

# ***Headquarters U.S. Air Force***

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*Integrity - Service - Excellence*

## ***Modeling & Simulation and (in) Development Planning***



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# Perspective: *DP is Shifting the Paradigm*

- MDD (and Concept Decision before that) widely viewed as opportunity to decide **“What are we going to acquire?”**
- MDD is really an investment decision – **“Do we need to acquire anything to address this capability need?”**
  - An acceptable answer is **“Not now; pursue S&T investment(s) and revisit the need in a few years.”**
  - Another acceptable answer is **“More (or different utilization) of what we currently have.”**
- AoA Report provides information to ask **“What could we realistically afford to think about acquiring?”**
- Sponsor – with materiel support – develops COAs and proceeds to MS A with focus on **“What do we want to start down the path to acquire?”**

➤ *DP ensures sufficient concept/solution work prior to MDD, AoA, & MS A*

➤ *M&S and Early SE form the analytical and technical foundation of DP*



# Acquisition Milestones, Phases, Events/Tasks, and Products

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GAPS

MDD

Capability - Based Planning (CBP)

Study Ktr(s)

Material Solutions Analysis (MSA)

\$0.1B/yr

Technology Development (TD)

Select N Ktr(s)

\$1B/yr

Engineering and Manufacturing Development (EMD)

Select 1 Ktr

\$4B/yr

Production and Deployment (P&D)

Operations & Support (O&S)

\$0.05B/yr

“ROI”

CCTD / AoA Plan    AoA    DP ... SPO    SRR, SFR, PDR, ...    CDR ... Build/Test/Fix

Events & Tasks

Many concepts to Preferred Concept  
CDD\*  
SRD, etc

Knowledge-Based Decision Making

Solutions  
• Non-Materiel  
• Materiel (OV-1)

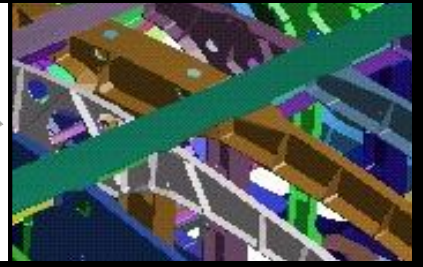
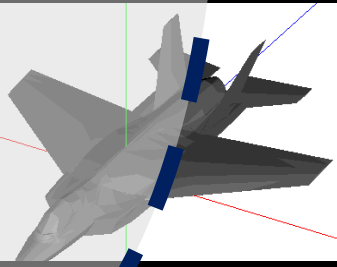
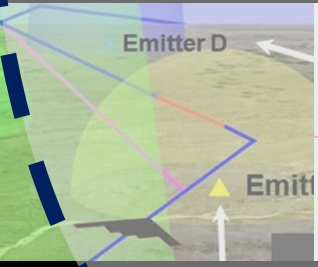
Trade Space

