



Virtual Proving Ground

Synthetic Environment Focus Group



Synthetic Environment Integrated Test bed (SEIT)
Initial Operational Capability 1 (IOC-1) Demonstration

A TEC 2003 Test & Technology Symposium



AGENDA



- SEIT Details
- SEIT IOC 1
- SEIT IOC 1 Accomplishments
- Future Plans for SEIT IOC 2



SEIT DESCRIPTION



What is Synthetic Environments?

A representation of the natural and man-made environment utilizing accepted M&S and T&E capabilities for providing a standard and common environment to support life cycle T&E requirements for Army acquisition systems.

What is Synthetic Environments Integrated Test bed (SEIT)?

An evolving test bed of the represented Synthetic Environment as applied to practical use cases on Army acquisition systems. Also, a collaborative effort among test centers and agencies to leverage the highest quality synthetic environment T&E expertise and capabilities.



SEIT BACKGROUND



How did SEIT start?

- Synthetic Environment Focus Group (SEFG) recognized that a *more robust test environment* was needed for supporting the Future Combat System (FCS)
- Current T&E capabilities, although extensive, were *not integrated* for supporting a full-scale FCS test
- Strong desire to *create a framework* for supporting a Synthetic Environment and develop associated Core Areas
- As a collaborative effort between test centers for establishing *peer communication and understanding*

Decided to undertake an integration exercise with capabilities from each test center for creating an initial Synthetic Environment capability



SEIT PURPOSE



- Support the Army in its T&E endeavors for its Transformation to the Objective Force
- Integrate ATEC Synthetic Environment M&S and T&E capabilities in a concerted effort for providing “best-value” to the warfighter
- Establish collaboration among Subject Matter Experts (SMEs) and leverage expertise in multiple technology areas



SEIT VISION



A synthetic environment which can be efficiently adapted to support a wide array of Army systems at varying phases of acquisition development.



SEIT GOALS



- Leverage the highest quality synthetic environment M&S and T&E capabilities from across DoD, with a focus on current DTC test capabilities
- Create a common, integrated, multi-level resolution environment to support life cycle M&S and T&E requirements including the seamless transition from digital to physical test articles
- Integrate engineering level simulations representing a variety of T&E technology areas into an interacting environment
- Develop the overall SEIT architecture using manageable SEIT threads that can be easily integrated with other M&S and T&E capabilities

