



ATEC TEST TECHNOLOGY SYMPOSIUM INDUSTRY DAY 2003

Las Vegas, NV

24 June 03

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OVERVIEW



- Open Air Flight Test
 - Helicopter Icing Spray System
- Modeling & Simulation
 - Objective MIRSP
 - Beam Steering
 - System Test & Integration Lab
 - Re-configurable cockpit
 - Power Environment Modeling
- Instrumentation
 - Mini Instrumentation Package
 - Cockpit Displays



Open Air Flight Test

HISS



- Primary Need
 - A capability to perform in-flight artificial icing and rain tests for rotary-wing, fixed-wing, and UAVs
- Current Capability
 - A kit (3500 mhrs) and B kit (300 mhrs) mods performed
 - A/C hydraulic and fuel systems required
 - 8 ft x 36 ft cloud size
 - Ice droplet size: 20 – 70 micron
 - Ice Liquid Water Content: 0.25 – 1.0 gm/m³
 - Rain droplet size: ≤ 3 mm
 - Rain rate: ≤ 5 in/hr
 - Duration: 45 min



Open Air Flight Test

HISS

Helicopter Icing Spray System (HISS)



Generates customized cloud characteristics and artificial icing conditions for the accretion of various ice forms



Unique national asset supporting multi-service aviation development and icing certification



Open Air Flight Test

HISS



- Required Capability
 - No structural mods to A/C
 - Independent of A/C hydraulic and fuel systems
 - Roll-on, Roll-off
 - 60 ft cloud size
 - Droplet size: 15 – 70 micron
 - Liquid Water Content: .25 – 3.0 g/m³
 - Duration > 1 hr
- Technical Challenges
 - FAR Part 25 icing qualification
 - Manned and unmanned platform support
- IOC by FY09



