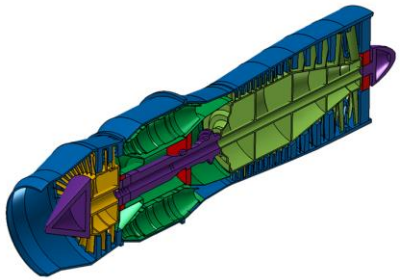
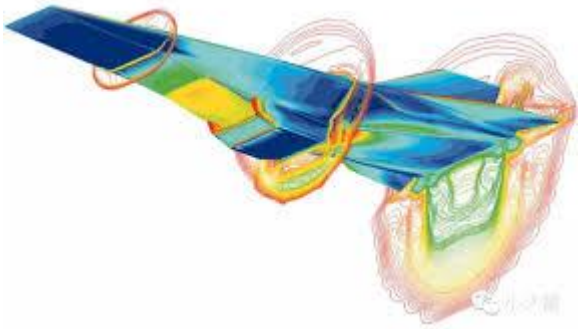
Automation and Integration for Complex System Design

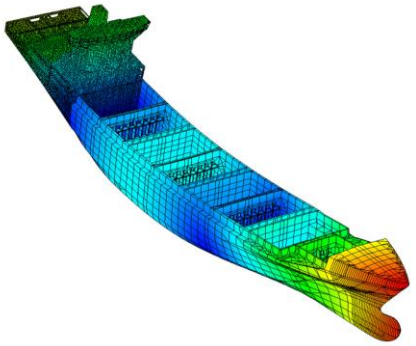
Dr. Scott Ragon
Phoenix Integration

INTEGRATE**EXPLORE**ORGANIZE

