Model-Based Concept Development

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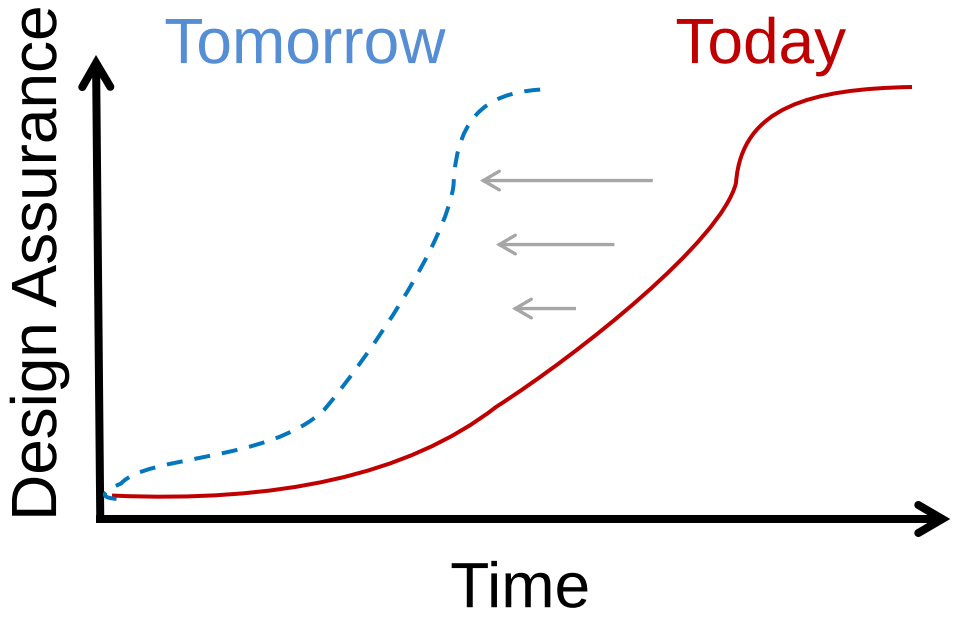
Agenda

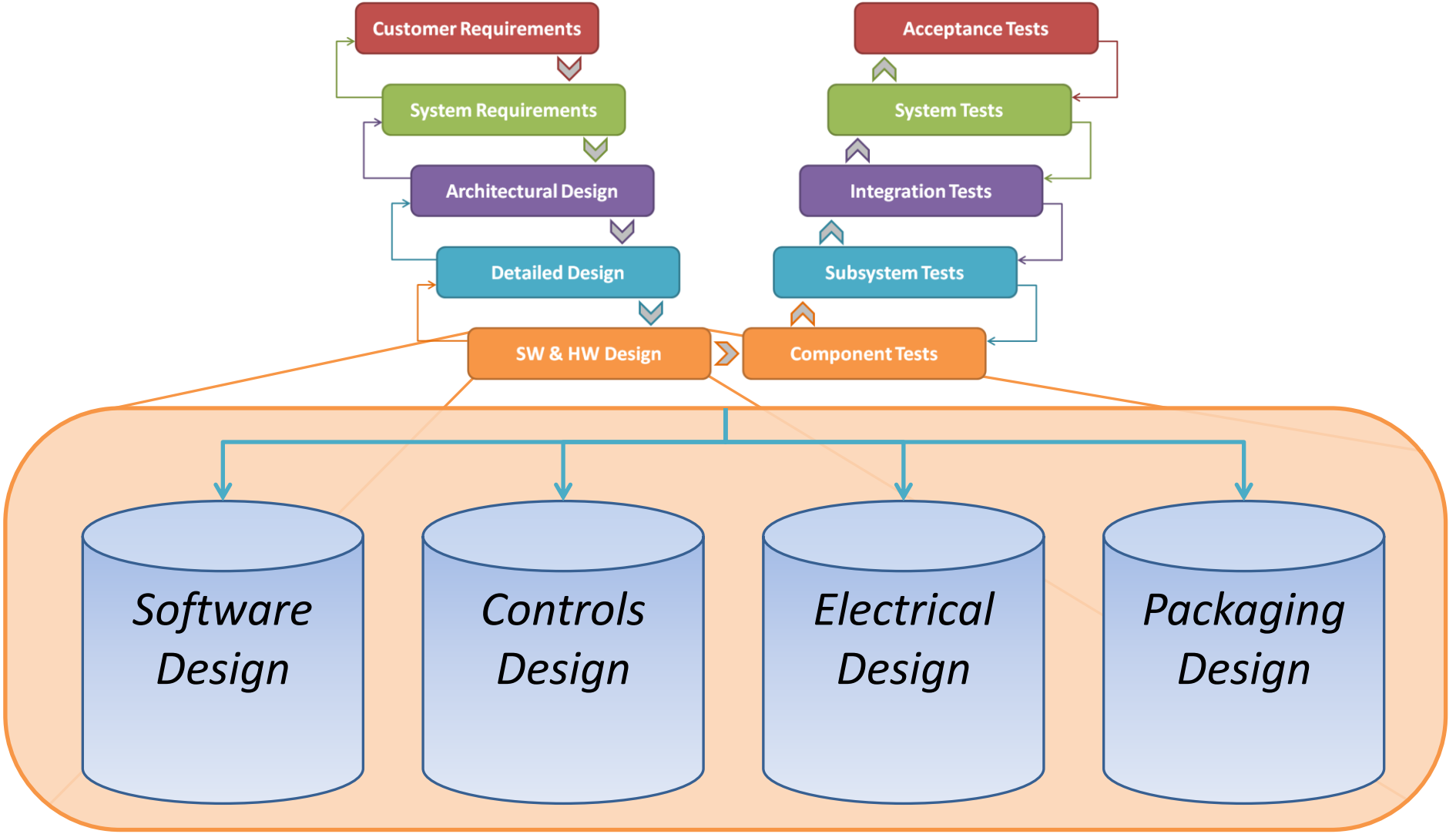
- **Problem Statement**
- **Model-Based Engineering Overview**
- **Model-Based Concept Development Framework Description**
- **Implementation Benefits and Challenges**