Work closely with Army customers for ensuring SEIT can support their T&E needs



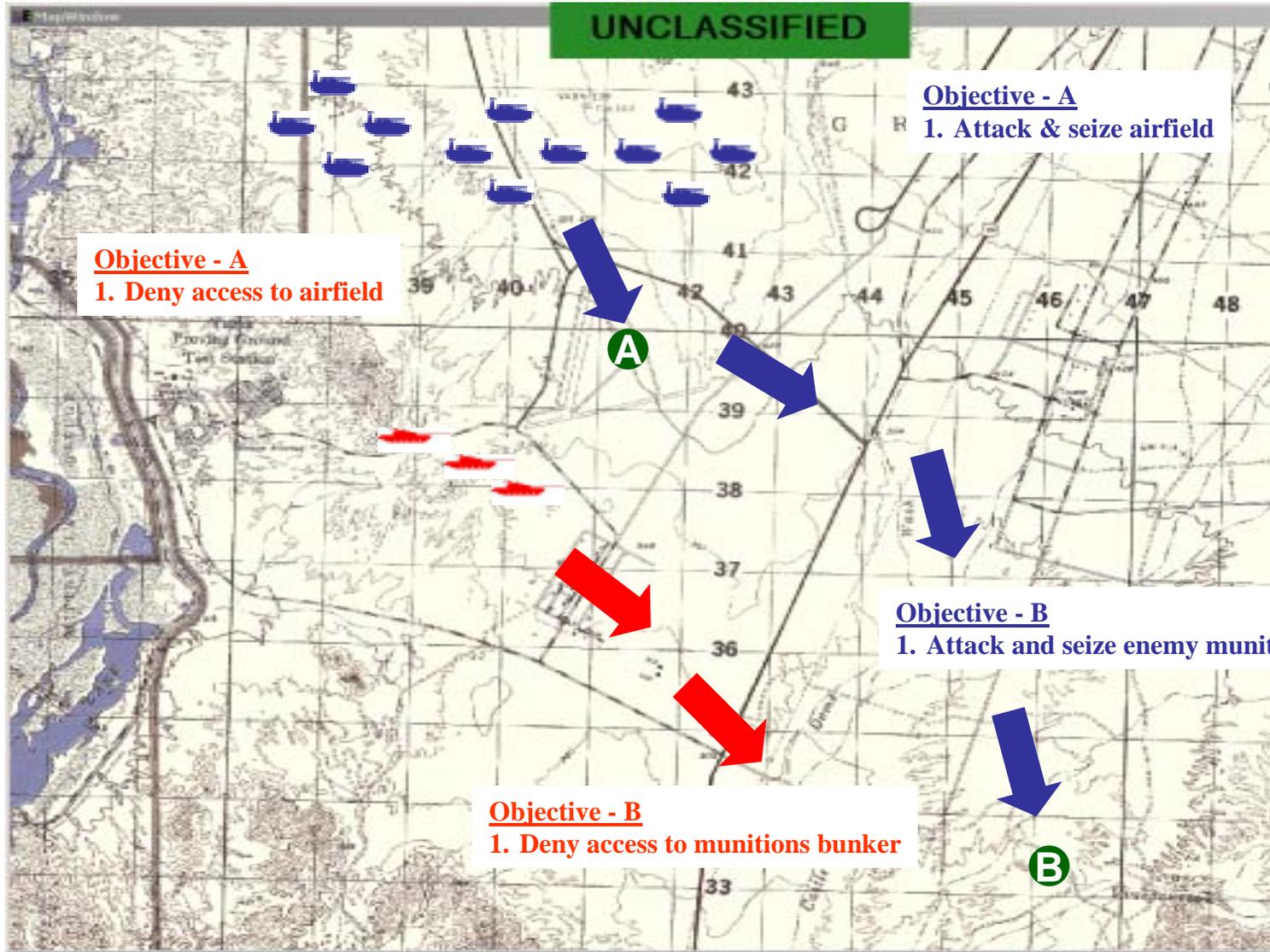
SEIT IOC 1



- Demonstration conducted in March 03, approximately 70 attendees
- Started with three “threads”, C4, CB ISR, IR ISR
- OneSAF Test Bed (OTB) used as integration simulation to “flow-down” the scenario between threads
- Used DoD High Performance Computing assets for CB and IR threads
- Participants
 - Four DTC Test Centers (DPG, EPG, RTTC, and YPG)
 - Defense Threat Reduction Agency (DTRA)
 - National Center for Atmospheric Research (NCAR)
- Roles
 - DPG: Chemical Detection and Weather
 - EPG: Tactical Communications and RF Degradation
 - RTTC: Enemy Target Acquisition and SPOT report population
 - YPG: Gaming Area and Digital Terrain Supplier
 - DTRA: Chemical Agent Dispersion Model
 - NCAR: Weather Models



