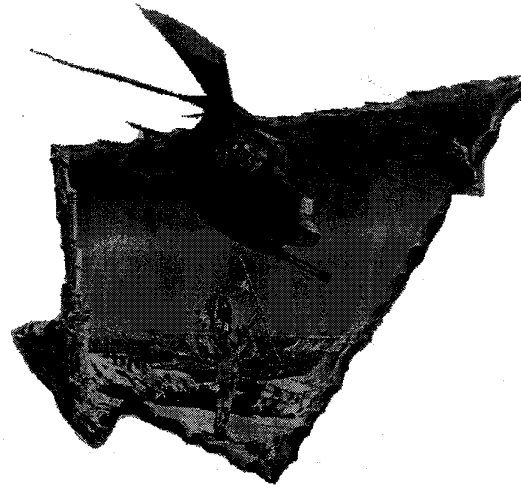




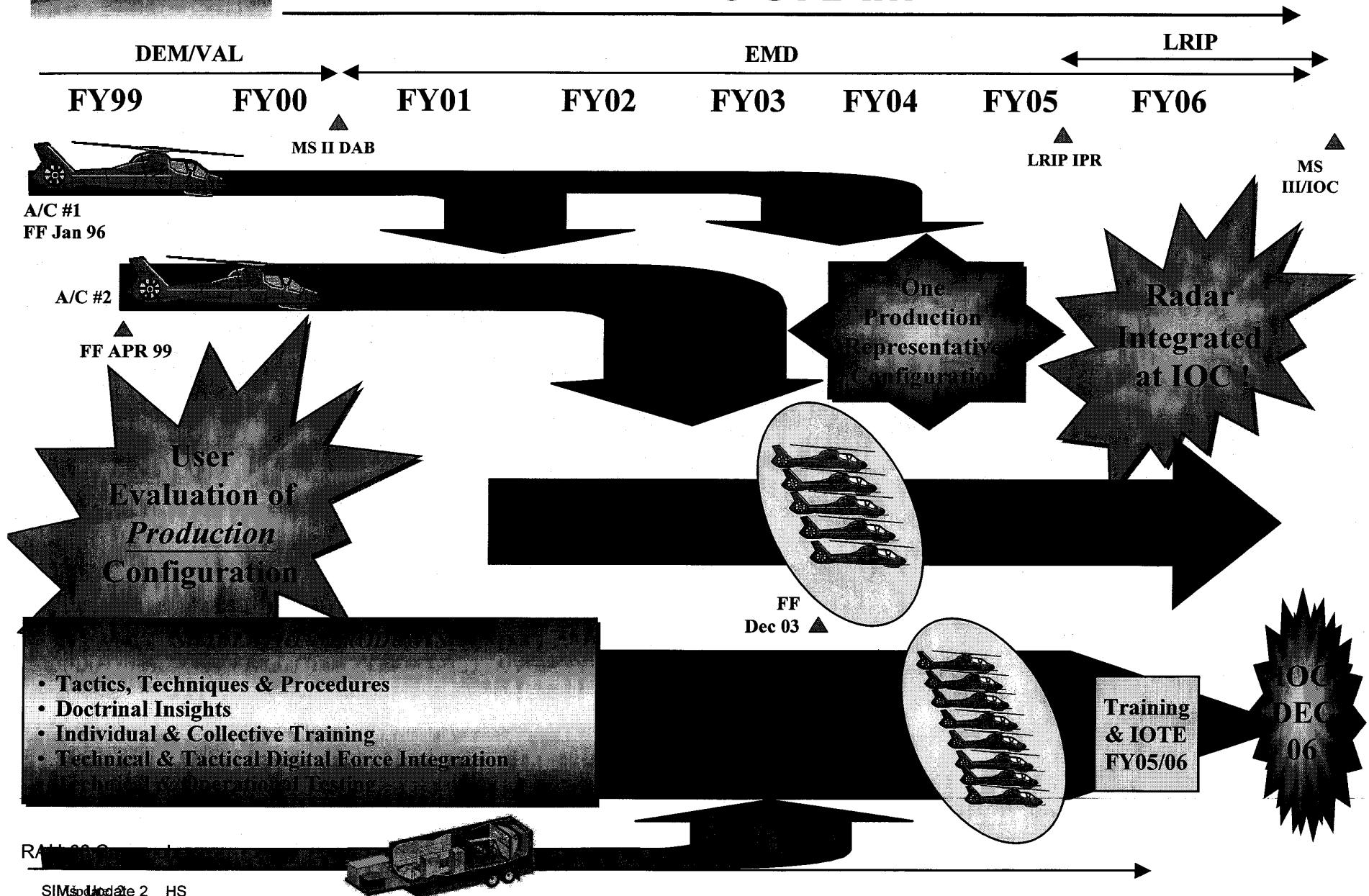
RAH-66 COMANCHE

Comanche's Approach to Simulation Based Acquisition

**Major Thom Crouch
APM Test & Evaluation
Office of the Program Manager - RAH-66 Comanche
e-mail: croucht@comanche.redstone.army.mil**