Why is this Required?

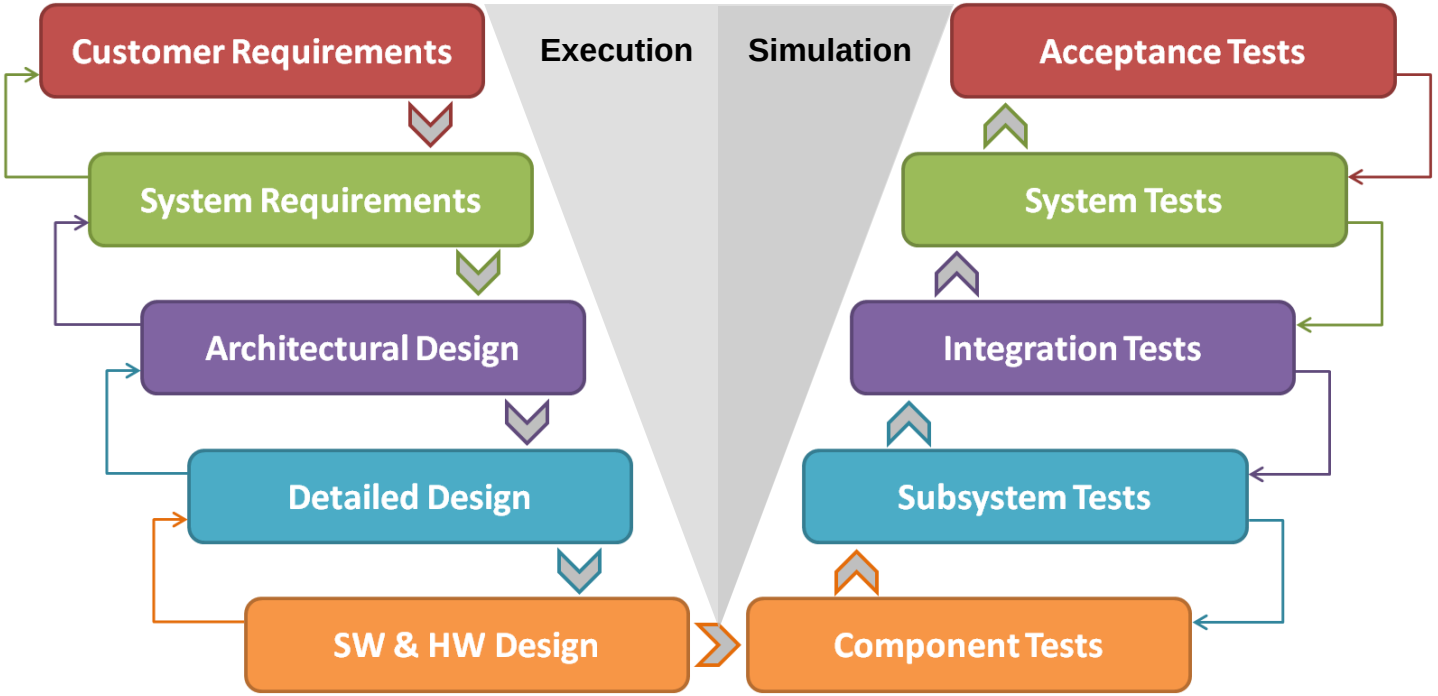


NEED: To reduce the cost and time required to develop and verify systems by effectively generating, capturing, organizing, sharing, and evaluating information using interconnected electronic models across the development lifecycle

