



Apache



SMART Briefing

Colonel Howard T. Bramblett

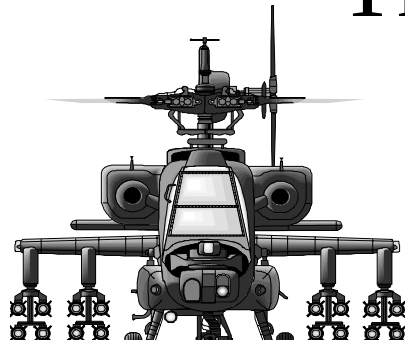
Project Manager, Apache Attack Helicopters

**LTC John D. Burke, Product Manager, Fire Control Radar and
Apache Training Systems**

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188		
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1. REPORT DATE (DD-MM-YYYY) 01-06-2002		2. REPORT TYPE Briefing		3. DATES COVERED (FROM - TO) xx-xx-2002 to xx-xx-2002	
4. TITLE AND SUBTITLE Apache SMART Briefing Unclassified			5a. CONTRACT NUMBER		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S) Bramblett, Howard T. ;			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME AND ADDRESS Apache Attack Helicopters xxxxxx, xxxxxxxx			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME AND ADDRESS United States Department of Defense Defense Modeling and Simulation Office 1901 N. Beauregard St., Suite 500 Alexandria, VA22311-1705			10. SPONSOR/MONITOR'S ACRONYM(S)		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT APUBLIC RELEASE					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT ? Logistics System Modeling ? Integration of Program M&S with Information Systems Modeling (C4ISR, JTA-A, Army Enterprise Strategy) ? SMART as a Complement to Spiral Development ? SMART used to Reduce Test and Evaluation (virtual testing) ? Integration of SMART into Army & DoD Cost Models (POM Builds) ? SMART use of Process and Data Models ? HTI Validation through the use of SMART					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:		17. LIMITATION OF ABSTRACT Public Release	18. NUMBER OF PAGES 21	19. NAME OF RESPONSIBLE PERSON Fenster, Lynn lfenster@dtic.mil	
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified		19b. TELEPHONE NUMBER International Area Code Area Code Telephone Number 703767-9007 DSN 427-9007	
				Standard Form 298 (Rev. 8-98) Prescribed by ANSI Std Z39.18	



The AH-64D System

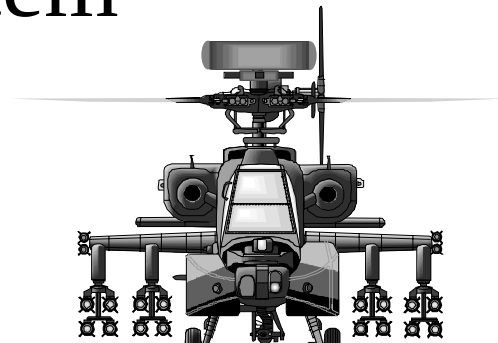


Use As-is

Modified

Excess

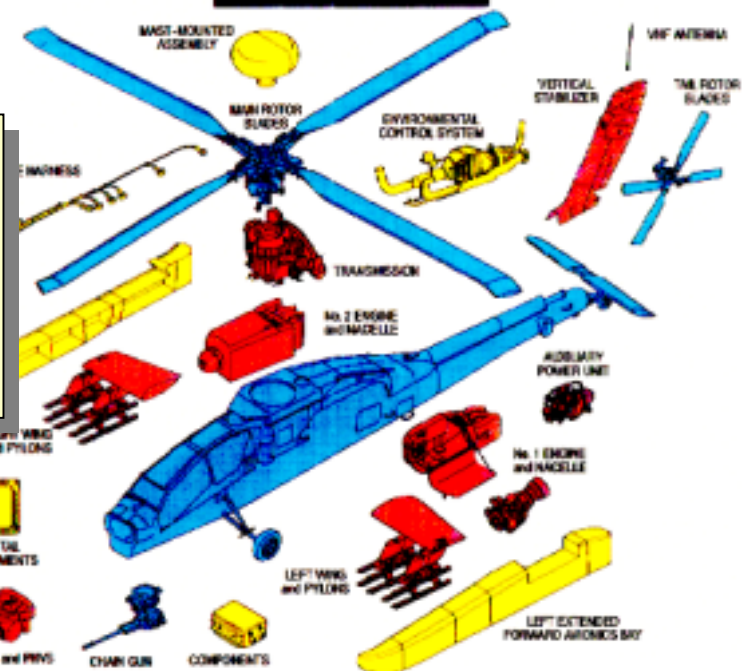
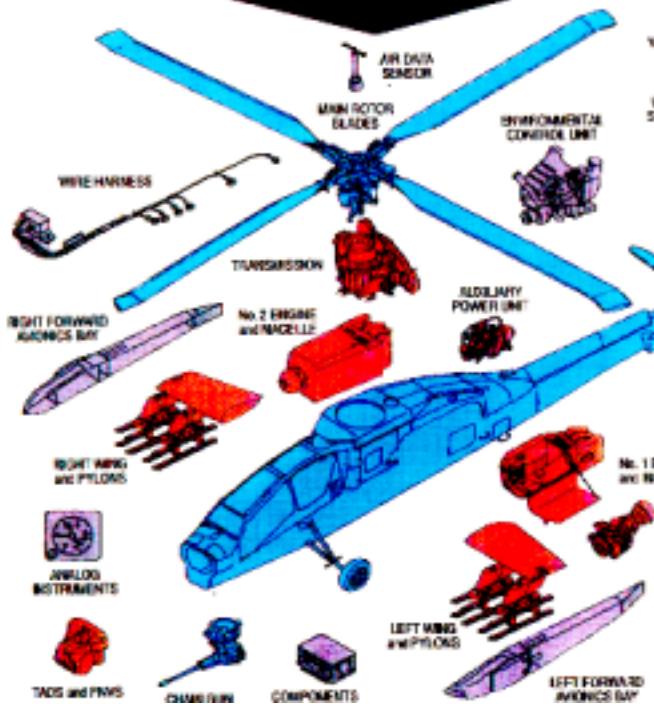
New