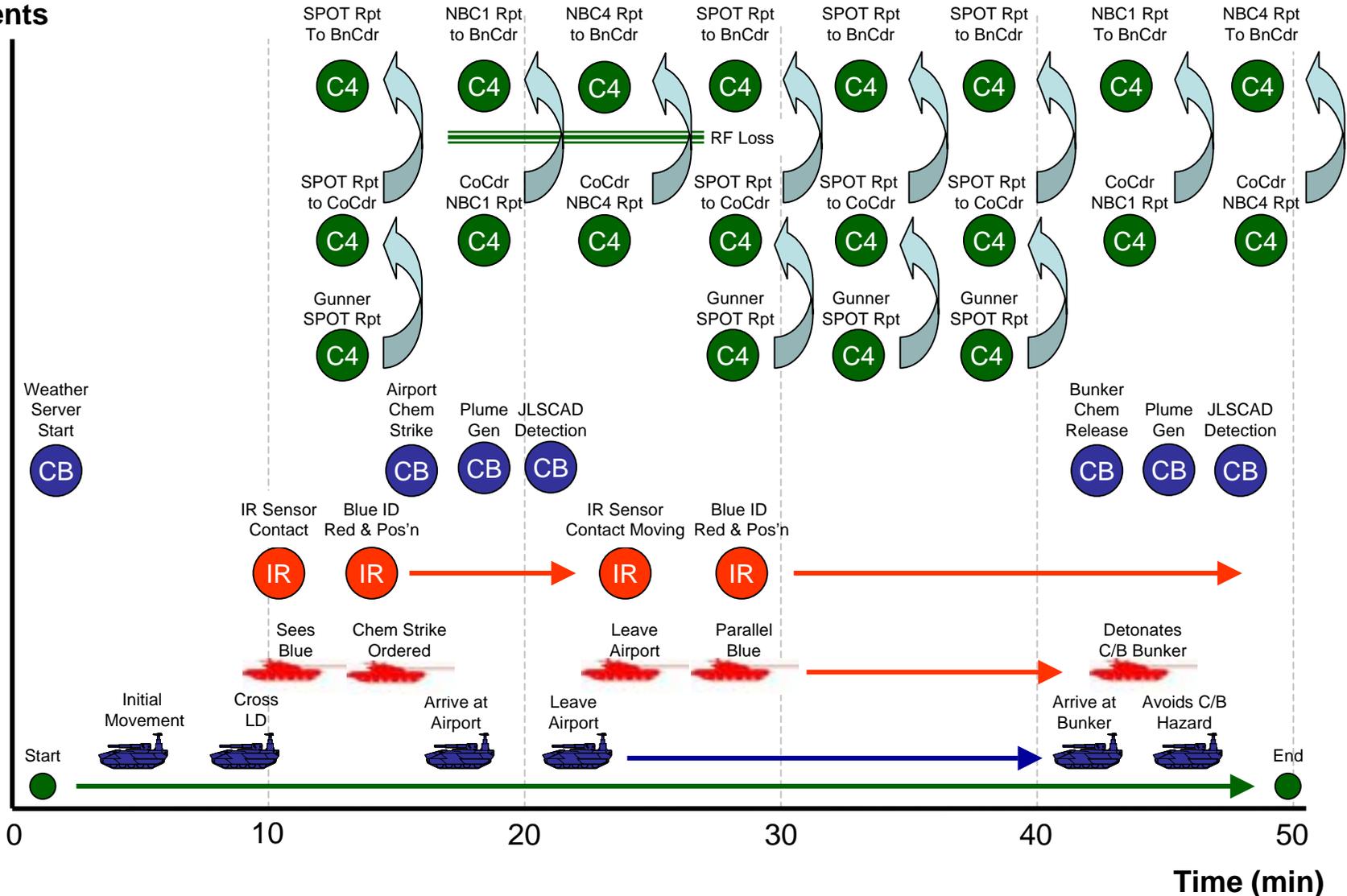
SEIT SCENARIO





SEIT TIMELINE

Events





SEIT IOC 1 THREADs

OPERATIONAL LAYER

OneSAF Test Bed (OTB)

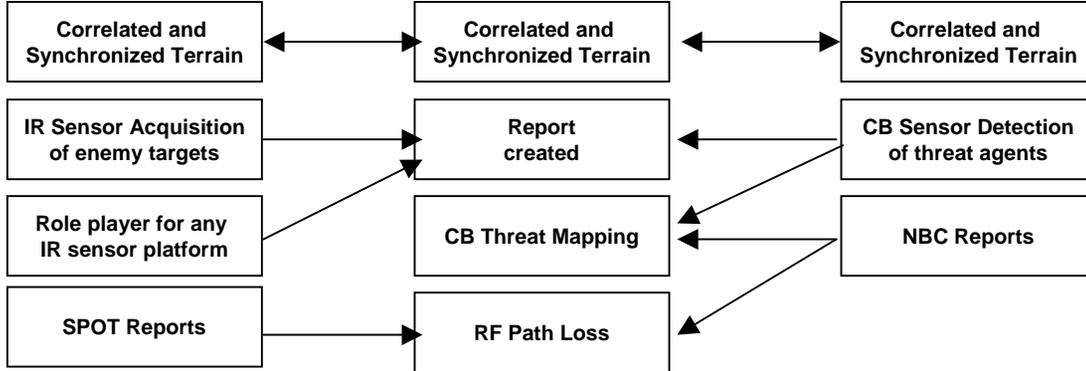
- Provides operational scenario
- Creates red/blue forces with functional capabilities