Traditional Design Practices

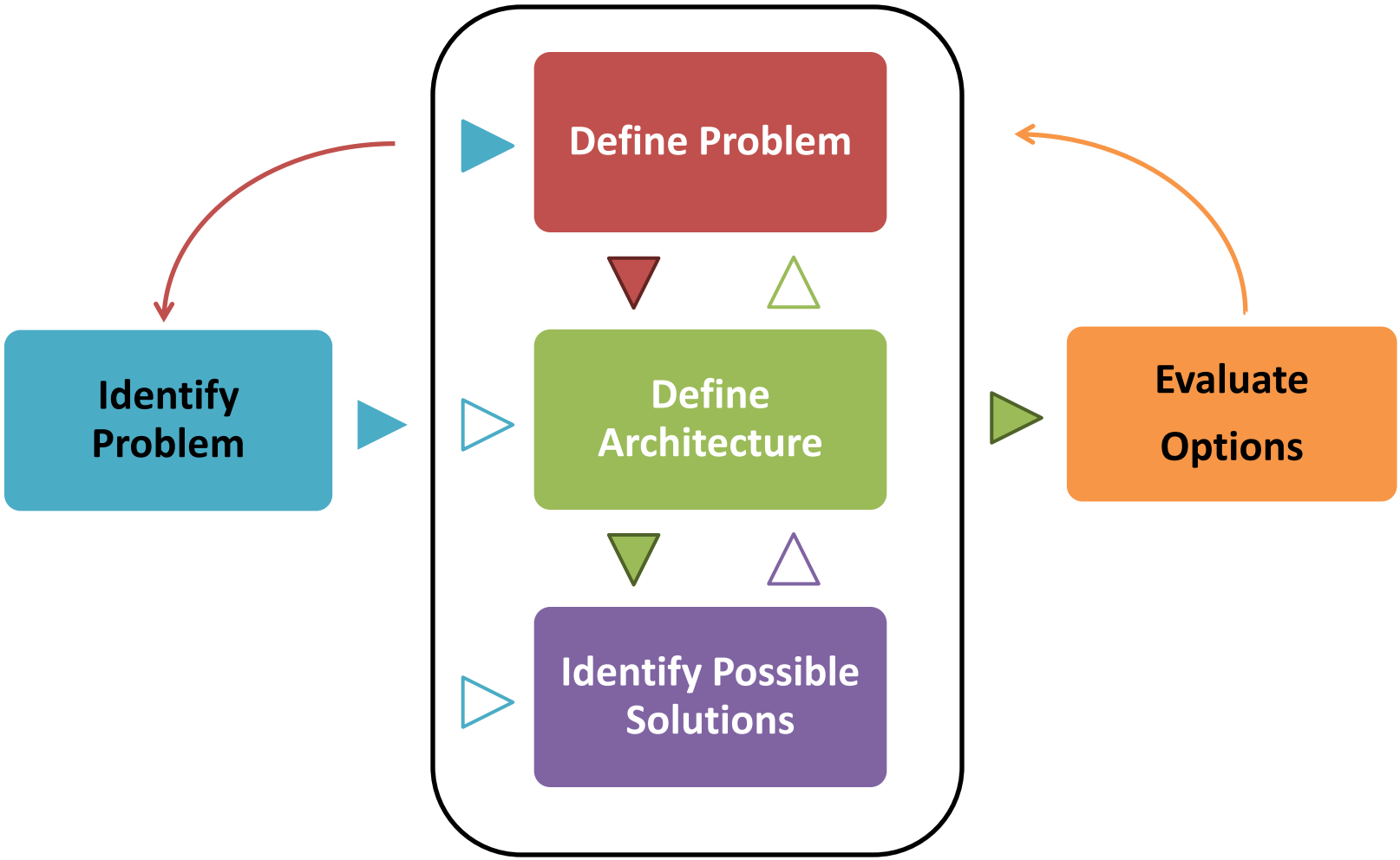


MBE Integrates Design and Verification



Prelim. Architectural Design
Architectural Design
System Requirements
Prelim. Software Design
Software Design
Prelim. Packaging Design
Packaging Design
Prelim. Electrical Design
Electrical Design