Premodification

Modification

About 30% of the AH-64D is “new” equipment





Sources of Improvements & Modifications

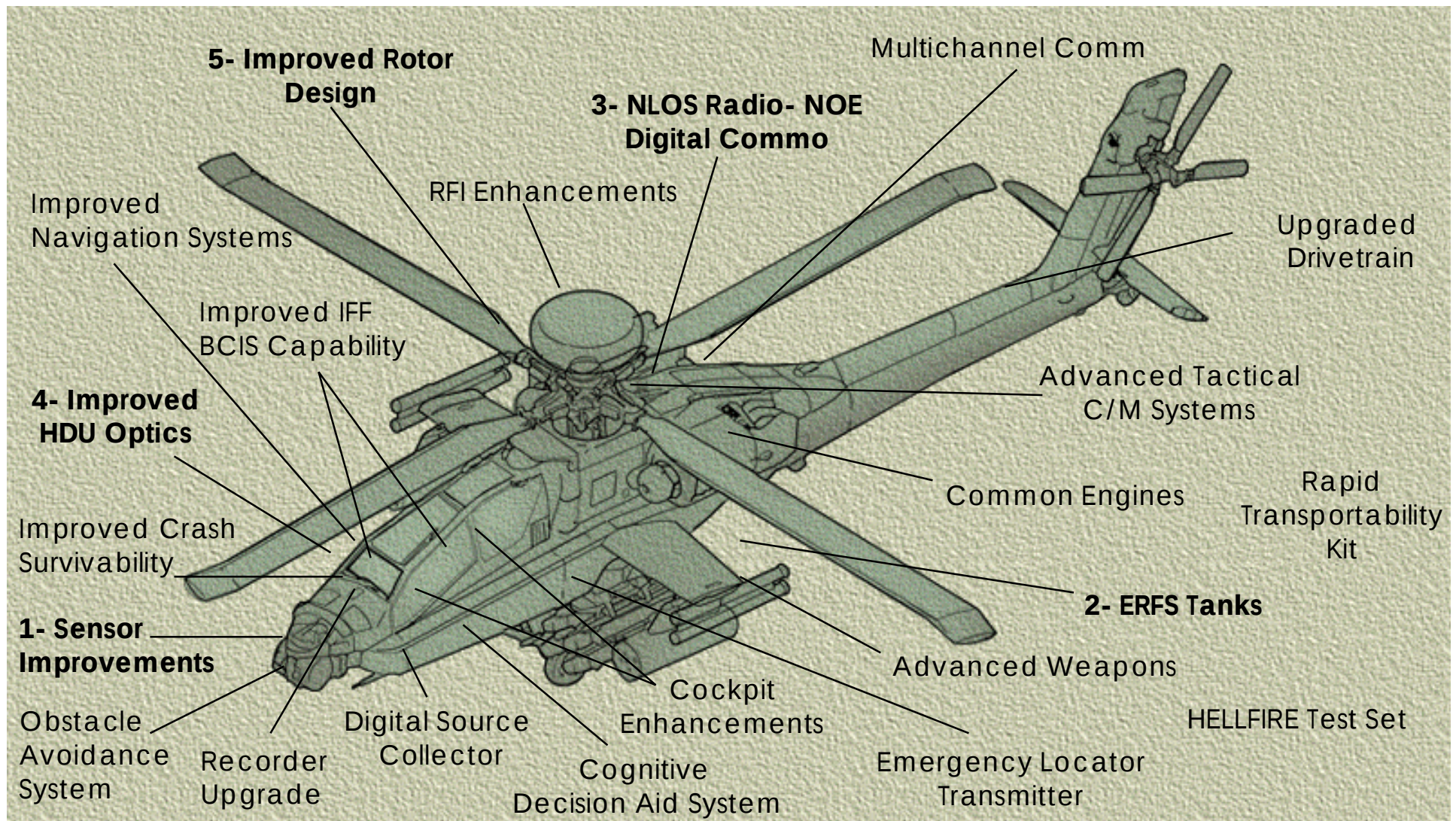


- Operational Capabilities Improvements & Priority List
- P3I List
- Funded Modifications
- Top Ten Cost Drivers
- Digitization
- Unfunded Requirements List
- Diminishing Mfg. Sources