IR ISR Thread

C4 Thread

CB ISR Thread

INTEGRATION LAYER



TEST LAYER

- Simulated IR Environm
- Simulated IR Threats
- Physical Test Hardwar
- Performance analysis
- Human-in-the-Loop

- STORM Suite
- ORION
- Simulate C3 messaging
- Capability to operate simulated or live

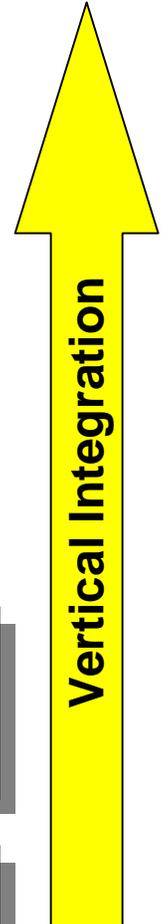
- Simulated CB Threats
- Dynamic Weather
- Capability to operate simulated through live

TEST ARTICLE

- IR Sensor

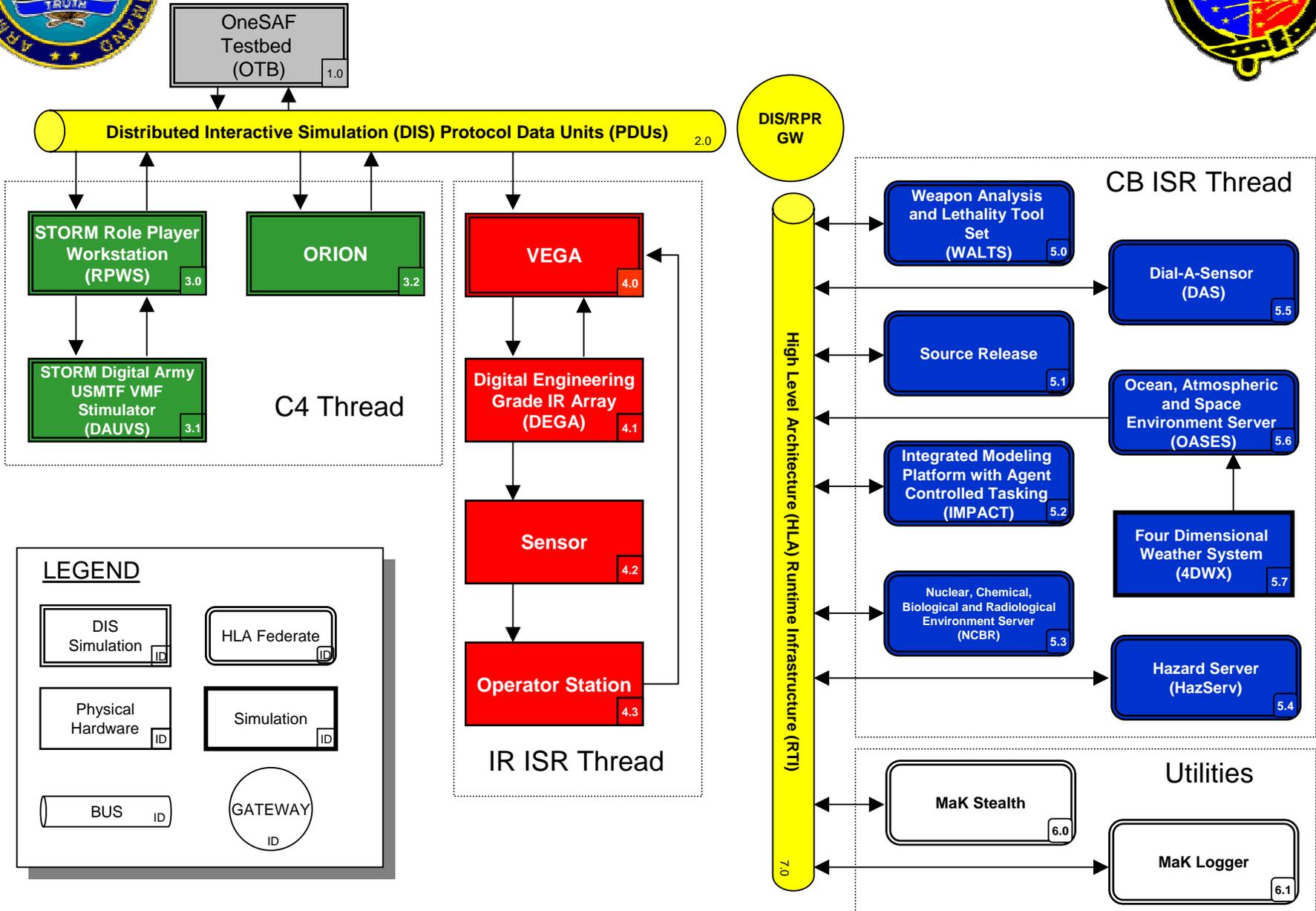
- Radio Communication Net
- C4I Systems

- CB Sensor



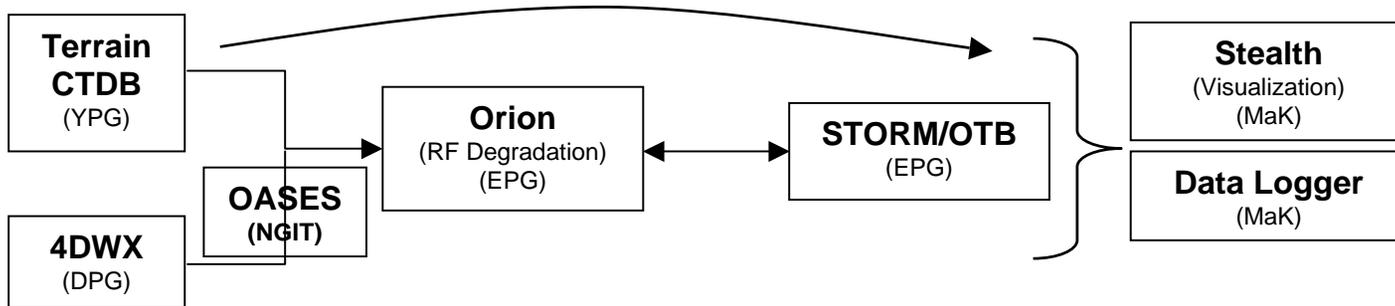
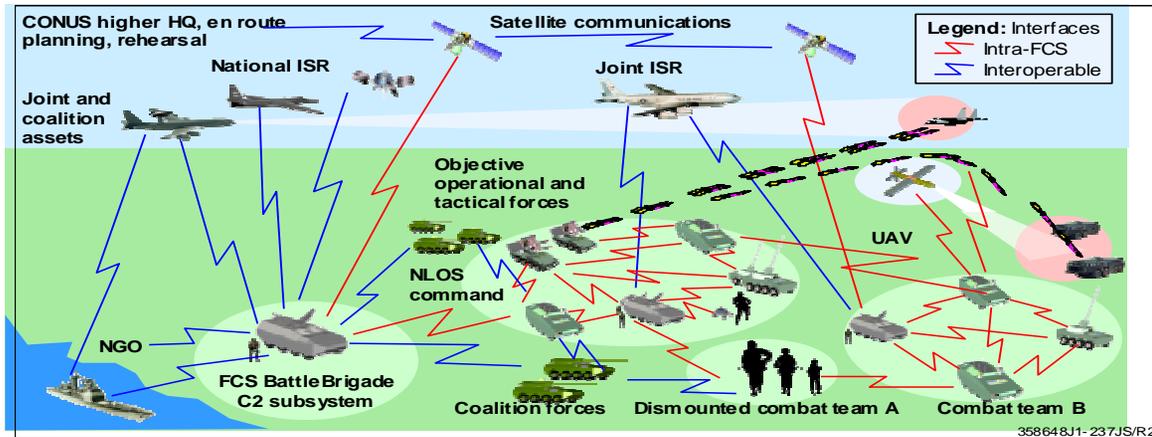