Modeling and Simulation software tools

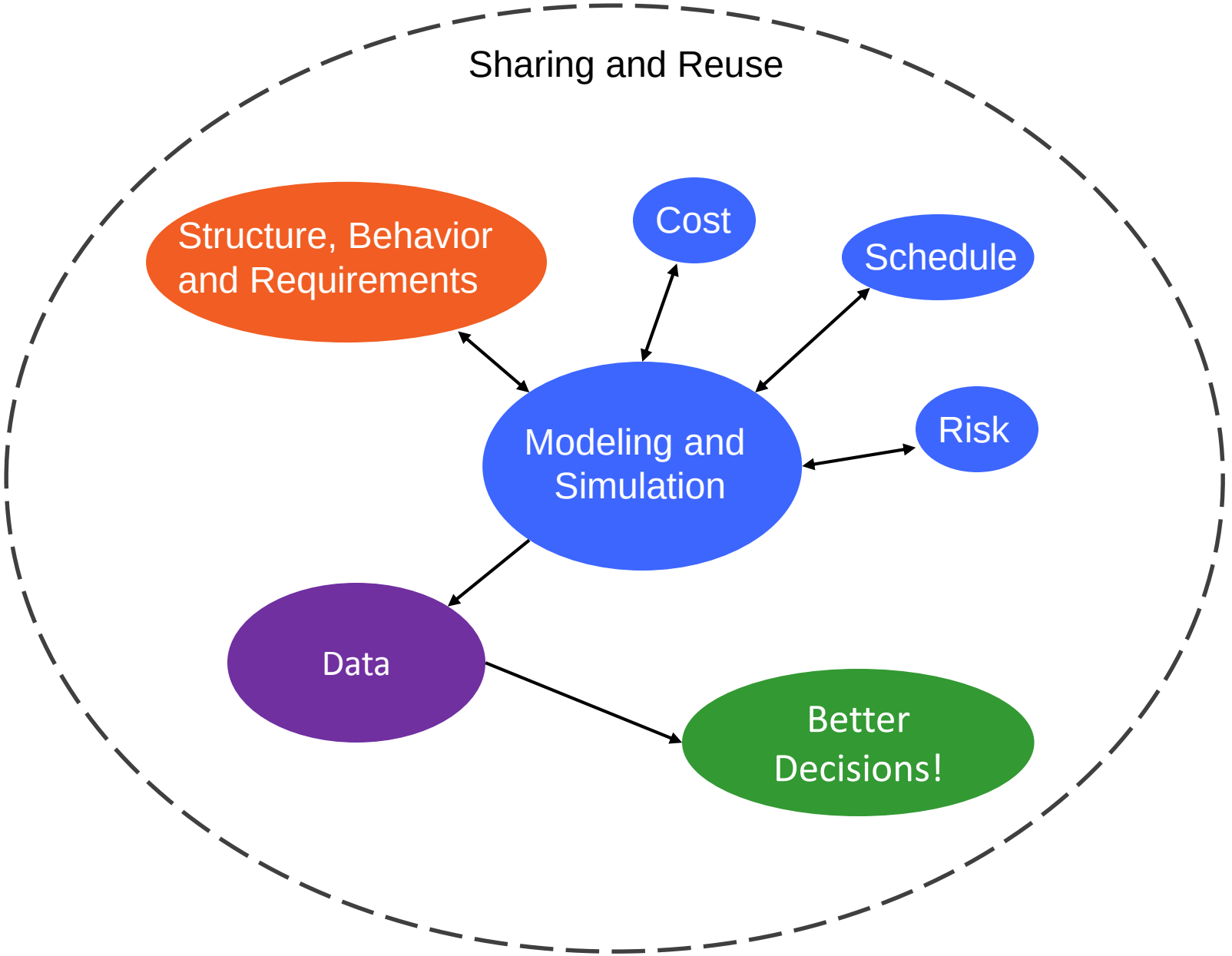


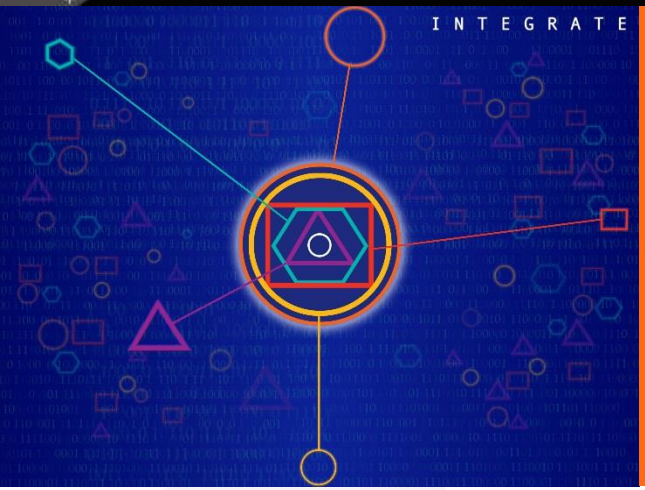


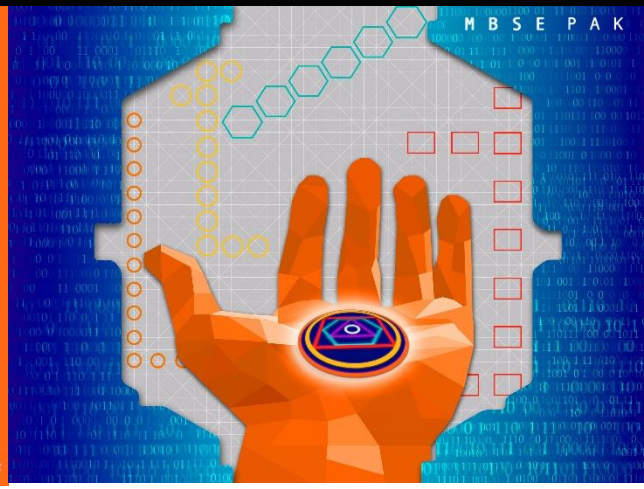


- ✓ Reduced development costs
- ✓ Increased Efficiency
- ✓ Better Performance