Concept Development Methodology

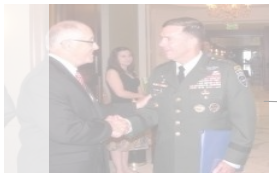


Model-Based Problem Definition

Define System Boundary

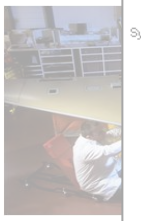
Define Stakeholders

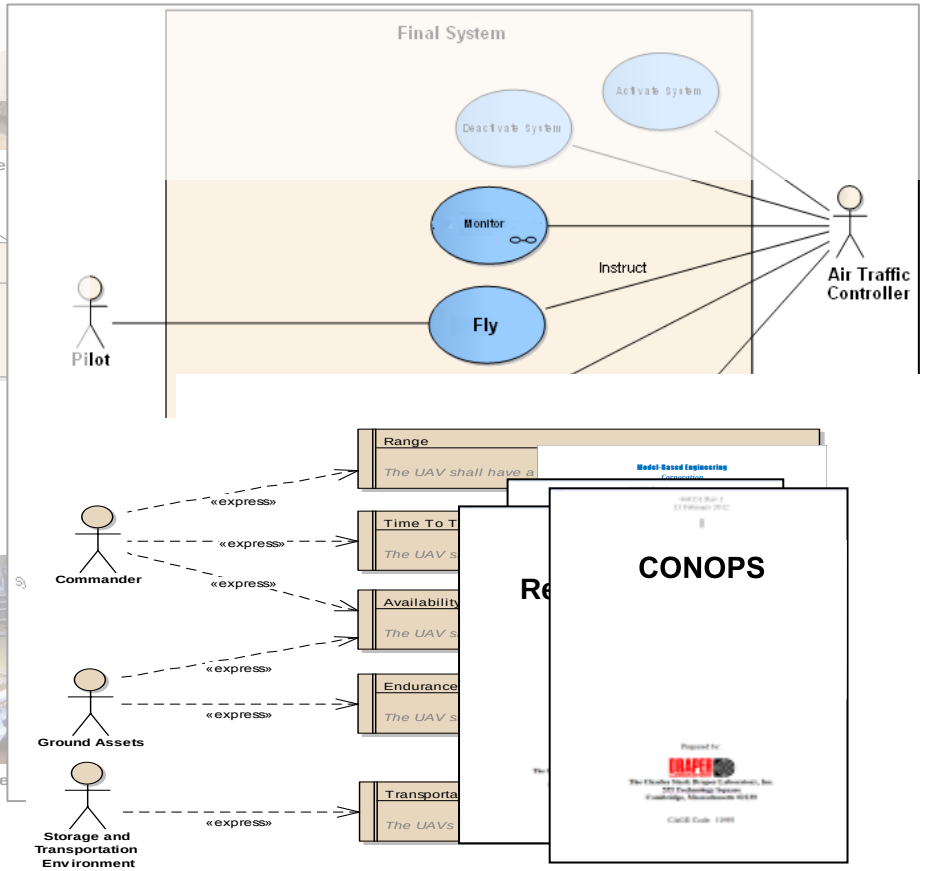
User



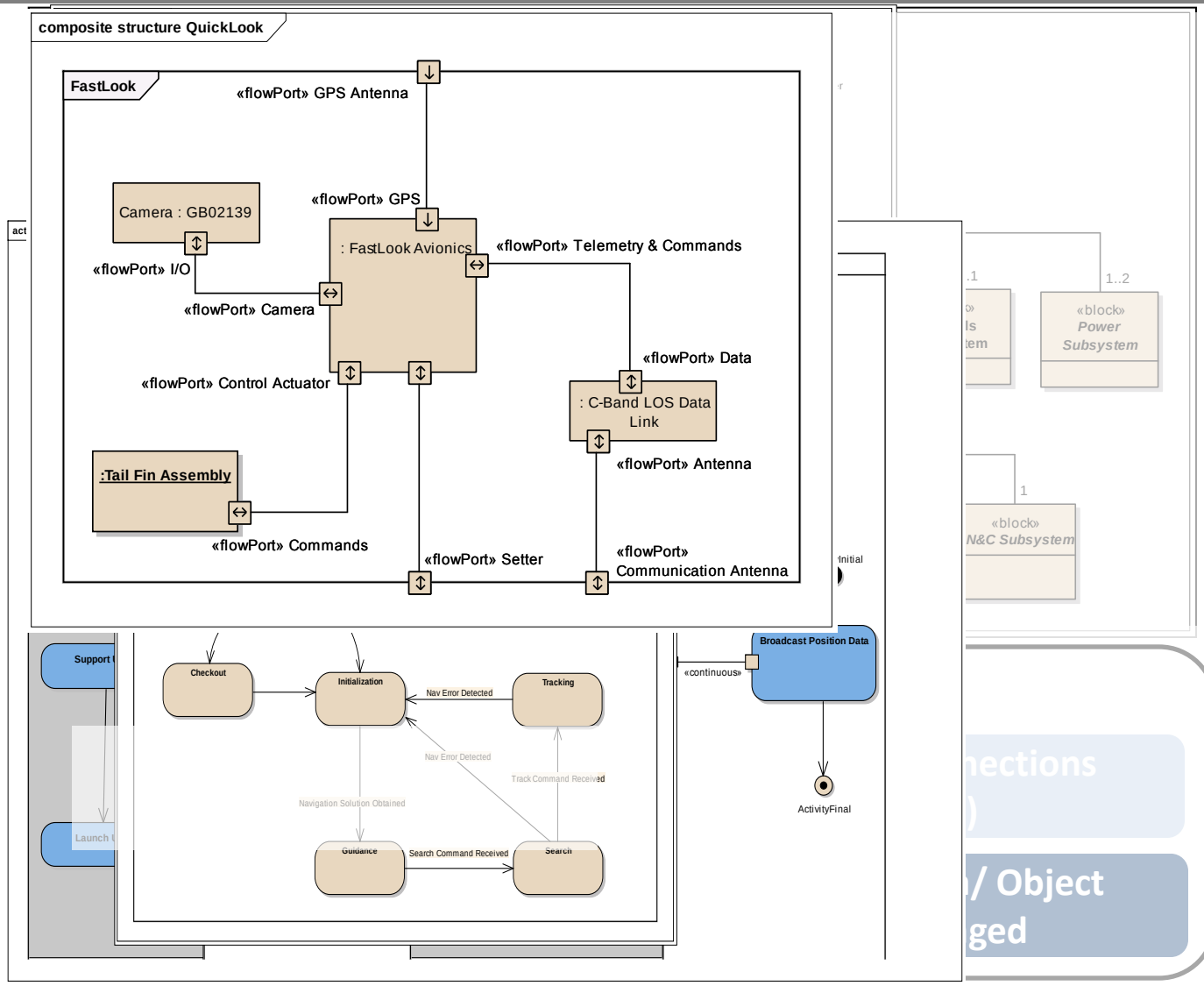
Sponsor

TRADOC

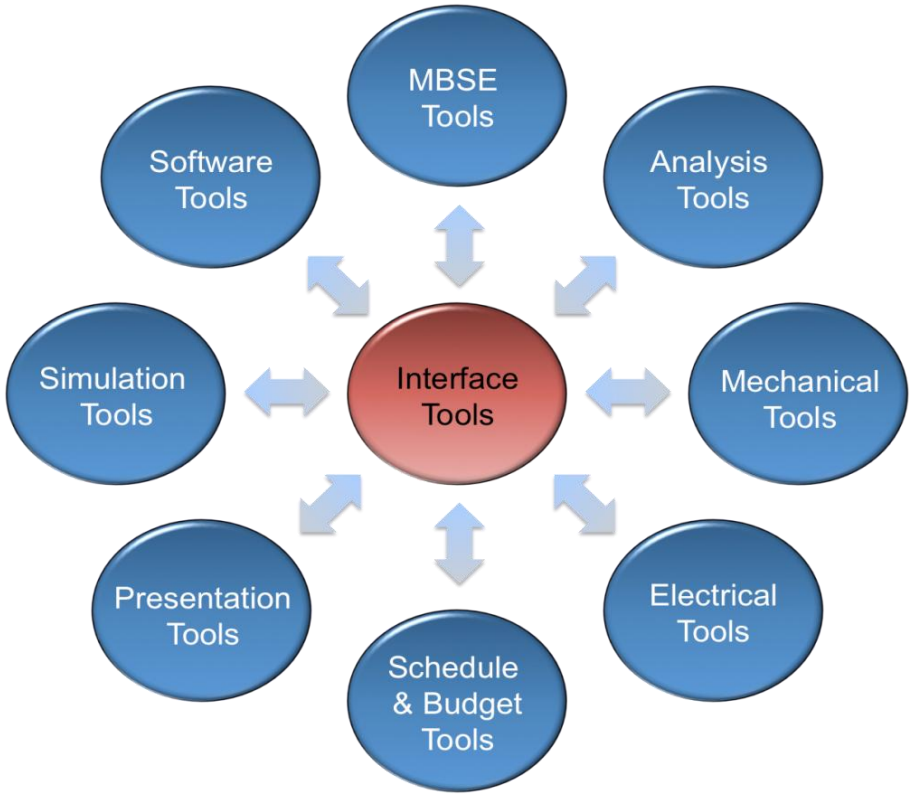




Defining System Architectures

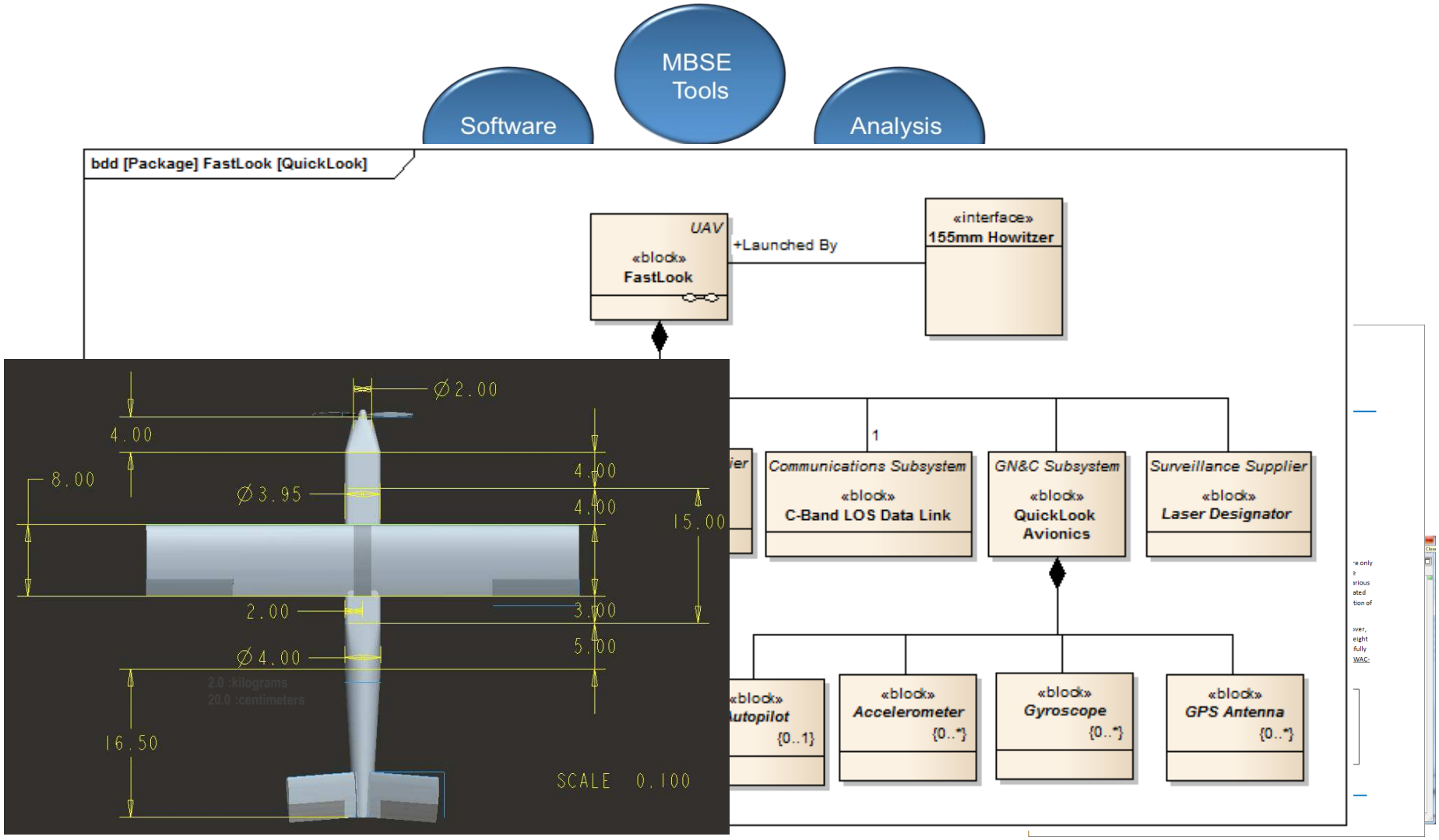


Effective Collaboration