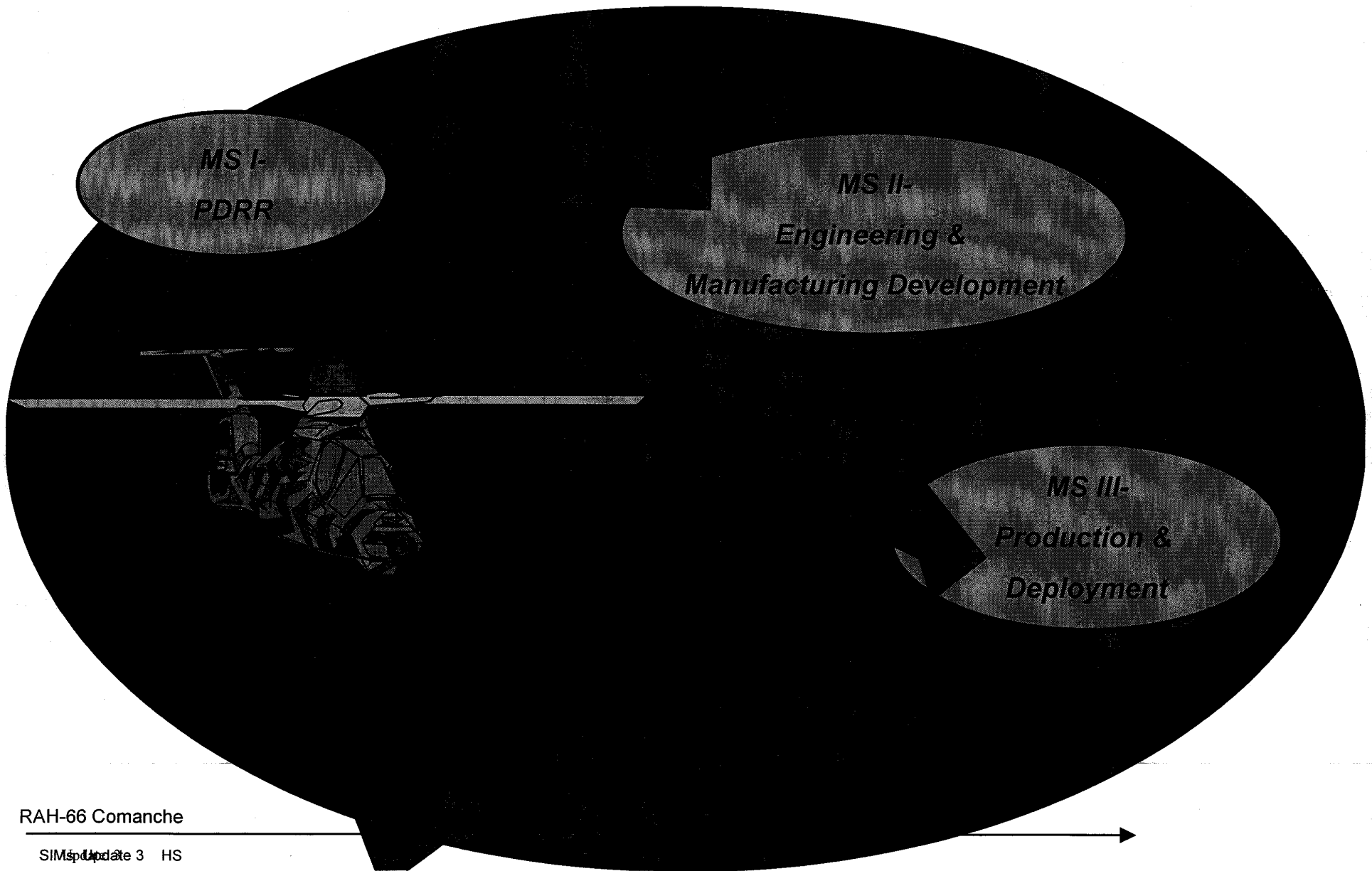
COMANCHE PRE-PRODUCTION PROGRAM



RAH-66



Simulation Support Plan Evolution



RAH-66 Comanche

SIM Update 3 HS



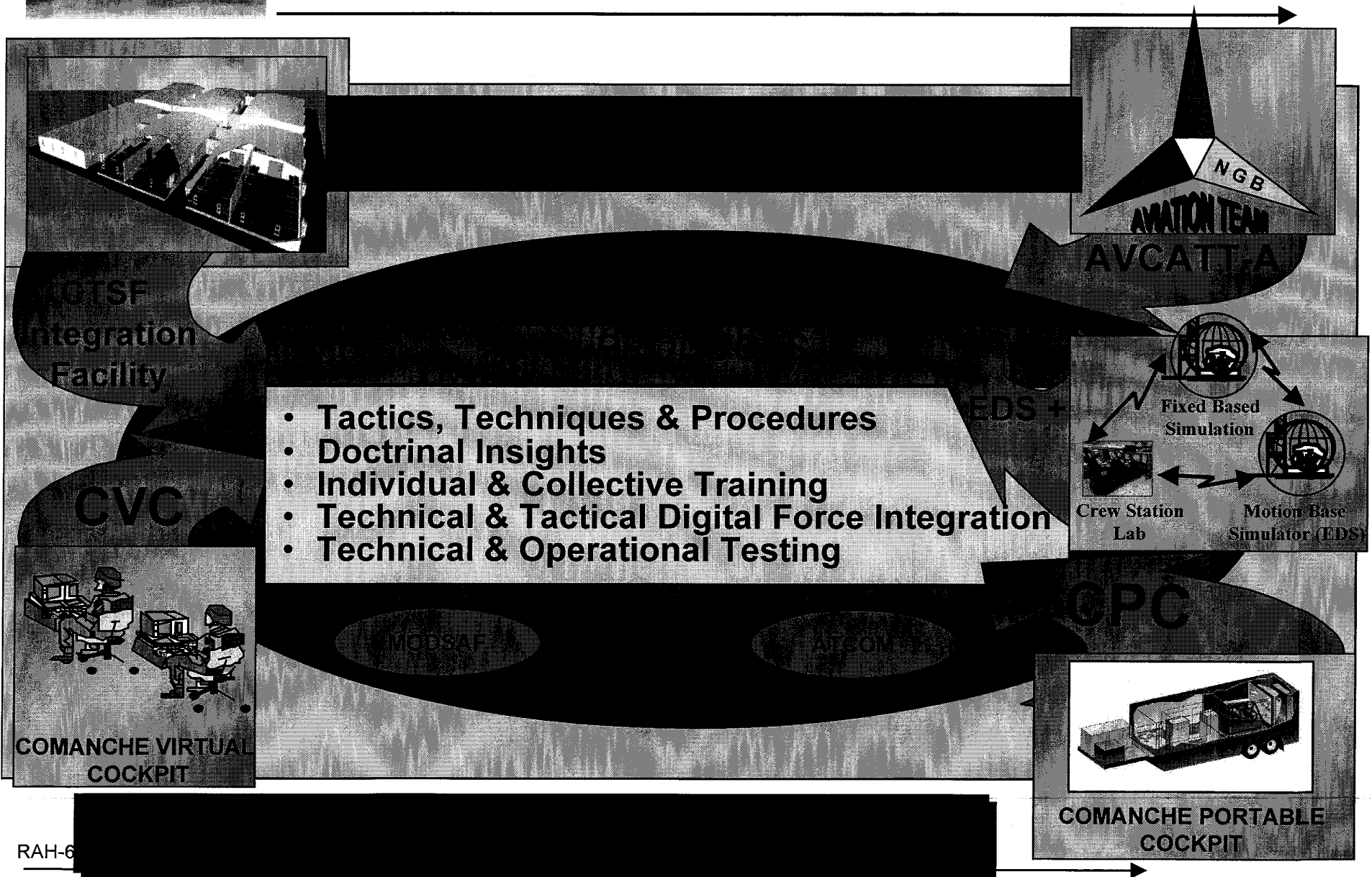
MODELING and SIMULATION REQUIREMENTS

- Engineering Development
- Pilot Vehicle Interface Analysis
- Test and Evaluation
- Tactics, Techniques and Procedures (TTP) Development
- AWE Support
- Individual Training