The Challenge





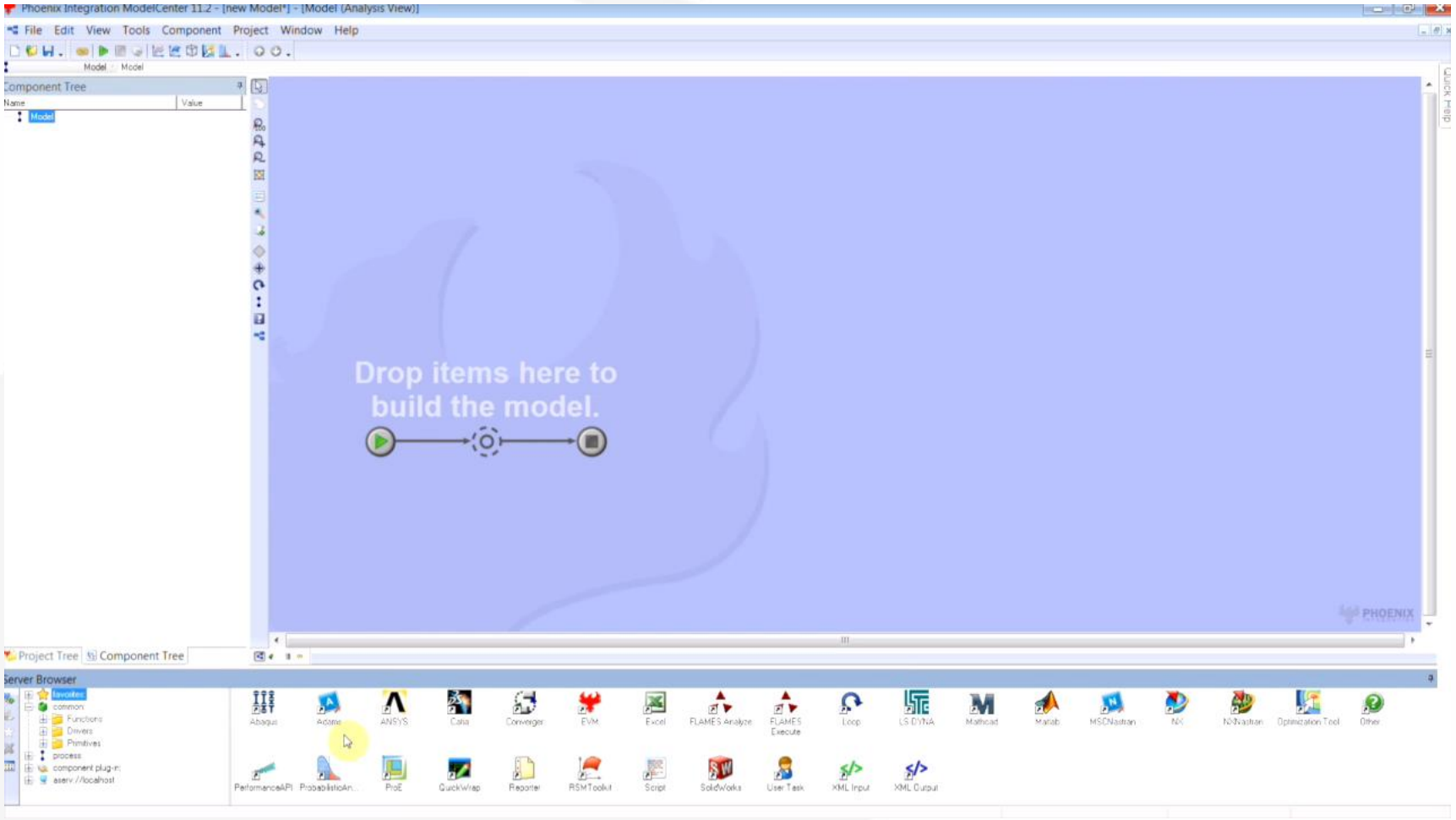


ModelCenter

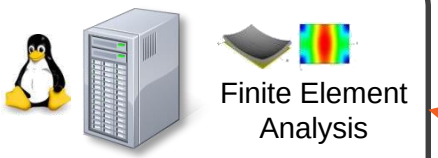
Automate Any Software Tool

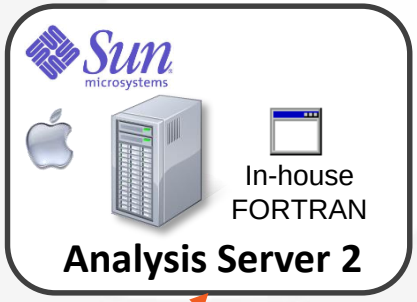
- Automate any software tool
- Vendor neutral