Information is captured once - then shared and reused by all stakeholders

Link Attribute Across Domains



Why Model-Based Engineering?

Benefits

- Error checking/ design verification
  - Evaluate model completeness
- Determine impact of changes
- Improve decision making
- Unambiguous, precise descriptions
- Reduce effort duplication

Challenges

- Manual linking
- Tool/ model integration
- Data configuration/ ownership
- Requires new skillsets
- New tool/ infrastructure costs

Benefits lead to costs and schedule reductions
Challenges can be overcome with planning, technology advancements

Summary

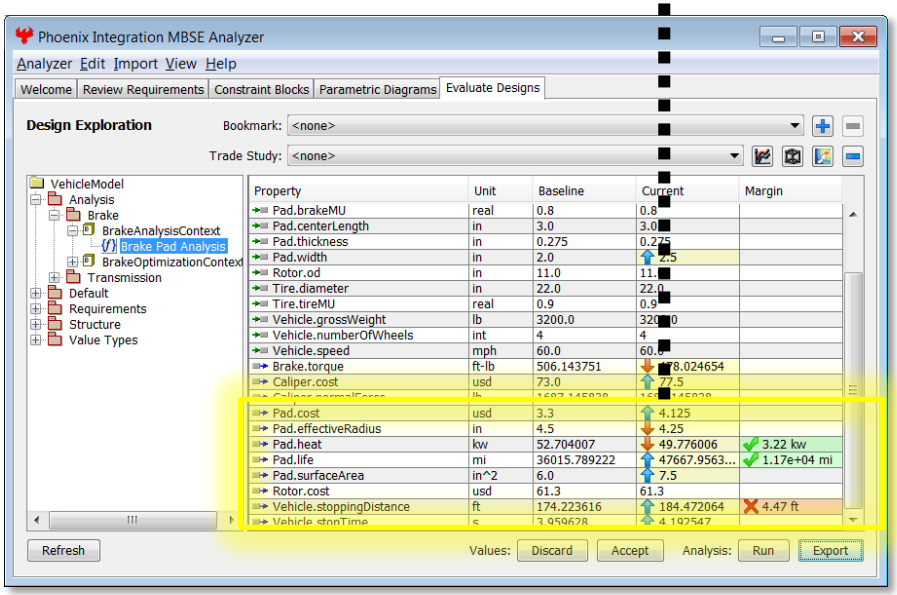
Model-Based Design Enables Cost and Schedule Reductions

- Reduce errors by capturing data once – reusing across design
- Verify designs earlier by enforcing consistency
- Simplify tracing between requirements and design
- Enables early assessments and detailed analyses
- Obtain a better change impact assessment

Backup

Assess Change Impacts

Caliper.normalForce	lb	1687.145838	1687.145838	
Pad.cost	usd	3.3	4.125	
Pad.effectiveRadius	in	4.5	4.25	
Pad.heat	kw	52.704007	49.776006	3.22 kw
Pad.life	mi	36015.789222	47667.9563...	1.17e+04 mi
Pad.surfaceArea	in^2	6.0	7.5	
Rotor.cost	usd	61.3	61.3	
Vehicle.stoppingDistance	ft	174.223616	184.472064	4.47 ft
Vehicle.stopTime	s	3.959628	4.192547	



- Verify Requirements Automatically
- Identify Design Margin or Issues
- Quickly Assess the Impact of a Change