- Collective Training
- Support Requirements Determination
- Digital Interoperability (System Development)
- Demonstrations



And Capability for Data Reduction and Analysis !

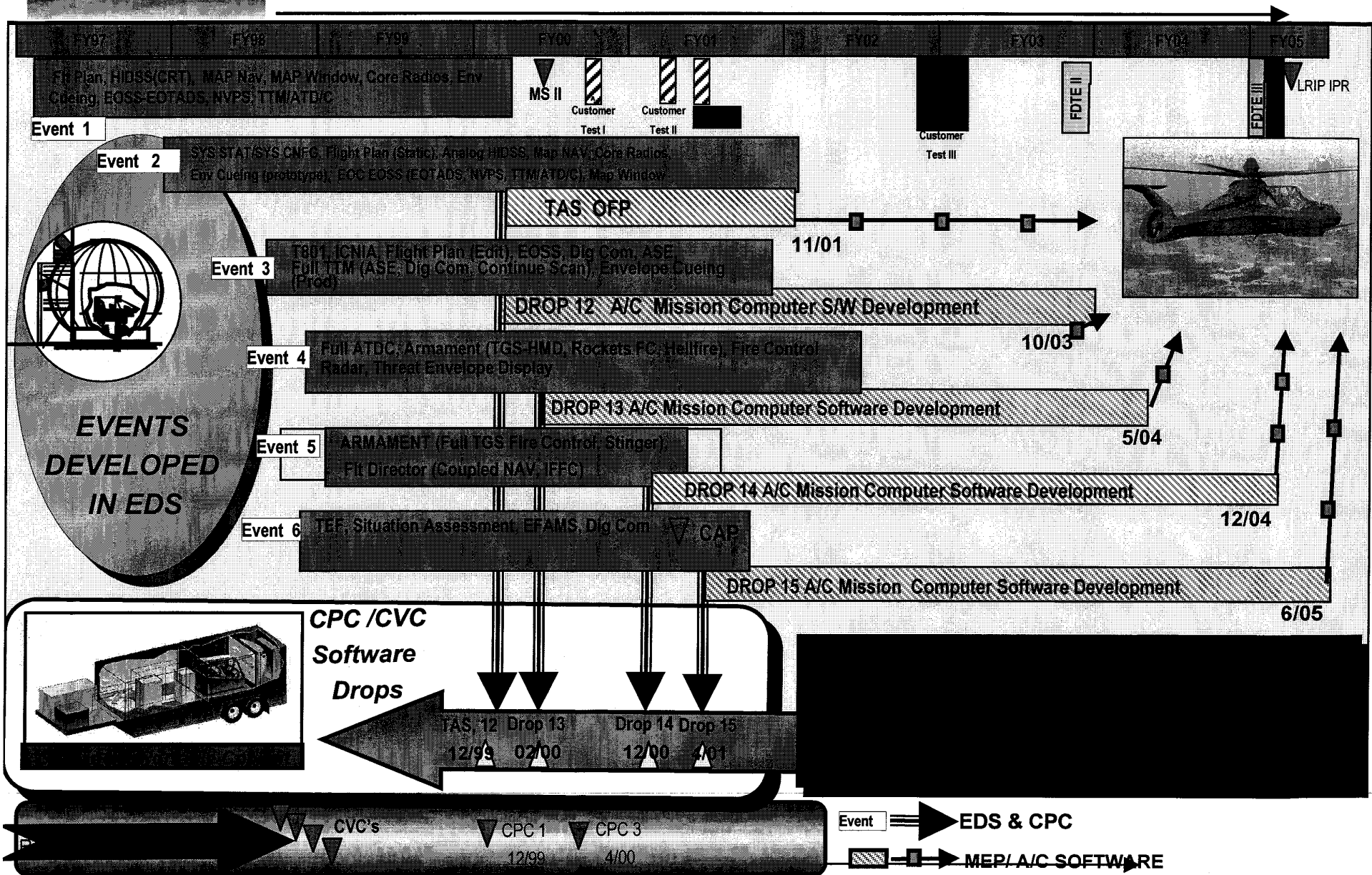
SIMULATION TOOLSET



RAH-6



SOFTWARE DROP SCHEDULE As of 25 Jan 99

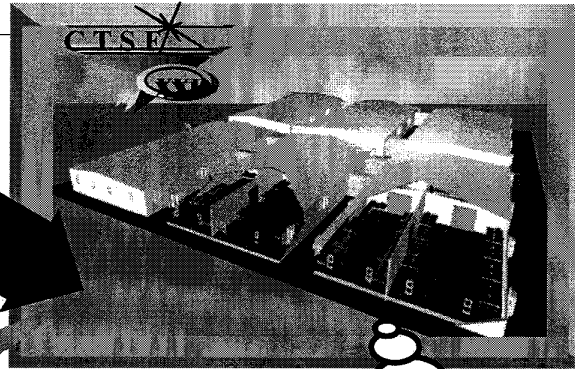




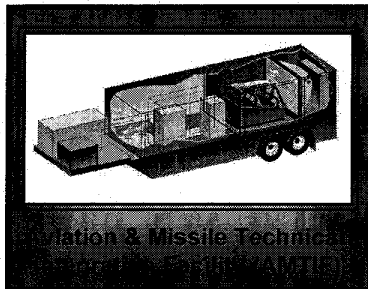
Central Technical Support Facility Fort Hood, Texas