Operational Capabilities Improvement Priority List





Operational Capabilities Improvement List



Fire Control Radar

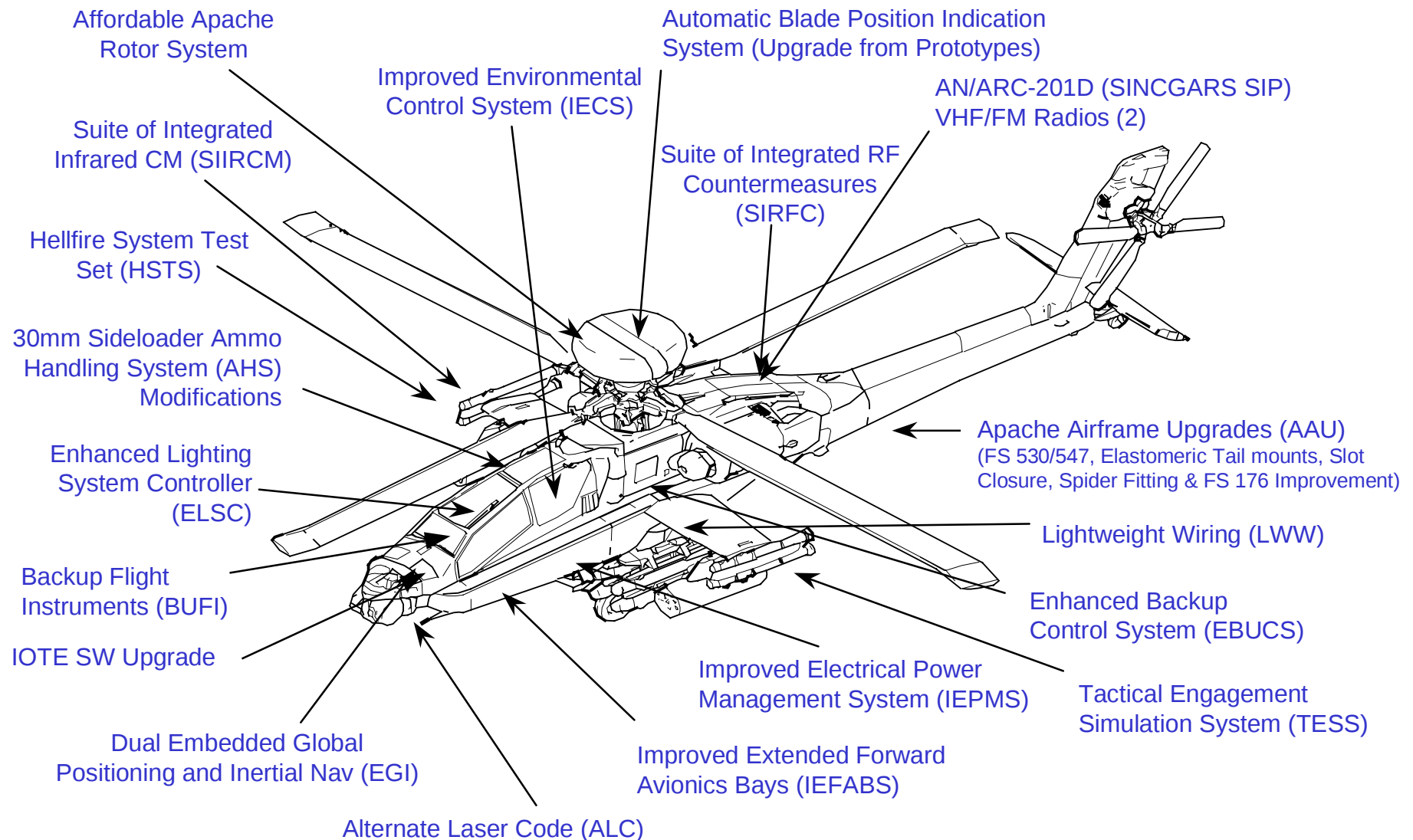
- Algorithm Robustness Improvements
- Capability to Track Targets
- Air to Air Targeting
- Terrain Profile and Ground Map
- Unmasked Indicator

AH-64D Aircraft

- Sensor Improvements
- Extended Range Tanks
- NLOS Radio/Comm
- Improved HDU Optics
- Improved Rotor Design
- Upgraded Drivetrain
- Digital Map