SEIT ARCHITECTURE





C4 THREAD



Purpose and Use for FCS Testing

- Provide a conduit for the interaction of engineering representations of the environment and the FCS SUTs to interact enabling generation of higher resolution C4ISR information for increased realism in stimulating the C4ISR OF Infrastructure
- Represent Objective Force C4 technologies, systems, architectures, potential scenarios and environments demonstrated for Block I FCS and scaleable to Blocks 2 through N
- Provide required C4ISR technical data to support FCS critical design and program decisions
- Reduce the cost and impact of C4ISR T&E on the FCS program schedule
- Support both C4ISR engineering design, TTP formulation and training

- CTDB – Compact Terrain Database
- DCARS – Digital Collection Analysis and Review
- 4DWX – Four Dimensional Weather
- OASES – Ocean, Atmosphere, & Space Environmental Services
- Orion – RF path loss model
- STORM – Simulation, Training, & Operations Rehearsal Model
- OTB – OneSAF Test Bed Baseline



C4 DEMO

Battalion Commander has been orphaned from his Radio-Nets, shown in Red

Sample Comm-Link shows How terrain is interrupting Radio Line-of-sight

DIS Gateway receives SA And sends Radio-Net status via DIS protocol

Query based GridViews dynamically show status of Radio-Nets

Chan	Frequency	Threshold	Type
18	402.5 MHz	90%	Peer-Routed
18	622.5 MHz	90%	Peer-Routed
18	402.5 MHz	90%	Peer-Routed
18	622.5 MHz	90%	Peer-Routed
2	50 MHz	90%	Direct
2	60 MHz	90%	Direct
2	50 MHz	90%	Direct

Name	Number of
1110005	EFPLS RDE WIDE SA MSG NET/Orphaned, EFPLS RDE WIDE C3 MSG NET/Orphaned, EFPLS LOCAL C3 CSMA NET/Orphaned, EFPLS LOCAL C2 CSMA NET/Orphaned

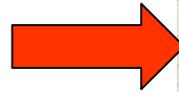
Communication Loss due to Terrain Effects