"Brings Together
in one Place"

- Soldiers
- Combat Developer
- Industry
 - Software Programmers
 - Technicians
- Test Community
- Trainers
- Warfighter Systems



Interface to Army
Battle Command
System



**Comanche
Focus**

Iteratively -

- Train
- Test
- Exercise
- Evaluate
- Improve & Enhance

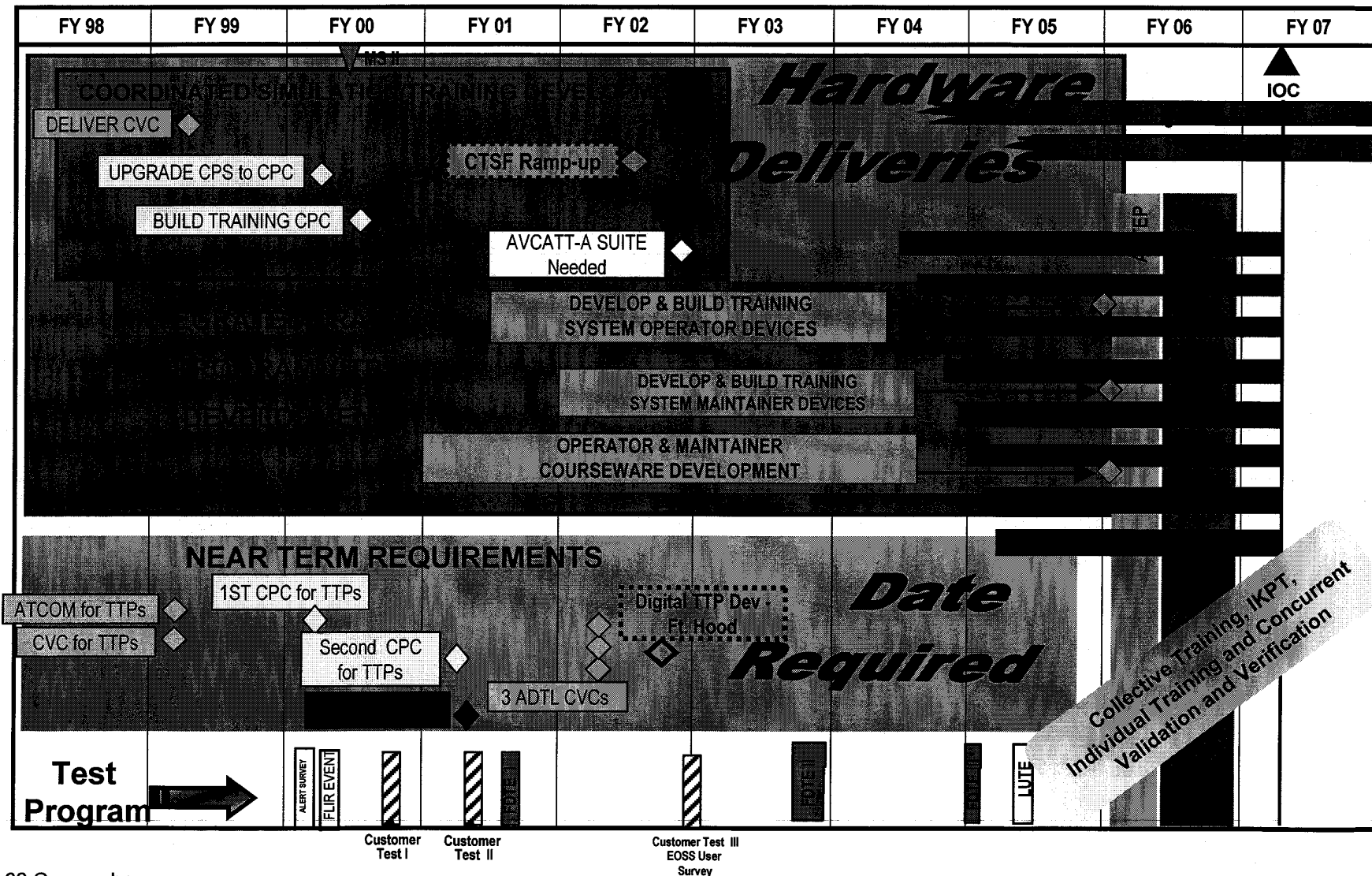
Refined and Enhanced
Warfighter Tools
(Every 3-4 Months)

Accelerated Modernization

Confirm Digital Interoperability with the Digitized Force
- **Hardware** - **Software** - **Digital Tactics, Techniques & Procedures**

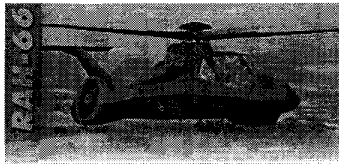


SIMULATION AND TRAINING DEVICE SCHEDULES



RAH-66 Comanche

SIMS Update 8 HS



INTEGRATED TRAINING PROGRAM (ITP) REQUIREMENTS

- Developed by the Contractor Concurrently With the Aircraft
- Developed IAW TRADOC Systems Approach to Training (SAT) Process
- Base Types, Quantities, Mix and Fidelity of Training Media on Results of SAT Process Analysis
- Include All Hardware, Software, Courseware, Documentation, Consumables and Facilities to Train Active and Reserve Components
- Train 100% of Critical Operator, Maintainer, and Support Tasks
- Tested, Validated, Verified and Ready for Training in the Training Base Prior to Initial Operational Capability