Funded Modifications





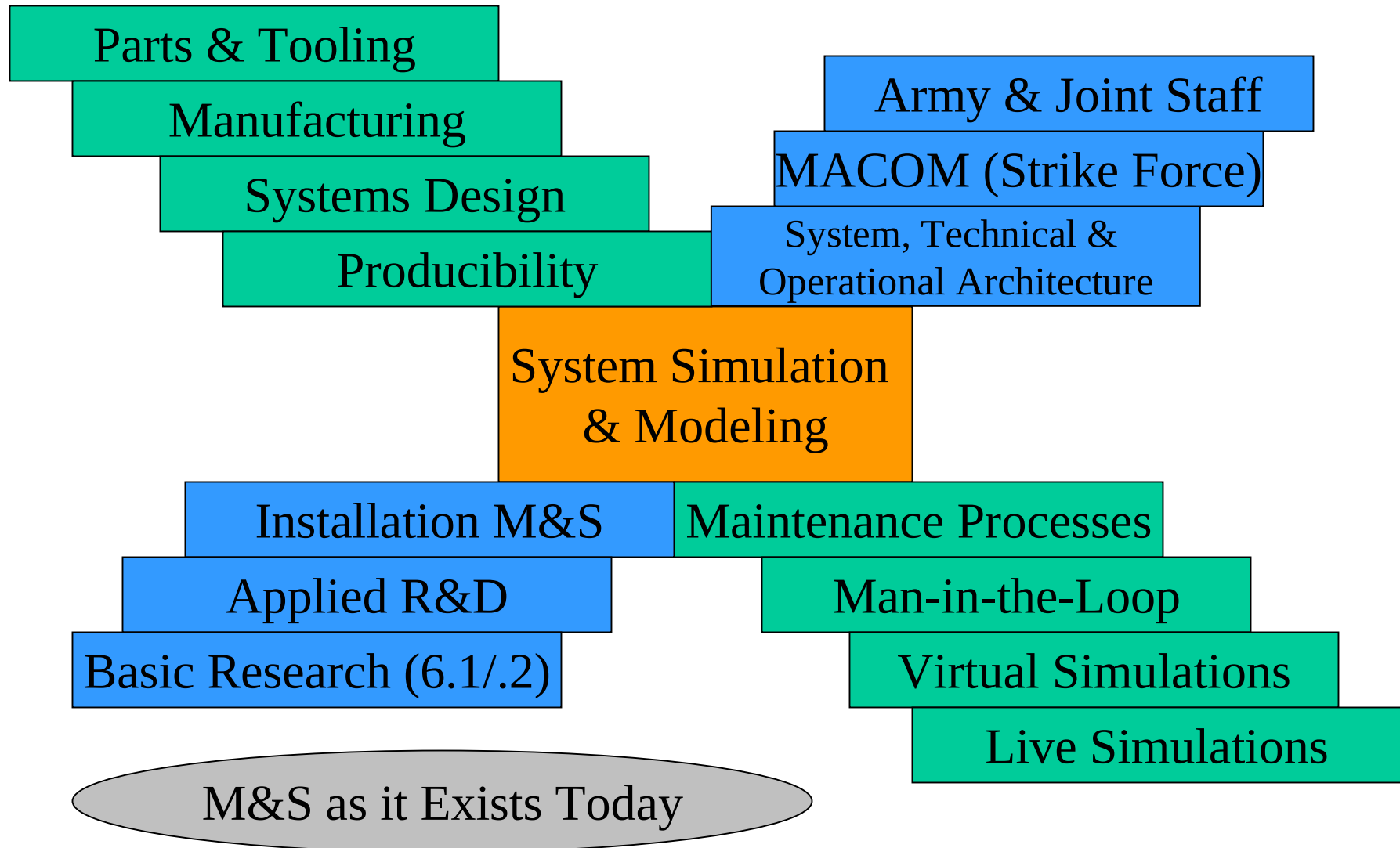
Apache SMART Goals

- 50% Reduction in Cycle Time
- 30% Reduction in Total Cost of Ownership
- Maximize use of Industry's Investment
- Integrate with Requirements Analysis & Funding
- Execute through Performance Based Contracts
- Establish Measurements and Thresholds of Success

“Better, Faster, Cheaper”
has taken hold of the
acquisition community.
But I assure you that
this is not simply a
slogan. It is a fundamental
blueprint for survival...
Dr. J. Gansler