C4 DEMO



Reports from multiple operators aggregated at Company Commander's View



Company Commander's View

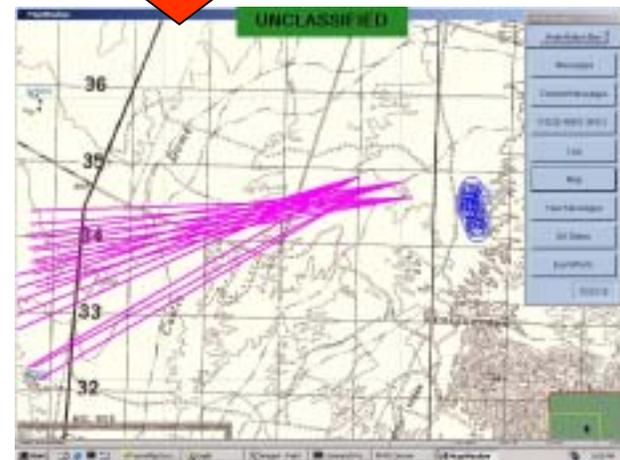


Operator View

SPOT Reports and NBC Reports created from Operator Station



Reports Forwarded



Battalion Commander's View



CB ISR THREAD

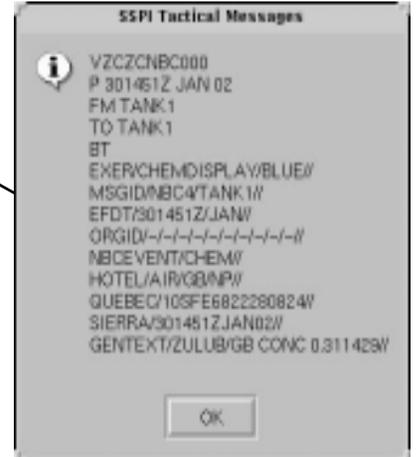
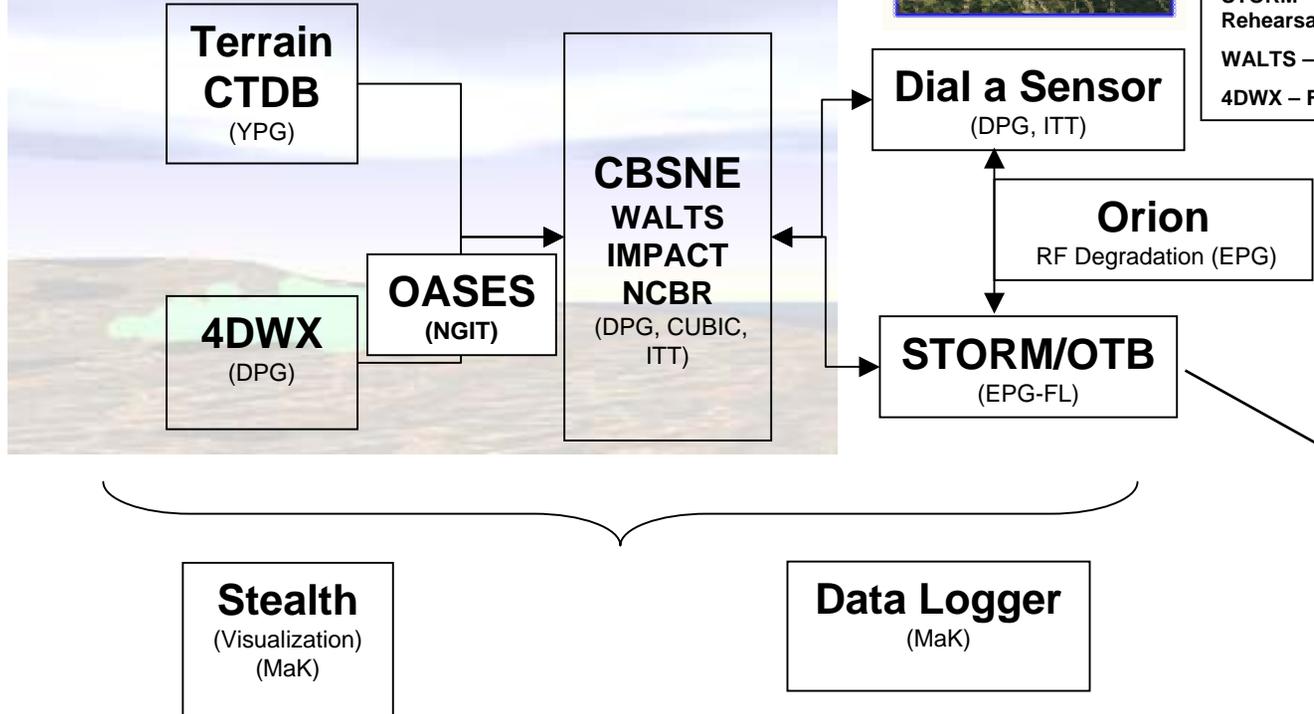


Purpose and Use for FCS Testing

- Provide insights into the CB ISR process and performance for FCS
- Provide required CB ISR technical data to support FCS critical design and program decisions
- Minimize the cost and impact of CB ISR T&E on the FCS program schedule
- Support both CB ISR engineering design and TTP formulation
- Represent Objective Force CB ISR technologies, systems, architectures, and scenarios demonstrated for Block I FCS and scalable to Blocks 2 through N