EMBEDDED TRAINING CONCEPTS

User Requirement: Optimize the Use of Embedded Training

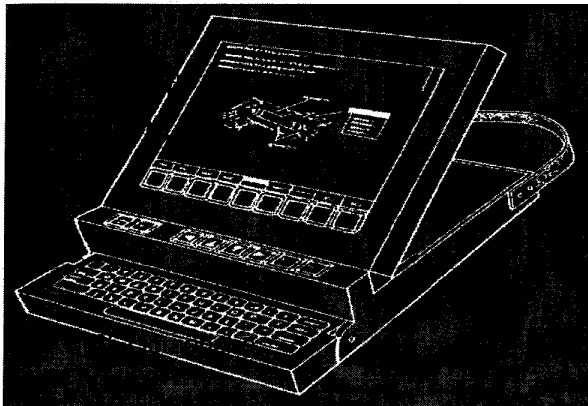
On Aircraft

- Operational Test, Training & Instrumentation System
- Aviation Survivability Equipment / Electronic Warfare (ASE/EW) Equipment Sensor Stimulation



Off Aircraft

- Portable Maintenance Aid (PMA)
- Aviation Mission Planning Station (AMPS)
 - Full Mission Rehearsal Capability



Portable Maintenance Aid (PMA)

- Primary Media for Maintainer Sustainment Training
 - Training Faults Embedded in PMA not Aircraft
 - Combines with PMA Instrumentation Pack (PIP) for Full Embedded Maintainer Training Capability
-



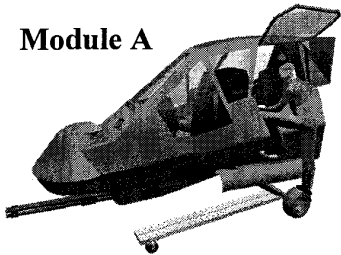
COMANCHE MAINTAINER TRAINING DEVICES

Proposed

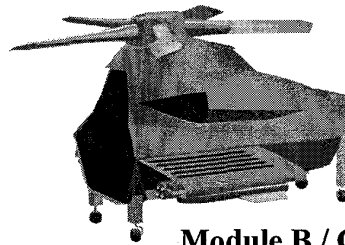
**Rotor/Transmission/Weapons Bays/
Engine/MEP/SPU/ECU Module**

**Cockpit/Sensor Turret/
Gun Module**

Module A

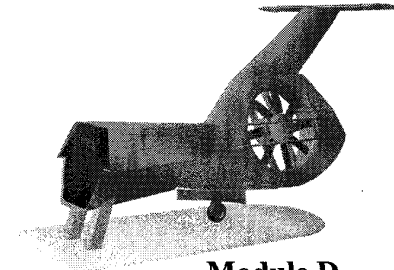


Module B / C

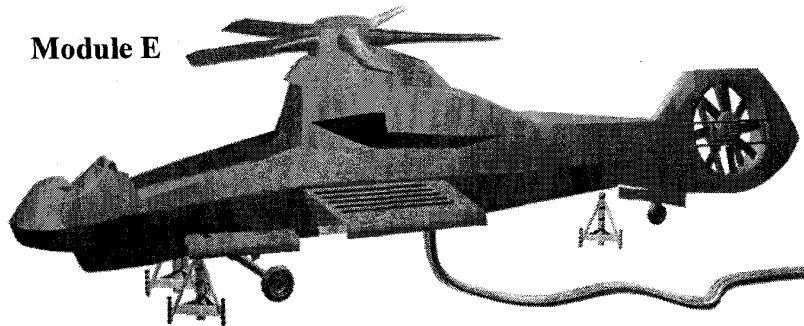


**FANTAIL/
Antenna
Module**

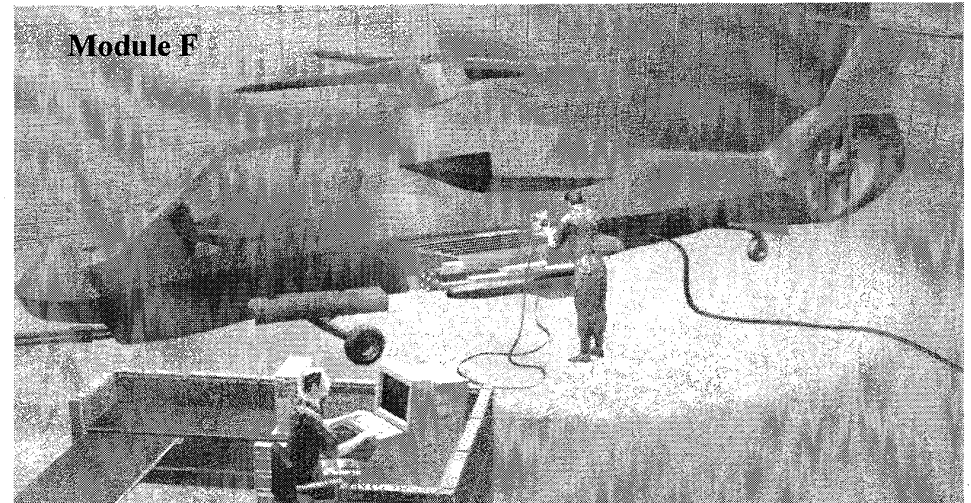
Module D



Module E



Module F



Landing Gear/Pneudraulic/Fuel Systems Module

Integrated Composite Maintenance Trainer

RAH-66 Comanche

SIMS Update 11 HS



PROPOSED OPERATOR TRAINING DEVICES

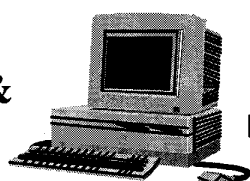
Initial Individual Training

TRAINING BASE



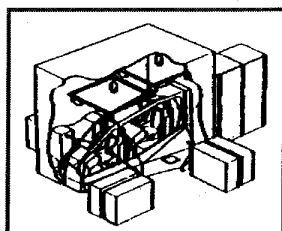
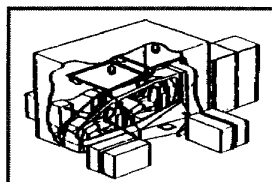
Comanche
Virtual
Cockpit
(CVC)