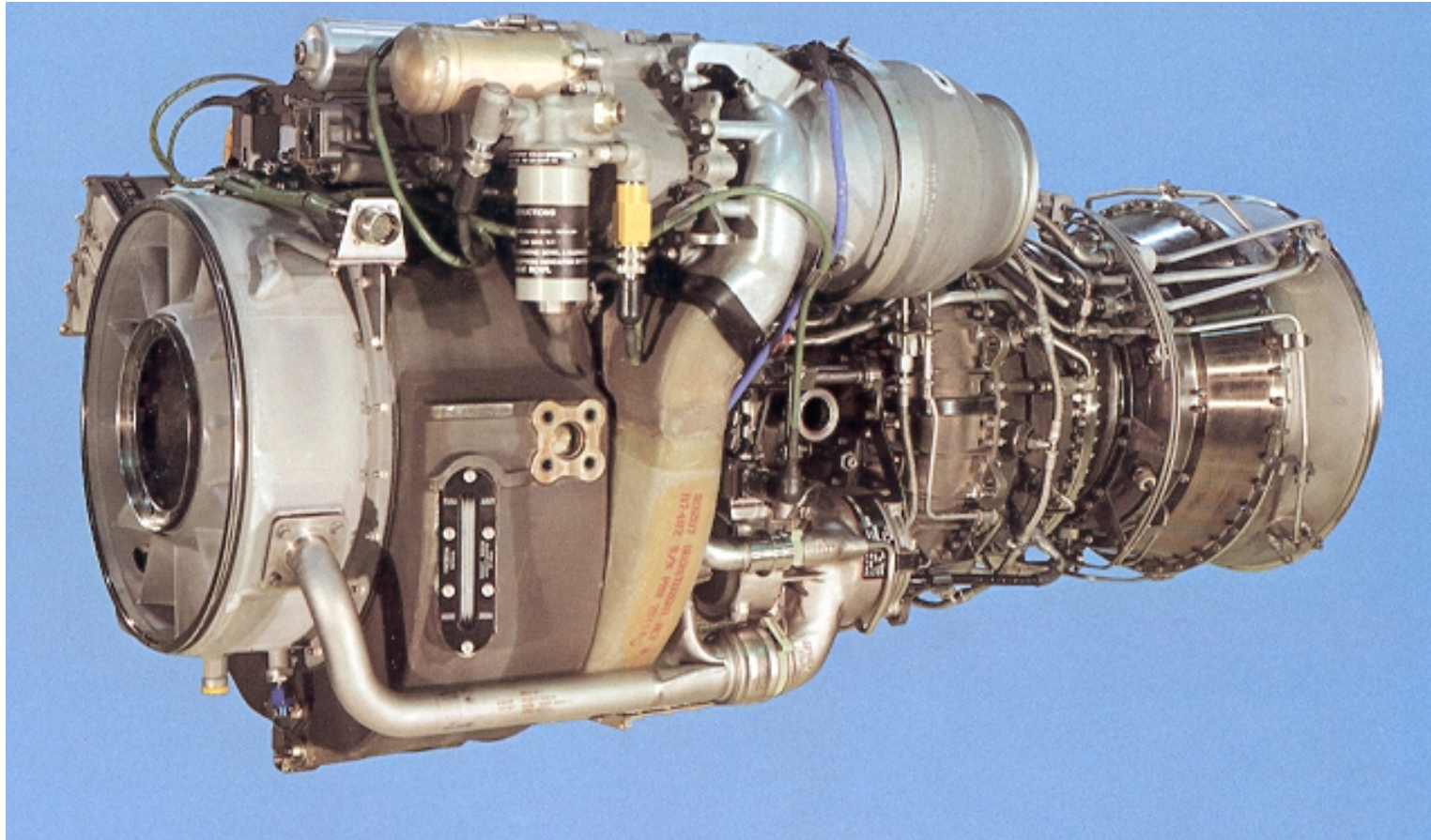


Modeling and Simulation Efforts



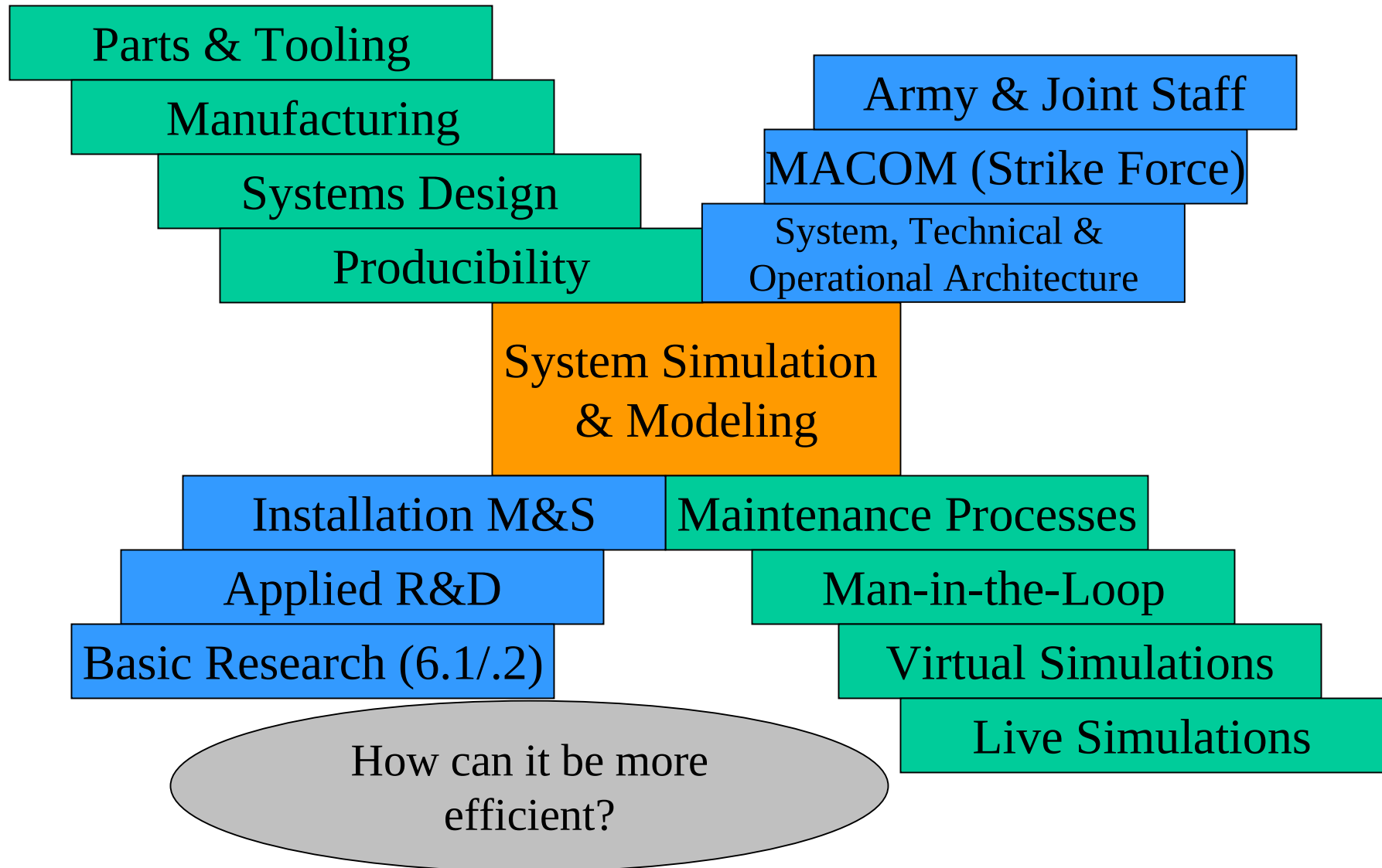


General Electric's T-700 Engine





Modeling and Simulation Efforts

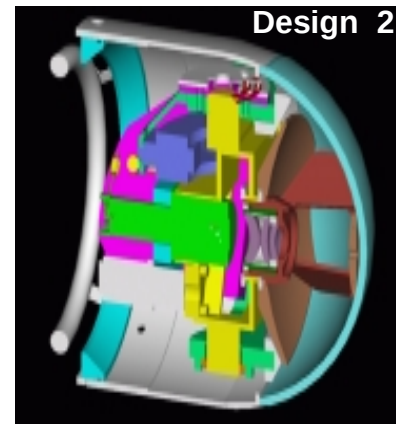
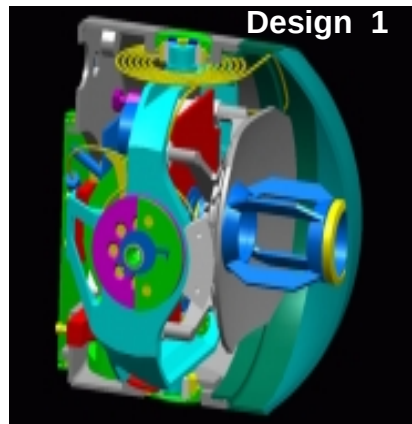




Lockheed Martin Electronics & Missile Systems

Development of an Adaptive Modeling Language (AML) for Knowledge-Based Engineering with Application to Interactive Gimbal Design (IGD)

	Optics	Mechanical	FE Analysis	Servo	Total
Design 1	1,082 ¹ hrs	4,955 hrs	1,214 hrs	1,383 hrs	8,634 hrs
Design 2	1,286 hrs	2,356 hrs	3,384 hrs	0 hrs	7,026 hrs