Modeling & Simulation

Objective MIRSP

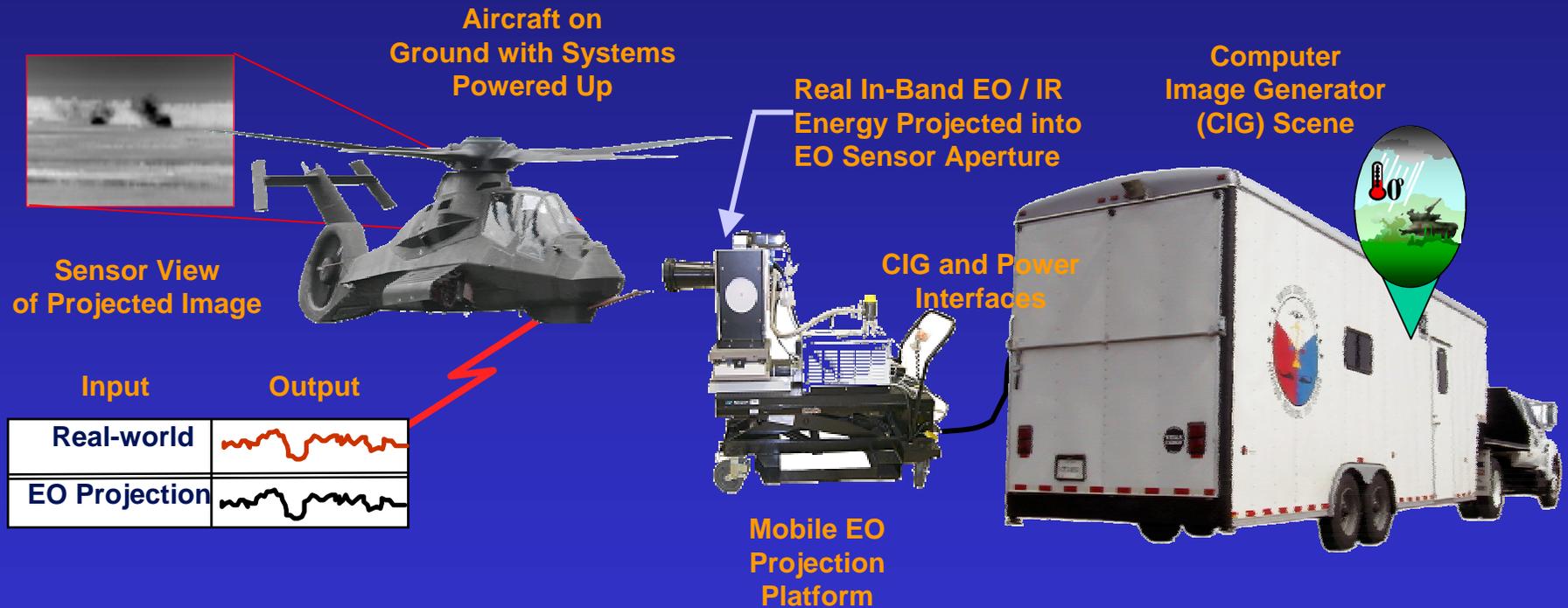


- Primary Need
 - A capability to perform installed sensor testing using projection technologies to stimulate imaging electro-optical (EO) sensors
- Current Capability
 - *Pathfinder* MIRSP
 - 672 x 544 resistor emitter array
 - Collimating optics
 - Field of View < 20°



Modeling & Simulation

Objective MIRSP





Modeling & Simulation

Objective MIRSP



- Required Capability
 - Image size > 1024 x 2048
 - 60° FOV
 - Refresh rate > 60 HZ
 - UV – LWIR waveband range
- Technical Challenges
 - 1K x 2K array development
 - Heat dissipation from the emitter array
 - Cost, program risk, and spare parts associated with large monolithic integrated circuits
- IOC by FY07



Modeling & Simulation

Objective MIRSP – Beam Steering



- Primary Need
 - A minimally invasive capability to perform T&E on installed EO sensors in a moveable turret using projection technologies
- Current Capability
 - Fixed focal length collimator
 - Sensor remains aligned with projector
 - LWIR only
 - Fixed line of sight (+/- 0° FOR)
 - Discrete lenses (WFOV, MFOV, NFOV)



Modeling & Simulation

Objective MIRSP – Beam Steering



- Required Capability
 - Mobile
 - Multi-spectral projection (UV – LWIR)
 - 60° FOV
 - > 180° FOR
 - Synchronization with cockpit state data
 - Min. modification to aircraft (return A/C to airworthy state quickly)
- Technical Challenges
 - Device to maintain line-of-sight between projector and sensor
 - Ability to support multiple platform types (AH-64, OH-58, UAV) with unique sensor locations
- IOC by FY07



Modeling & Simulation Systems Test & Integration Lab



- Primary Need
 - A capability to perform system of systems testing on all electronic aviation systems to assess performance characteristics and address integration issues.
- No current capability exists