&



Computer
Aided
Instruction

Cockpit Procedures
Trainer (CPT)



Comanche Mission
Simulator
(Hi-Fidelity Cockpit Simulation)

- Motion / Non-Motion ?
- HLA Compliant

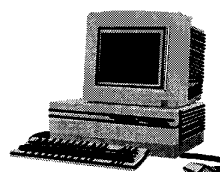
Comanche Aircraft
(Embedded Training)



RAH-66 Comanche

Collective and Sustainment Training

USING INSTALLATION



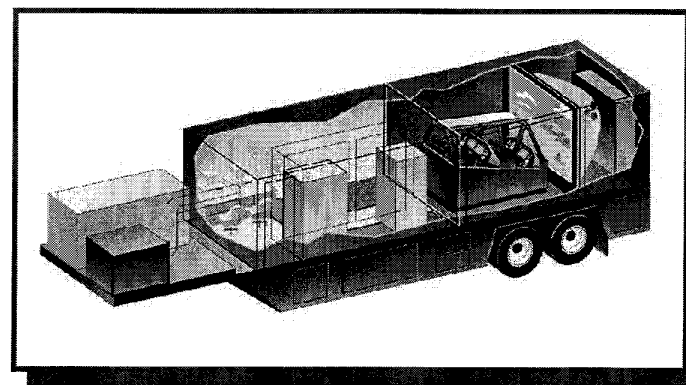
Computer
Aided
Instruction

&

Comanche
Virtual
Cockpit
(CVC)



Comanche Mission Simulator
(Mobile Variant)



- Fidelity ?
- Multiple Cockpits
- Transportable
- HLA Compliant

AVCATT / ARMS

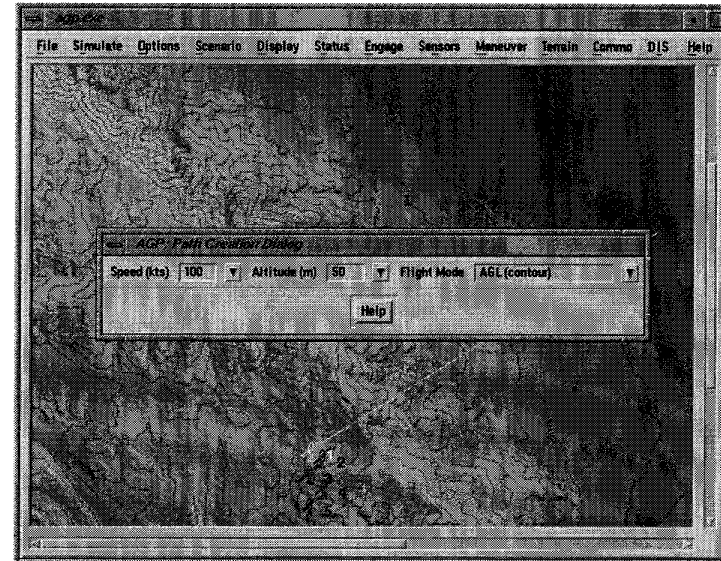


CVC DESKTOP SIMULATOR ELEMENTS

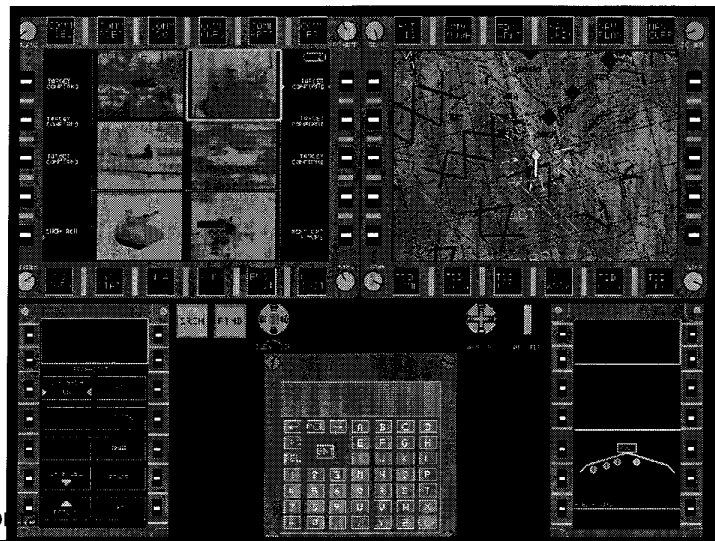
Stealth Viewer for out-the-window view



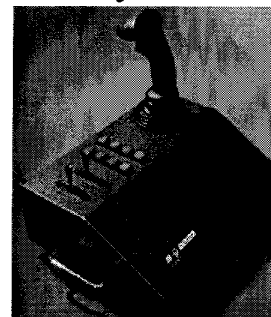
ATCOM model for the tactical environment