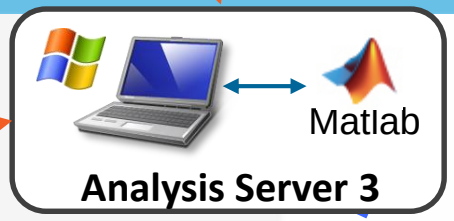
Create and Automate Workflows

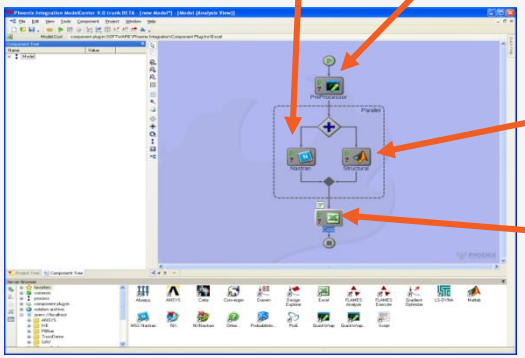


Distributed Engineering



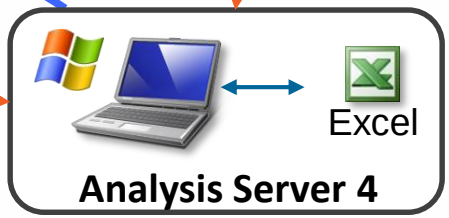




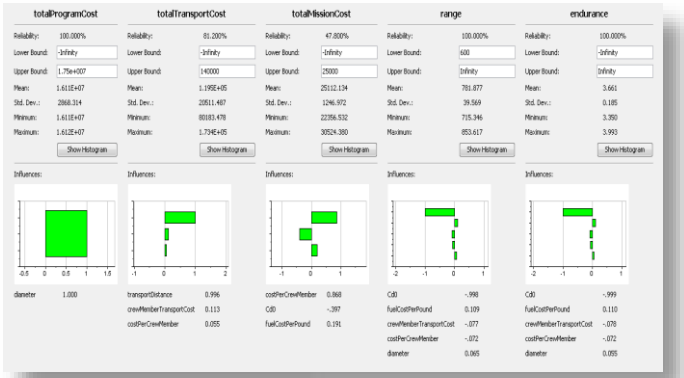


ModelCenter

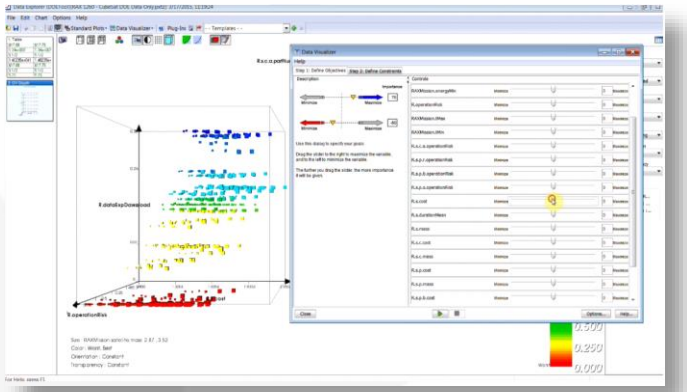
Network (LAN or WLAN)