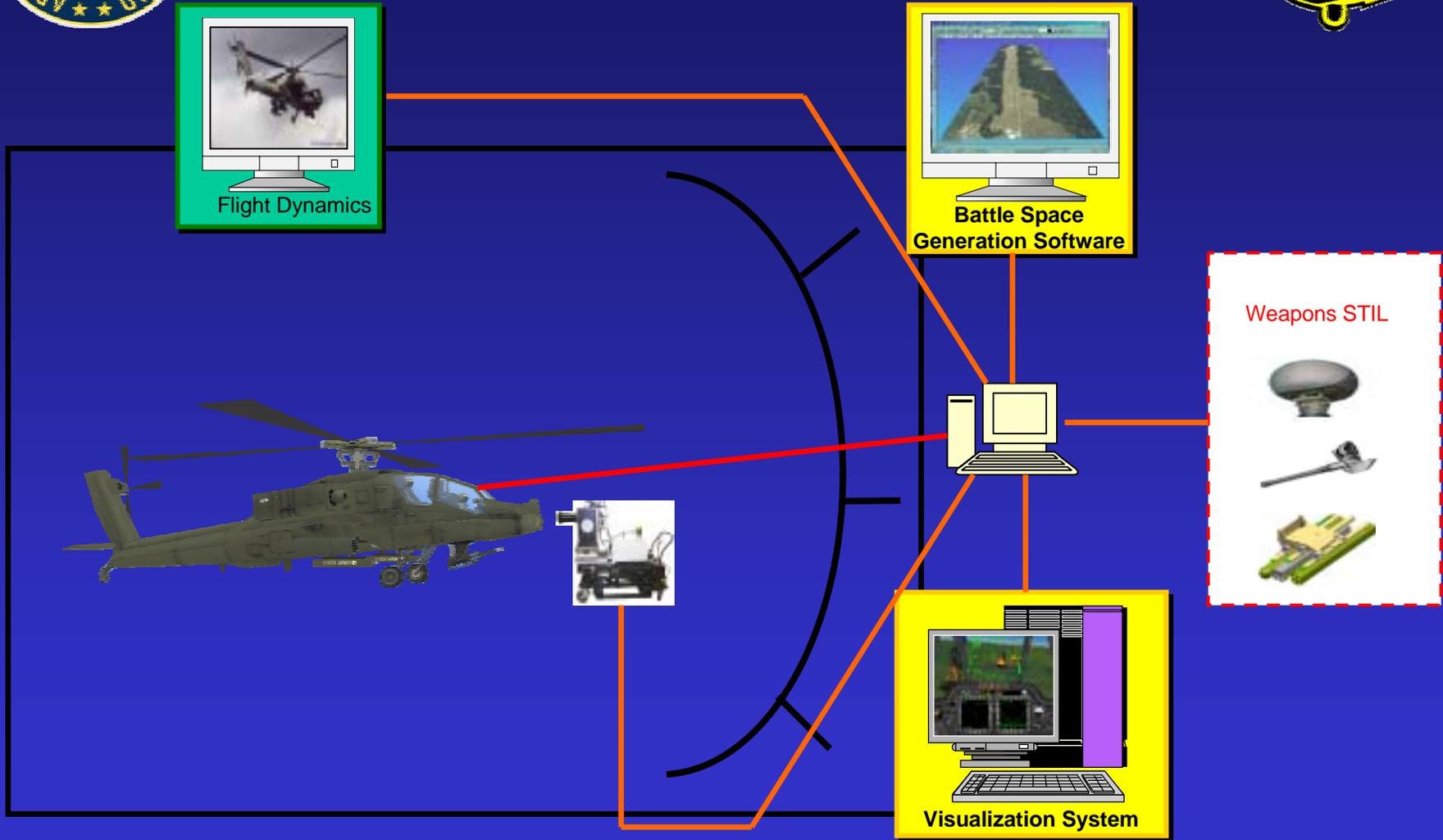
Modeling & Simulation Systems Test & Integration Lab



- Required Capability
 - Distributed
 - Constructive and virtual scenarios
 - Realistic environment
 - Real-time
 - Man-in-the-Loop feedback
- Technical Challenges
 - Link A/C avionics, communications, navigation, weapons and sensors, countermeasures, and flight controls in a laboratory environment
 - Interaction with A/C flight control computer
- IOC by FY09



Modeling & Simulation Systems Test & Integration Lab





Modeling & Simulation Re-configurable Cockpit



- Primary Need
 - A capability to interject the human element (pilot) into ground based M&S aircraft DT scenarios providing replication of the cockpit environment to assess A/C performance characteristics and pilot workload.
- No current capability exists