Comanche VAPS for Pilot Interface

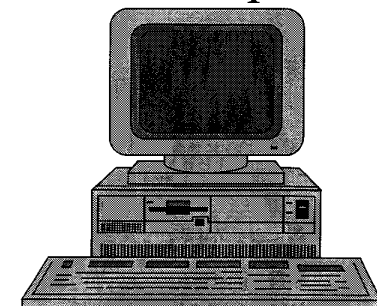


FlyBox



BG Systems
Joystick Control Box

SGI Computer



Two or more processors

RAH-66 Co



POTENTIAL UPGRADES

- Sound Enhancements**
- Instructions
 - Error advisement
 - Simulation realism

Touch-Screen interaction

Actual Grips with functional switches

FlyBox

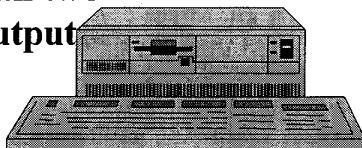


Flat-Panel Displays

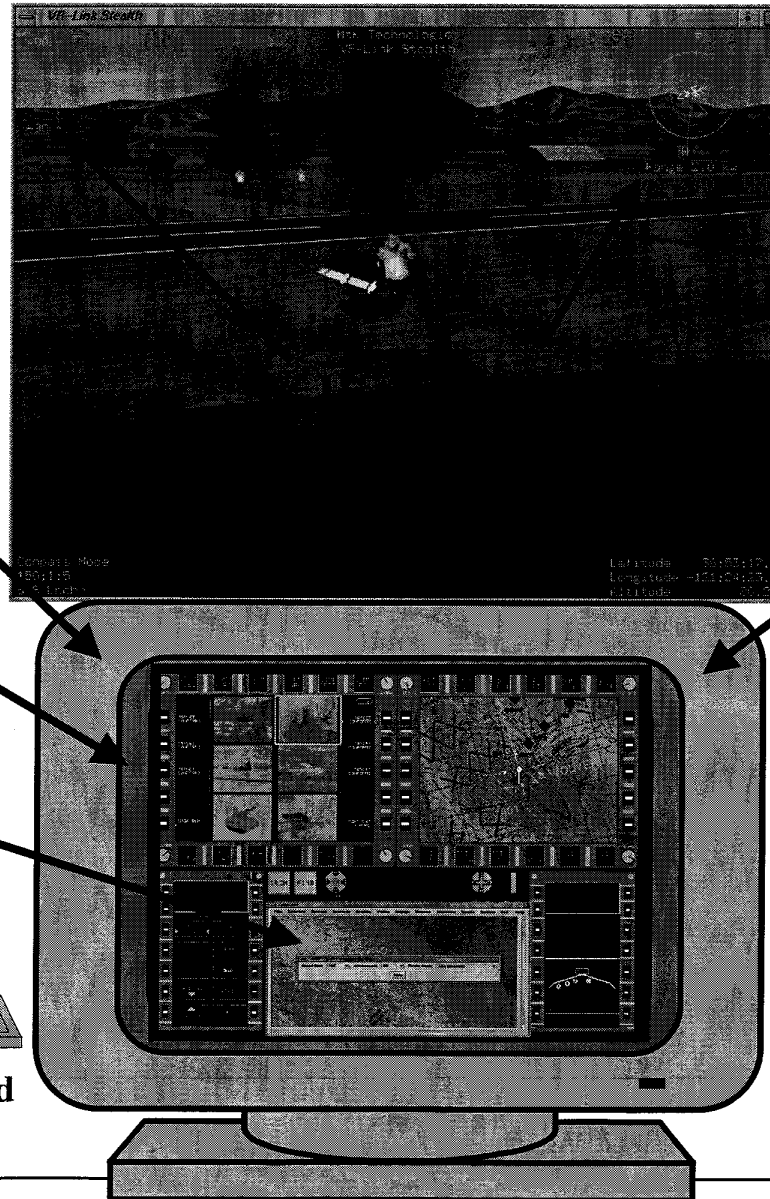
IR or TV imagery for EOTADS manual scan/stare