Maturation

Allocation

Next Block

Design Evolution



Product

Technology Maturation

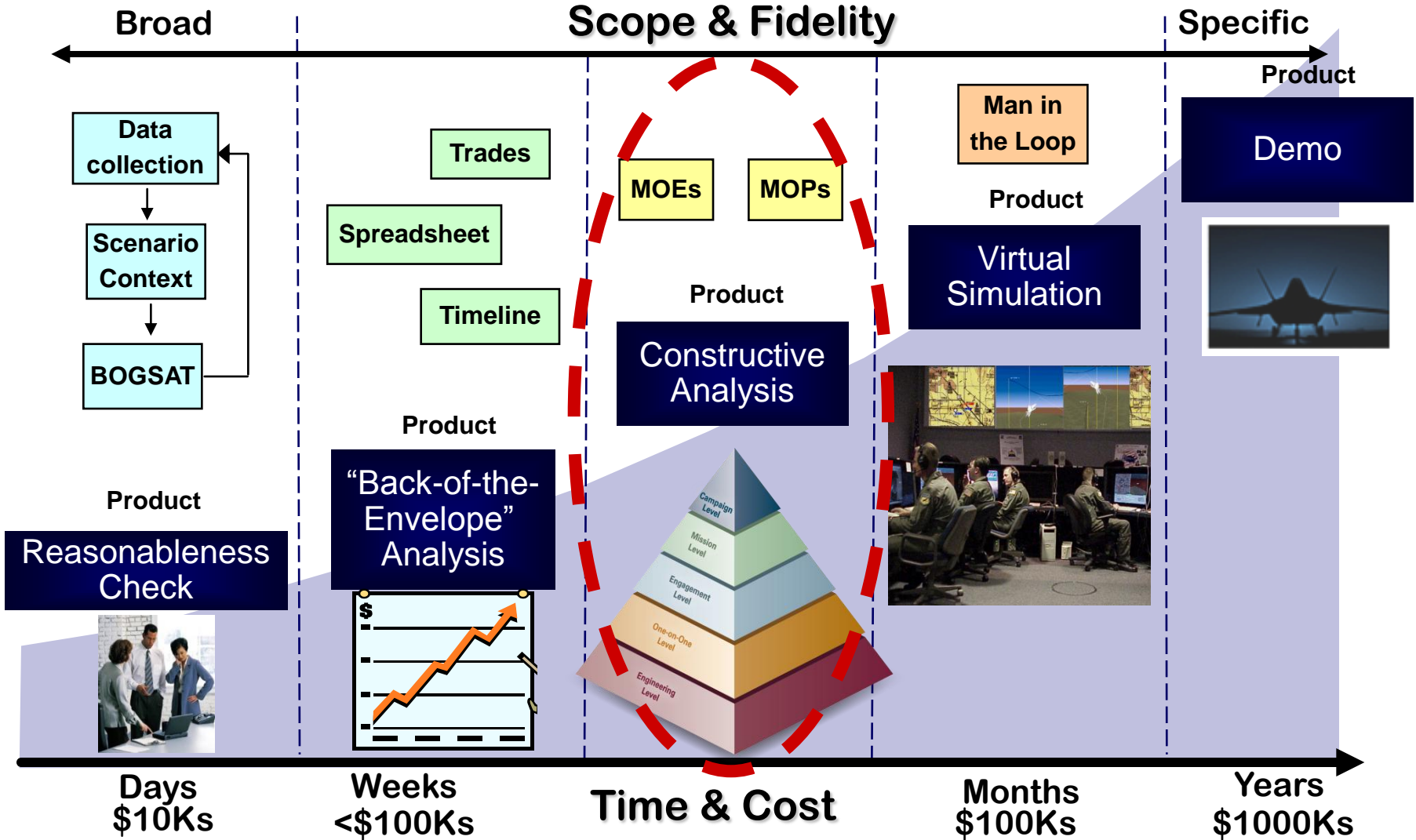
Competitive Design & Prototyping

Risk Reduction



# Levels of Analysis

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# System Effectiveness Analysis Process

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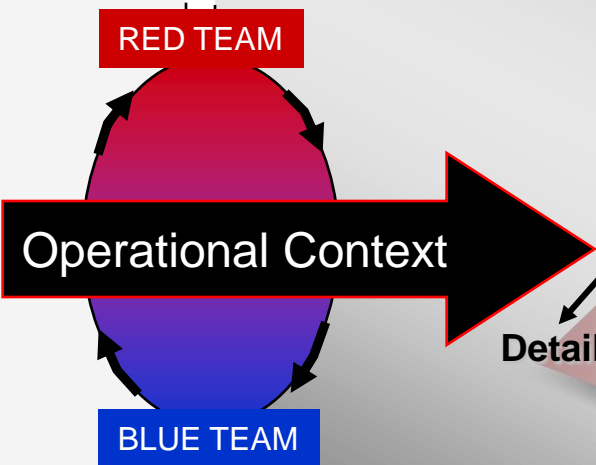
## Authoritative Data