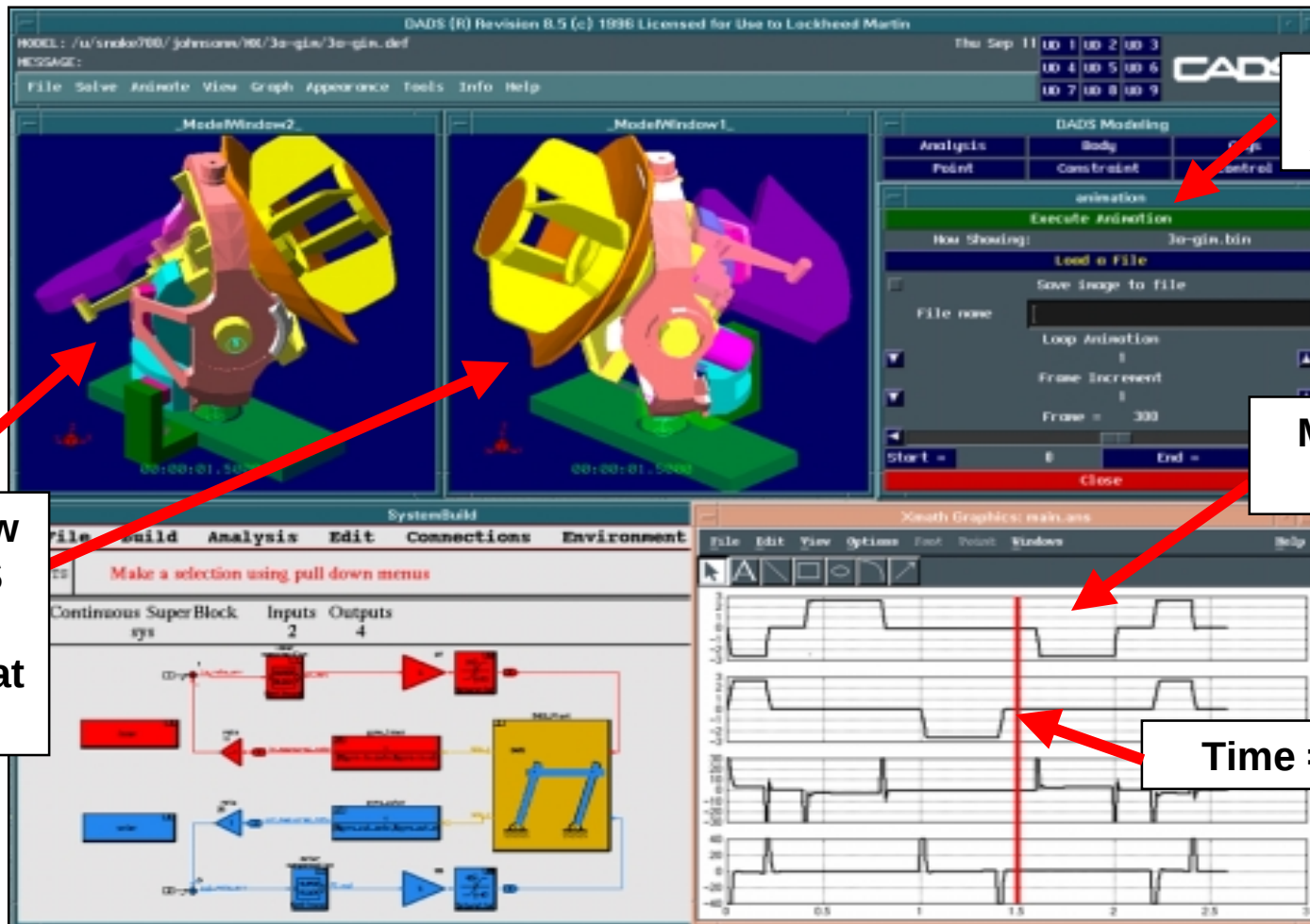


**40:1 payback
equals
\$6 million @
\$100 per hour
between design
and
maintenance**



Systems Analysis

DADS animation output from Matrix-X to DADS Simulation



DADS
Animation

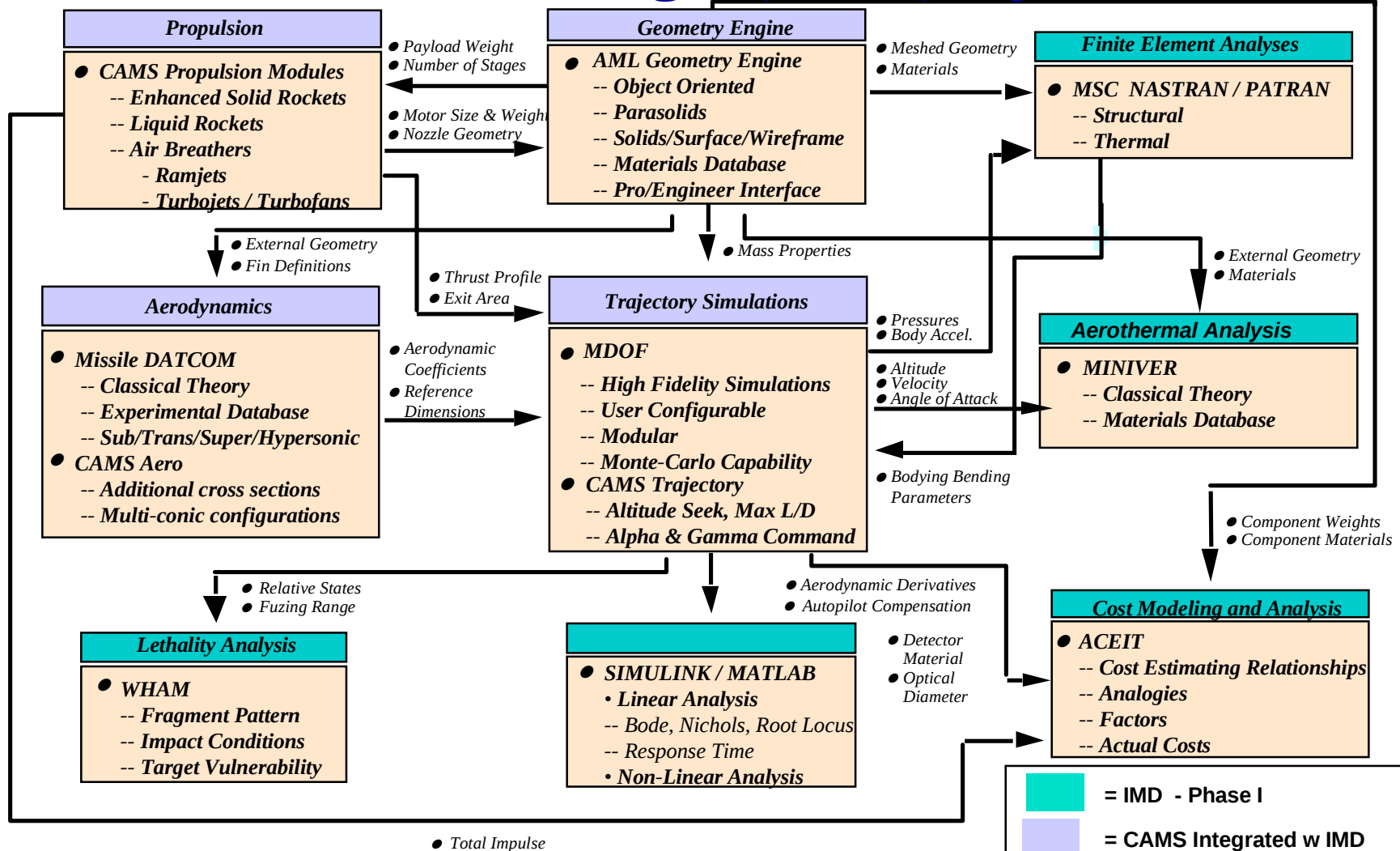
Matrix-X
Output

Multi-view
of DADS
Output
Position at
1.5 sec

Time = 1.5 sec