Explore

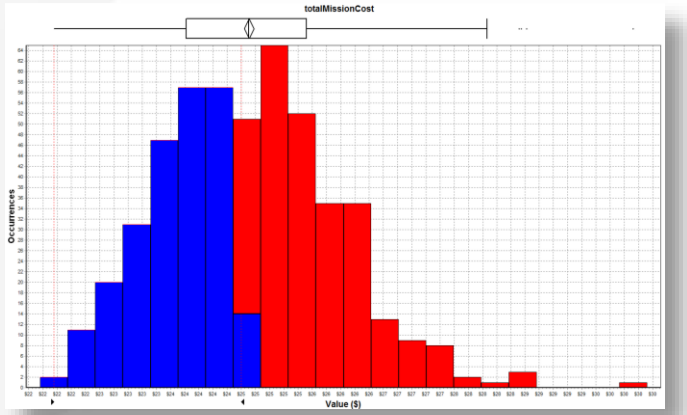


Sensitivity Analysis



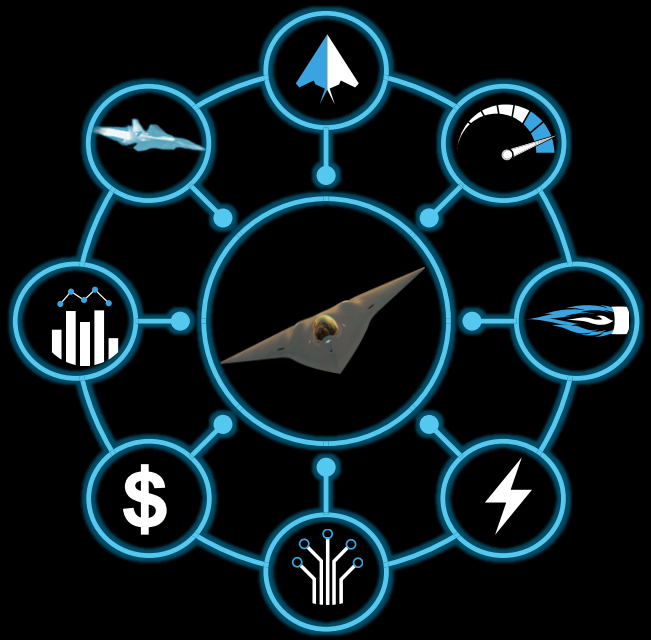
Trade Space Visualization

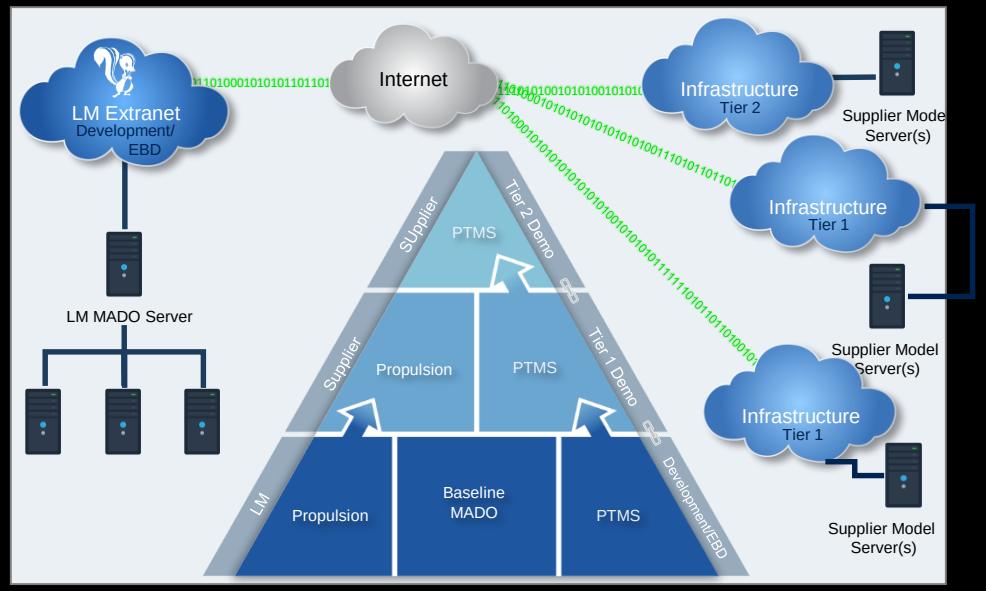
Optimization



Probabilistic Analysis

Customer Collaboration





EXPEDITE

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EXPEDITE Objectives

- **Phase I: MADO Expansion Phase**
  - **Expansion of MADO from the current state-of-the-art**
    - **Path and state dependent system and design**
    - **UQ analysis within operational analysis (OA) space**
    - **cost and reliability manufacturability metrics**
  - **Coupling DV's, objective function(s) and constraints for Effectiveness Based Design**
  - **Execute MADO in correct security posture for EBD**
    - **Apply appropriate computational resources**
    - **Three tiers of distributed MADO**
- **Phase II. Verification Phase**
  - **Demonstrate on a relevant MADO design problem of interest based on a mission-level OA**
    - **Work in space where vehicles operate at or below Mach 2.5**
    - **Single or multiple platform systems**

ERS: Pushing the Envelope

ERS Powerful Tradespace Approach

ERS Tradespace Concept

- Architecture
- Tradespace Analytics
- Advanced Modeling
- Environmental Rep.
- Mission Context

Cost models
-ilities
....other

ERS CLOUD COMPUTING ENVIRONMENT (CCE)

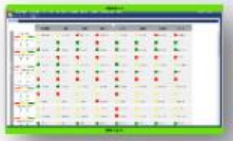
10,000X *Improvement in productivity in Analysis of Alternatives*

Efficiently discover key performance parameters (KPPs)

HPCMP and S&T Resources

Currently Applied ERS Advanced Tradespace Analytics

TRADElite



- Early concept tool
- Functional / component breakdown
- Explore tradespace edges

Expand Tradespace Fully

Performance Assessments
Performance Metrics

High-fidelity Models
Parameter Sweeps:
Design Variations

TRADEStudio

- Highly computational
- Sifts through millions of designs
- Refined set of specifications for viable design solutions

Proposed Collaboration

ERS and ModelCenter

- Export data from ModelCenter into TradeStudio
- Submit analyses from ModelCenter directly to ERS Cloud Computing Environment (CCE)
- Call ModelCenter workflows from ERS workflow

What Do You Think?