OSD Analytic Agenda

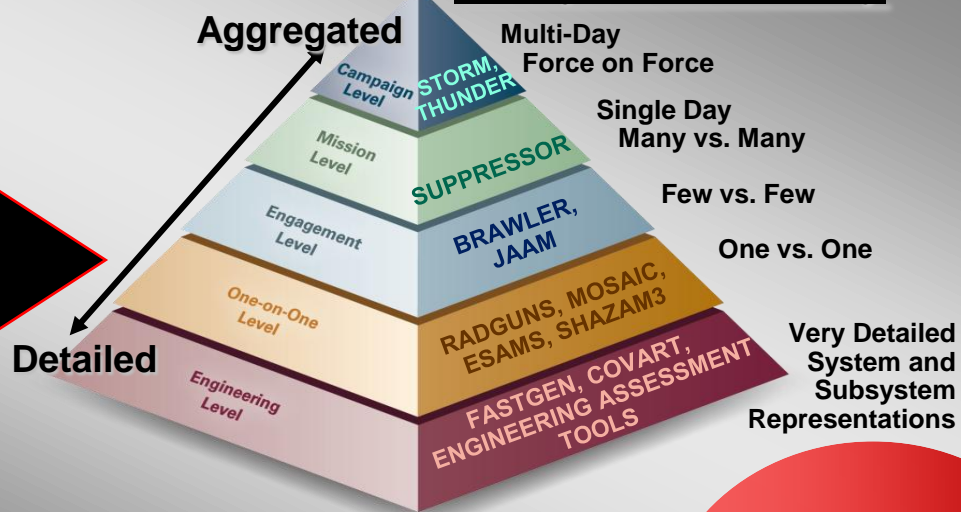
Joint CONOPS

Red/Blue System Data

Subject Matter Experts



## Analysis Hierarchy



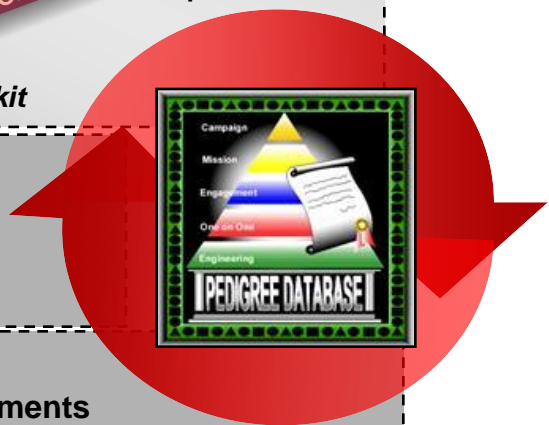
Air Force Standard Analysis Toolkit

### Types of Analysis

- ✓ Combat Effectiveness
- ✓ Military Worth
- ✓ Vulnerability Assessment
- ✓ Survivability
- ✓ Lethality

### Types of Products

- ✓ Analysis of Alternatives (AoA)
- ✓ Requirements Development
- ✓ Live Fire Test Assessment
- ✓ Concept Assessments
- ✓ Systems Engineering Trade Studies
- ✓ DT / OT Planning



## End-to-End Assessment of System Effectiveness in a Total Force Context



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# M&S Contributions to DP

1 of 2

## *Trade Space Exploration*

- Provide analytical support to JCIDS and CBP processes
  - Effectiveness estimates: one-on-one or one-on-many solutions
  - Feasibility studies: concept exploration, technical evaluation
  - Effectiveness/supportability studies: design evaluation and risk reduction of technical options
  - Mission Area Assessments

## *Concept Development, Refinement, and Analysis*

- Support acquisition decision processes through MSA Phase
  - AoA activities – primarily support Effectiveness Analysis Working Group (EAWG) and Threat Working Group (TWG) principals
  - Consider options of business processes/models
  - Costing (program and life cycle)



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## ***General***

- **Support technology demonstration / transition activities to evaluate concepts**
- **Evaluate opportunities for integration with other systems, SoS characterization, environment representation**
- **Live / Virtual / Constructive environments augment and mature early engineering assessments**

***System-of-Systems Analyses Throughout the Life Cycle --  
Investment Strategy, Portfolio Analysis,  
Roadmap Development, and more***



