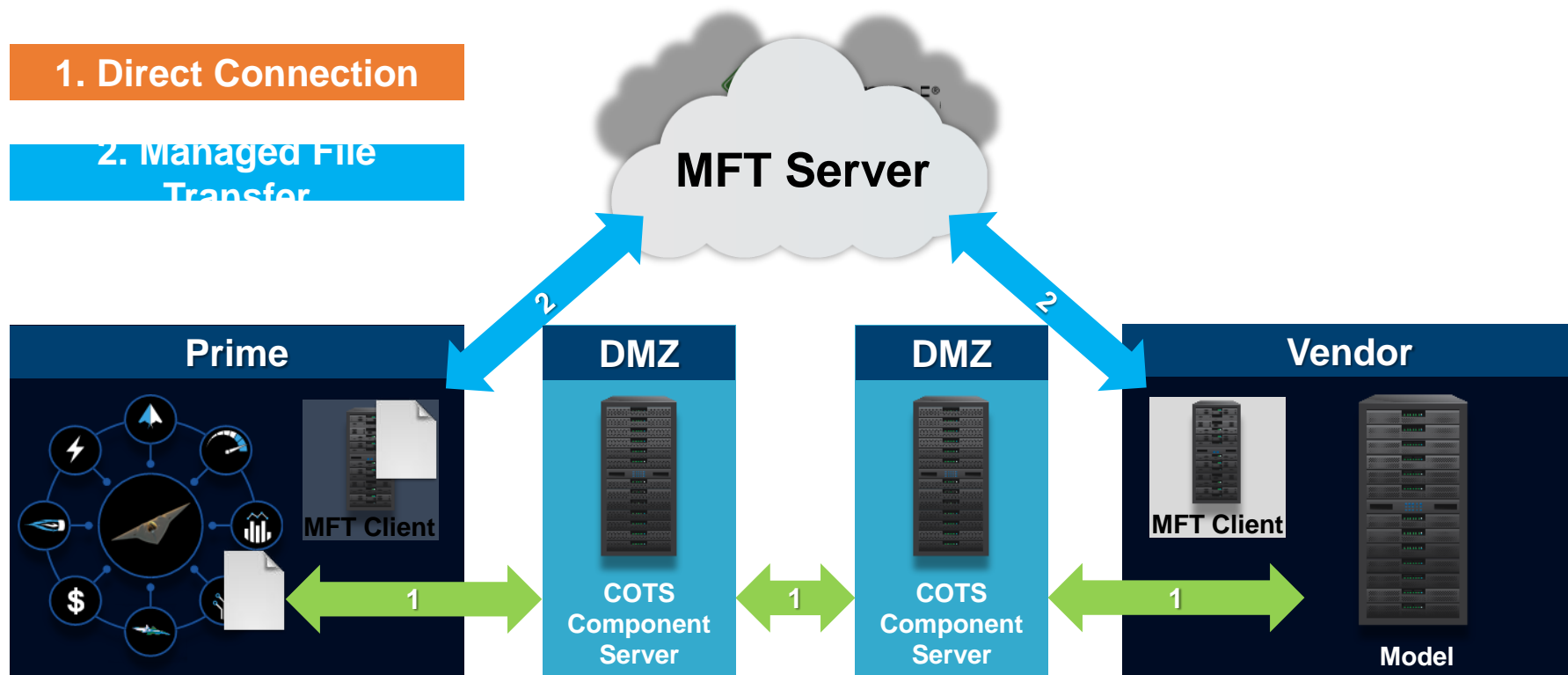
Collaboration Options



PHOENIX
INTEGRATION

1. Direct Connection

2. Managed File Transfer

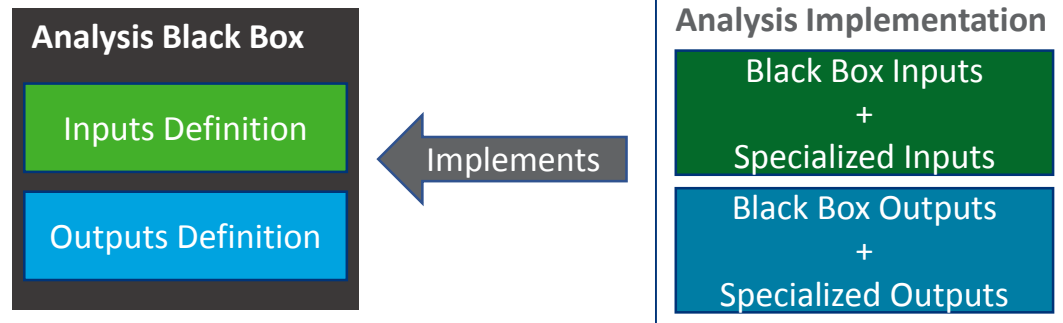




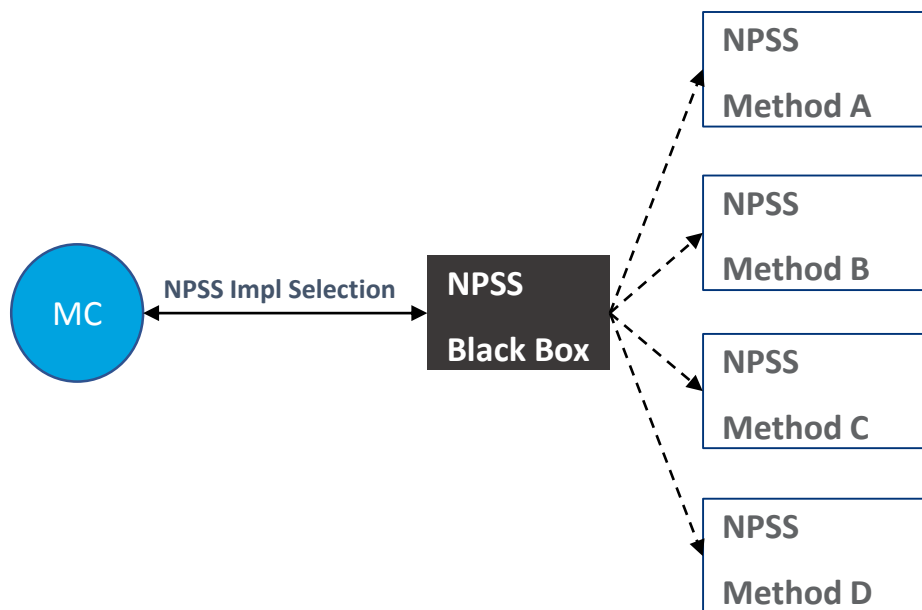
EXPEDITE Look-Ahead



- MC 12 Features
- Exploring new approaches to dist comp.
 - Modeling practices
 - Relative paths
 - Black Box technology
- Best practices to improve productivity
- Improving development methods for MC integration
- Business model changes for increased advanced feature availability



A BLACK BOX
DEFINES AN
INTERFACE THAT
EACH VERSION
OF A
COMPONENT
MUST
IMPLEMENT



UNDERLYING IMPLEMENTATION
VARIES ACCORDING TO
ENGINEERING NEEDS

IMPLEMENTATION CAN BE
SELECTABLE AS A DESIGN
VARIABLE

WITH PERFORMANCE
MEASUREMENT, WE CAN THEN
APPLY EXPERIMENTAL DESIGN TO
UNDERSTAND AND IMPROVE
IMPLEMENTATION DECISIONS
THROUGHOUT DESIGN LIFECYCLE

Questions?