Overview: Interactive Missile Design (IMD) System



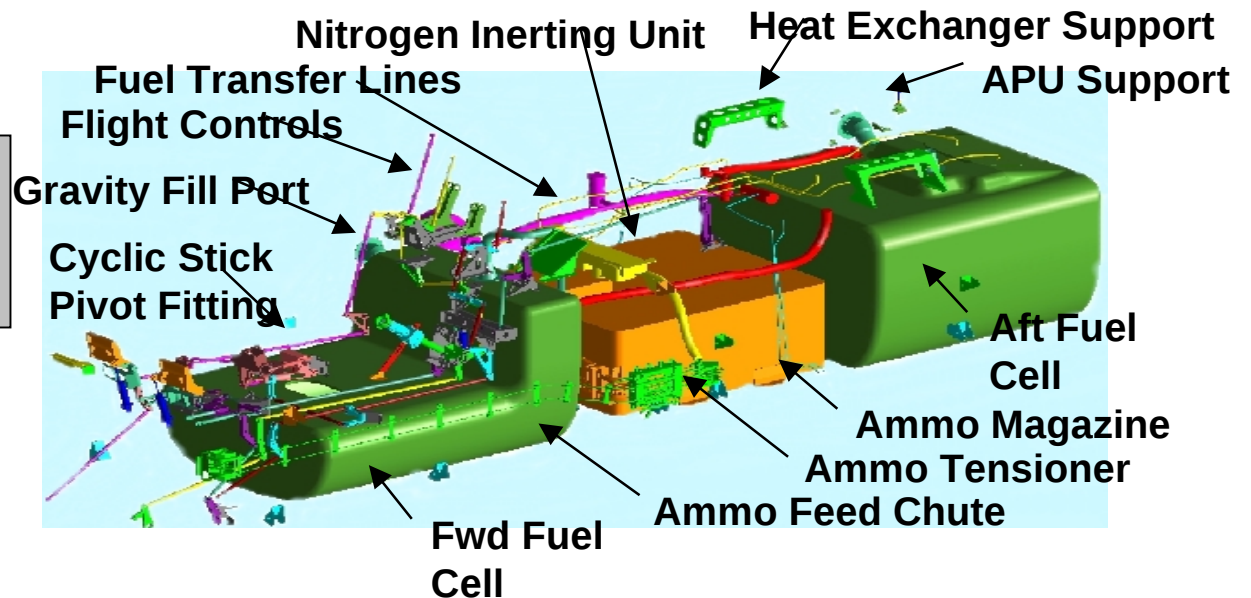


Boeing (McDonnell Douglas Helicopter Systems)



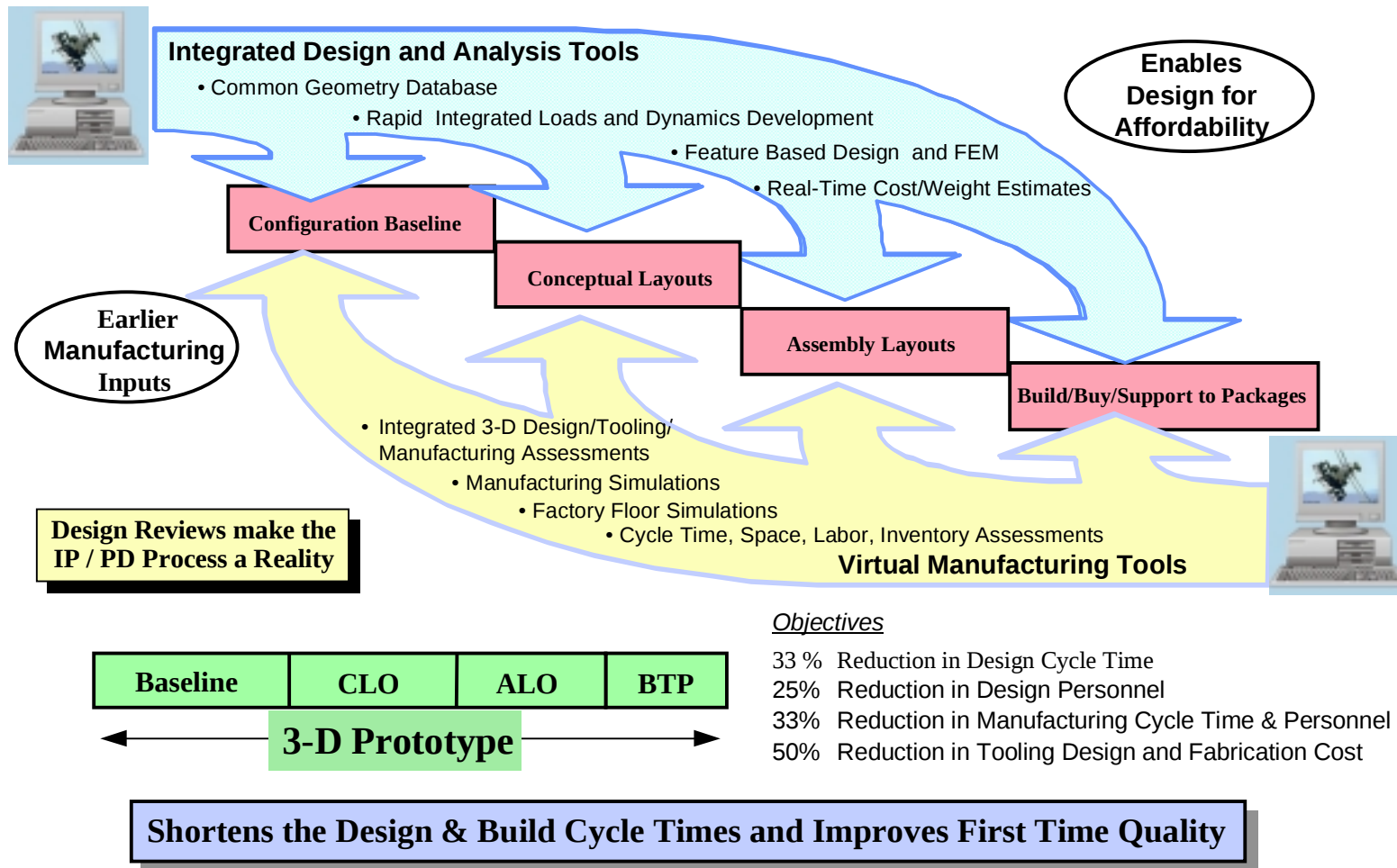
- Rotary Wing Structures Technology Demonstration Program (RWSTDP)
- DMAPS — A Suite of VPD Tools for Integrated Product and Process Development (Design, Manufacturing and Producibility Simulation)