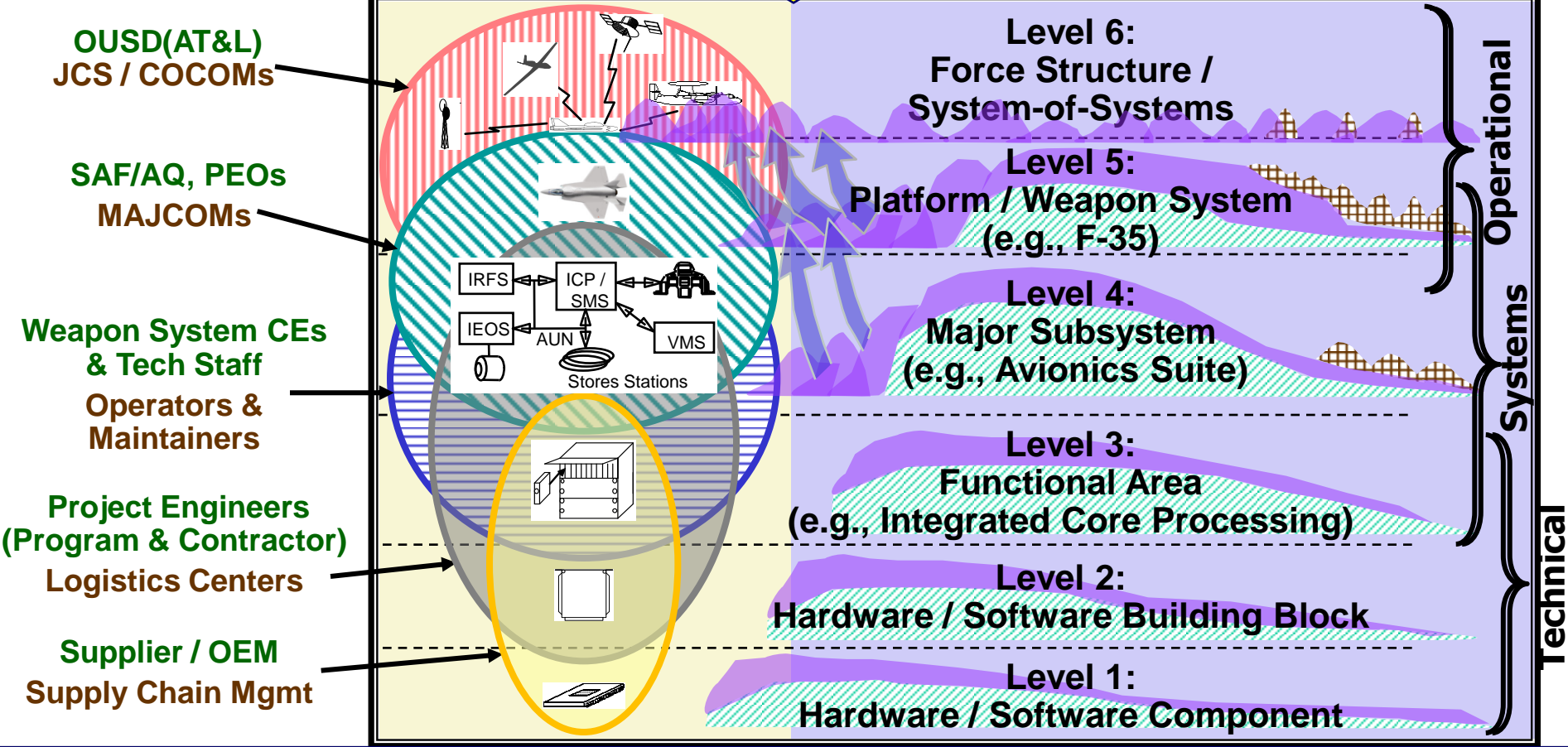


# SE and SoSE Perspectives

## Acquisition, Operations, Integration, Architecture

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Capability Planning / Development Planning **MDD**    Materiel Solutions Analysis **A**    Technology Development **B**    Engineering & Manufacturing Development **C**    Production & Deployment Operations & Support Disposal



**Views of the "universe"**      **Test & integration focus (notional)**      **Architecture views**  
 Acquisition   Operational      DT&E   M&S / Experimentation   OT&E      (spans are not authoritative)