Modeling & Simulation Re-configurable Cockpit



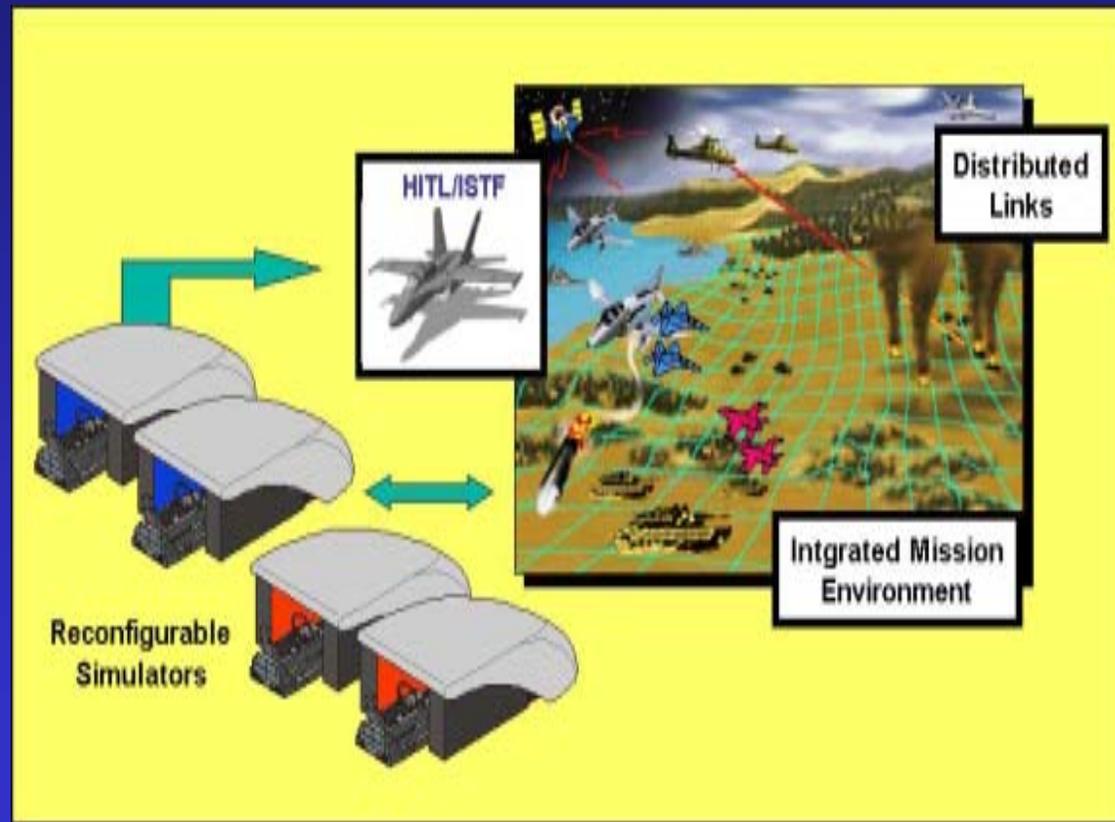
- Required Capability
 - Distributed
 - Constructive and virtual scenarios
 - Realistic environment
 - Real-time
 - Man-in-the-Loop feedback
- Technical Challenges
 - Tandem and side-by-side- configurations
 - Engineering fidelity and robustness suitable for DT
 - Links to other engineering capabilities
 - Secure connections
- IOC by FY09



Modeling & Simulation Re-configurable Cockpit



- Eliminates and improves upon existing, low-fidelity simulators that are developed around a single aircraft.
- Develops a reconfigurable medium to high-fidelity simulator supporting multiple aircraft types.





Modeling & Simulation

Power Environment Modeling



- Primary Need
 - Model aircraft operational power environment
 - Ability to assess electronic performance under operational aircraft power transients
 - Provide subsystem developers actual power spectrum from Army platforms rather than designing to MIL-STD's
- Current Capability: Limited test sets with power supplies providing ideal power characteristics to electronic components under test



Modeling & Simulation

Power Environment Modeling



- Required Capability
 - Ability to assess electronic equipment susceptibility to dynamic, operational power transients as seen in battlefield conditions
 - Ability to collect RAM data on individual components without actual flight hours
- Technical Challenges
 - Providing models under various conditions
 - Numerous Army aircraft configurations will require different models
- IOC NLT FY07



Instrumentation

Mini Instrumentation System



- Primary Need
 - A low-power suite of instrumentation for UAV performance and systems testing.
- Current Capability: Limited for UAV support
- Required Capability
 - Instrumentation to measure engine data, flight control surface positions, airspeed, position, temperatures, strains, pressures, etc.
- Technical Challenges: Unknown
- IOC by FY05.



Instrumentation Cockpit Displays



- Primary Need
 - A compact flat-panel color display unit for use in A/C performance and systems testing
- Current Capability
 - Electroluminescent flat panel display mounted in an aluminum chassis
 - 320 x 240 (quarter VGA) resolution
 - 28V power can be run remotely <+ 200 ft.



Instrumentation Cockpit Displays



- Required Capability
 - 640 x 480 resolution
 - Operational in multiple environments
 - Mountable in A/C cockpit
 - Operational power range: 10V – 32V
- Technical Challenges: Unknown
- IOC by FY05



Technical POCs



- HISS

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