SUBSYSTEMS IN
CENTER FUSELAGE



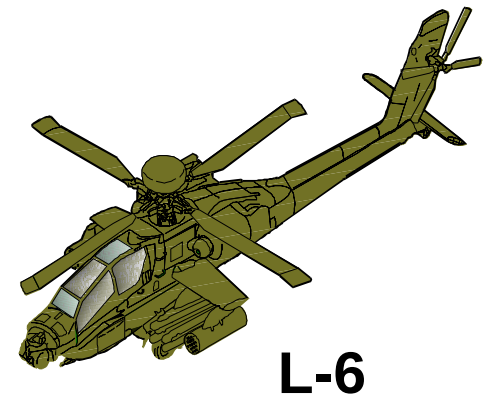


Flow Chart Of DMAPS Process

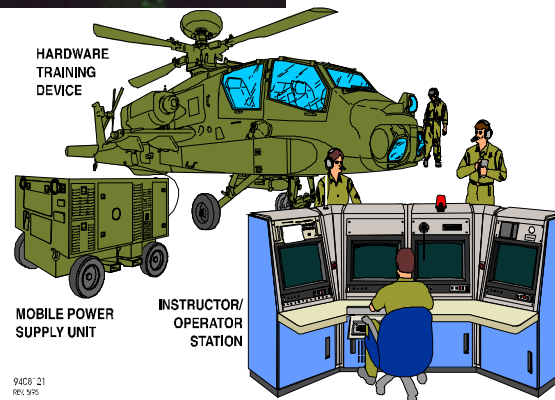




Apache Training Devices



L-7



9400 21
REV 9/95



Applications of SMART/SBA

- Candidates are in the P3I, OC IPL, Top 10 Cost Driver, and UFR Lists
- Apache Program is 93-94% Committed to Multi-year Production Contracts
- High Priority Candidates
 - 1) 2nd GEN FLIR
 - 2) Embedded Battle Command & Integrated Data Modem (IDM)
 - 3) Rotor Blade 2000
 - 4) Longbow FCR on Comanche & Future Scout
 - 5) SIRFC or ARC 220 (HF Radio)

“Industry will do what the customer wants. Outcome is determined by the rules and not by emotion. We will respond; but, there has to be an incentive.” Steven Conver, Lockheed Martin



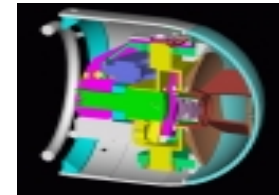
Observations

- Profitable Corporations use M&S profitably
 - But, M&S is a Corporate Asset and Guarded Carefully
- Industry will Mirror the Customer's Priorities and Organization
 - M&S is an overhead cost and industry would like to see more integration
- Expensive, High Risk (complex), High Visibility Programs Demand Proportionate M&S
- Industry concerns: 1) Staying Power of SMART/SBA;
2) Existing Programs Poorly Compare to “Virtual Systems”



Conclusions

- M&S exists at every level in the program, both in the system and “environment”
- Industry has made a tremendous investment, and keeps investing for strategic advantage
- M&S is not well integrated, especially between design and operational trade-offs
 - Not a single company bill
 - Could be expensive to fix
 - Could be administratively burdensome
- 50% reduction in cycle time and 30% reduction in cost of ownership will come from integration
- How to pay for it?





Recommendations

- Productize SMART in ACAT I and II Programs
- SMART/SBA as a Decision Component in P3I Prioritization
- Prototype 1-4 high payoff candidates, *then* Incorporate SMART/SBA as a Contract Provision in the Proposed Effort
- Cost share the application of SMART/SBA between Government and Industry



Areas for Further Exploration

- Logistics System Modeling
- Integration of Program M&S with Information Systems Modeling (C4ISR, JTA-A, Army Enterprise Strategy)
- SMART as a Complement to Spiral Development
- SMART used to Reduce Test and Evaluation (virtual testing)
- Integration of SMART into Army & DoD Cost Models (POM Builds)
- SMART use of Process and Data Models
- HTI Validation through the use of SMART

“If you can’t do it with brainpower, you can’t do it with manpower - overtime.” Kelly Johnson, F-16 & SR71 System Architect