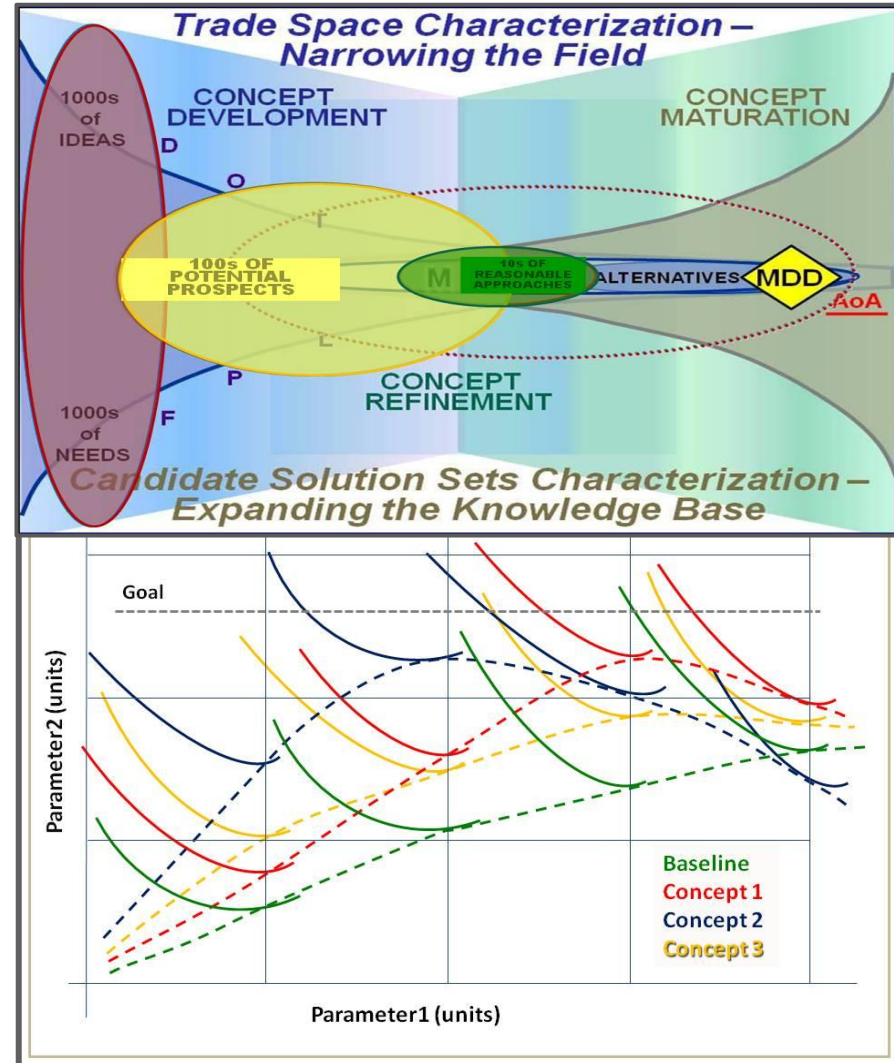




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# What Models & Tools Can Bring to Development Planning

- First-order discriminators to support early trade space exploration
  - Efficient filtering of ideas identifies those that may warrant further study
- Improved ability to select appropriate analytic environments
  - Sensitivity analyses to find the inflection points (“knees in the curves”) are more significant than domain-specific analyses that establish design details

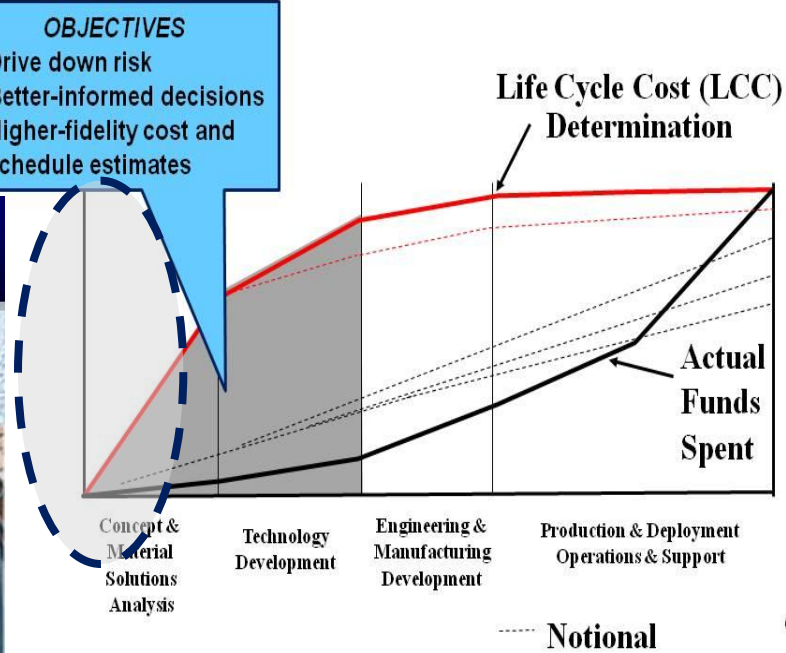




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# Why It's Important

- OBJECTIVES**
- Drive down risk
  - Better-informed decisions
  - Higher-fidelity cost and schedule estimates



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**M&S and DP provide the technical and analytical basis to inform pre-acquisition investment decisions and start high-confidence programs**



# Be Careful What You Ask For ...

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## Development Planning, Pre-WSARA ...