Eliminate the need for ATCOM display

Octane with two graphic output devices



Upgrade as required



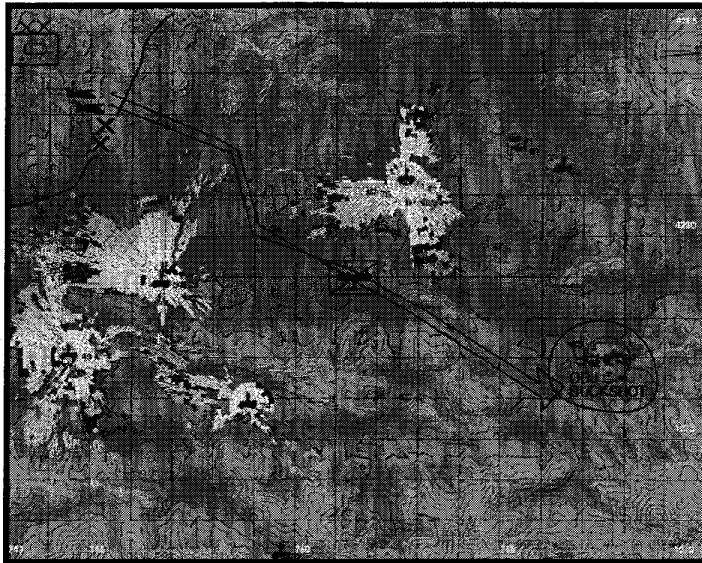
RAH-66 Comanche

SIMS Update 14 HS



Advanced Tactical COMbat Model

Graphical Display



Stealth Viewer



MaK Technologies VR-Link

Player Interactive Force-on-Force Model

- Stochastic
- Up to Brigade-Level Combat Interactions
- DIS Compliant

High Resolution for Rotorcraft Systems

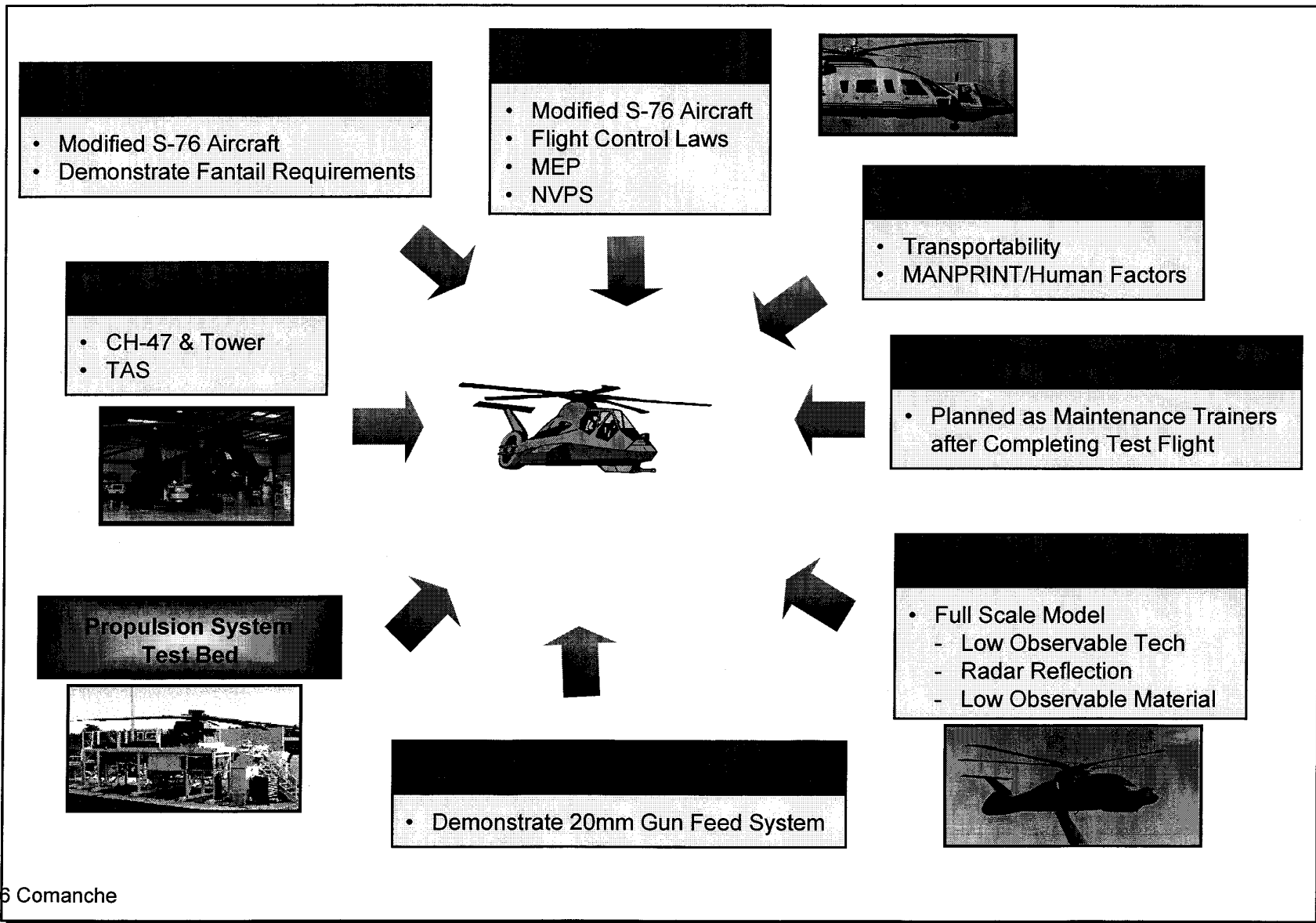
- Validated Detection Modules
- Validated Radar Clutter & Propagation Modules
- 6-DOF Aerodynamics

RAH-66 Comanche

SIM Update 15 HS



ADDITIONAL RAH-66 MODELS



RAH-66 Comanche



COMANCHE IS A SUCCESS STORY

171 Kts Forward
204 Kts TAS (Dive)
75 Kts Left Sideward
65 Kts Right Sideward
70 Kts Rearward Flight

T801
Builds on T800 Success
17% Power Increase

2.0G Pull-Up @
100 Kts
2.15G Pull-Up @
120 Kts

PSTB
200 Completed
of 200 Hours MQT
669 Hours Total

First Flight
January 4, 1996

112 Flights
124.8 Hours to Date

PMA
In Use

Dual Mode
"Eye Safe" Laser
Demonstrated

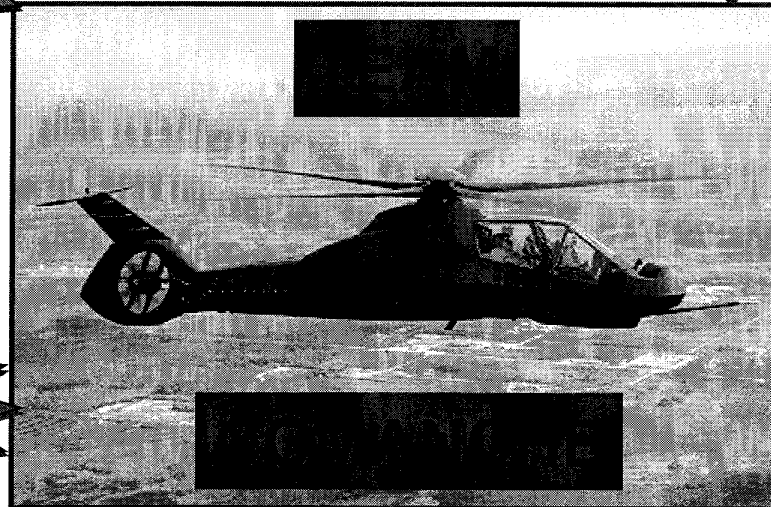
T800
Easily Maintained
Lightweight
High Power
Low Fuel Consumption
Military & Civilian
Qualified

Combined Test Team
Operational

Digital Flight
Control System
Minimizes Pilot
Workload

Radar Signature
Model Testing
Successful

Force XXI Activities
Global 97
SIMEX - Sep 97
DIV XXI - Nov 97



Demonstrated
Integrated
Architecture

TSM
Representatives
in Plant



SUMMARY

Put the INTELLECTUAL before the PHYSICAL -

*Simulation Based Acquisition
... From Concept Exploration
Through Operation and Support
Provides -*



- Capability Leap Ahead
 - Tactics, Techniques & Procedures Development
 - Doctrinal Insights
 - Technical and Tactical Digital Force Interoperability and Integration
 - Individual & Collective Training
 - Demonstrate Early Operational Capability Through Simulation
- Technical and Operational Testing
- Reduced Lifecycle Cost