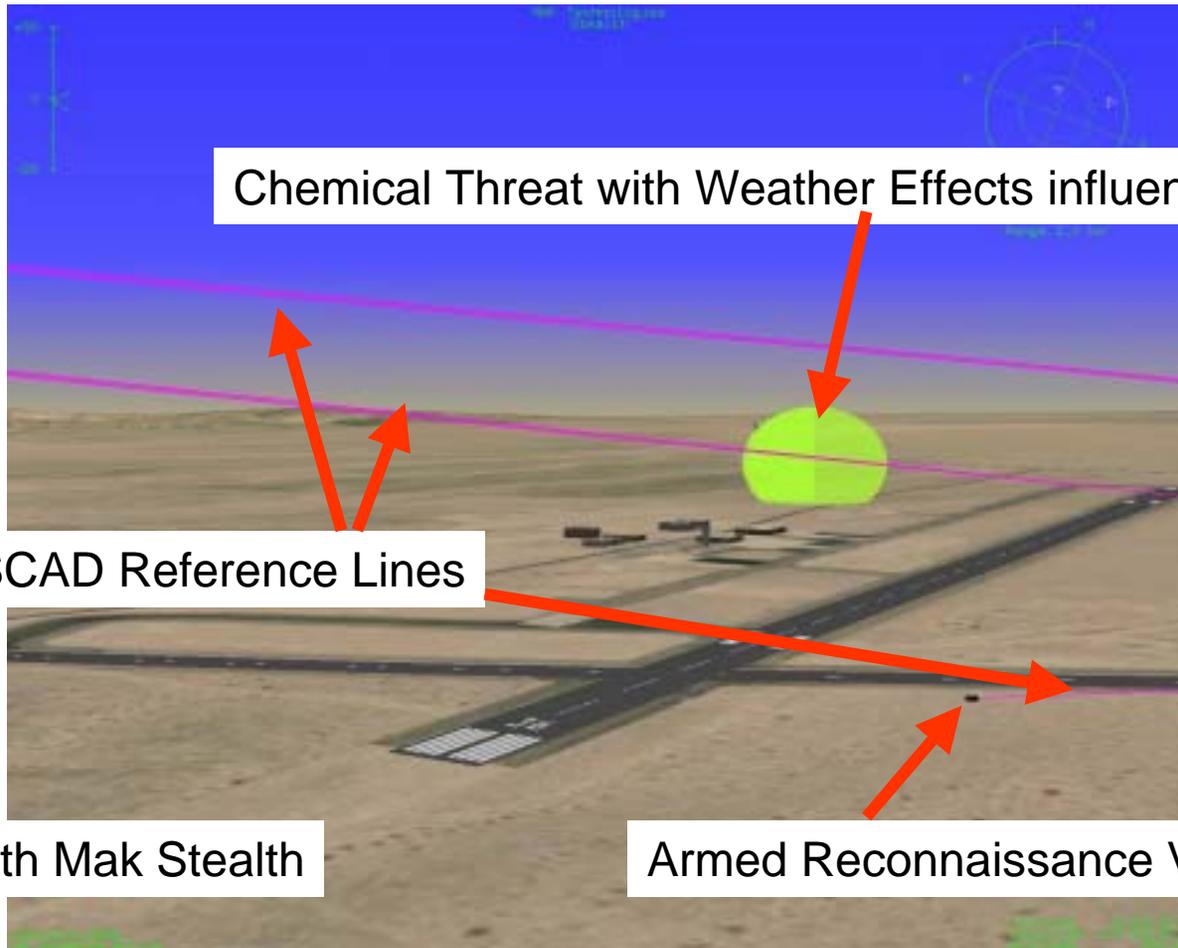


- CBSNE – Chemical & Biological Synthetic Natural Environment
- CTDB – Compact Terrain Database
- IMPACT – Integrated Modeling Platform with Agent Controlled Tasking
- NCBR – Nuclear, Chemical, Biological, Radiological Environment Server
- OASES – Ocean, Atmosphere, & Space Environment Server
- OTB – OneSAF Test Bed Baseline
- STORM – Simulation, Training, & Operations Rehearsal Model
- WALTS – Weapons Analysis & Lethality Tool Set
- 4DWX – Four Dimensional Weather





CB ISR DEMO



Chemical Threat with Weather Effects influencing dispersion

JSLSCAD Reference Lines

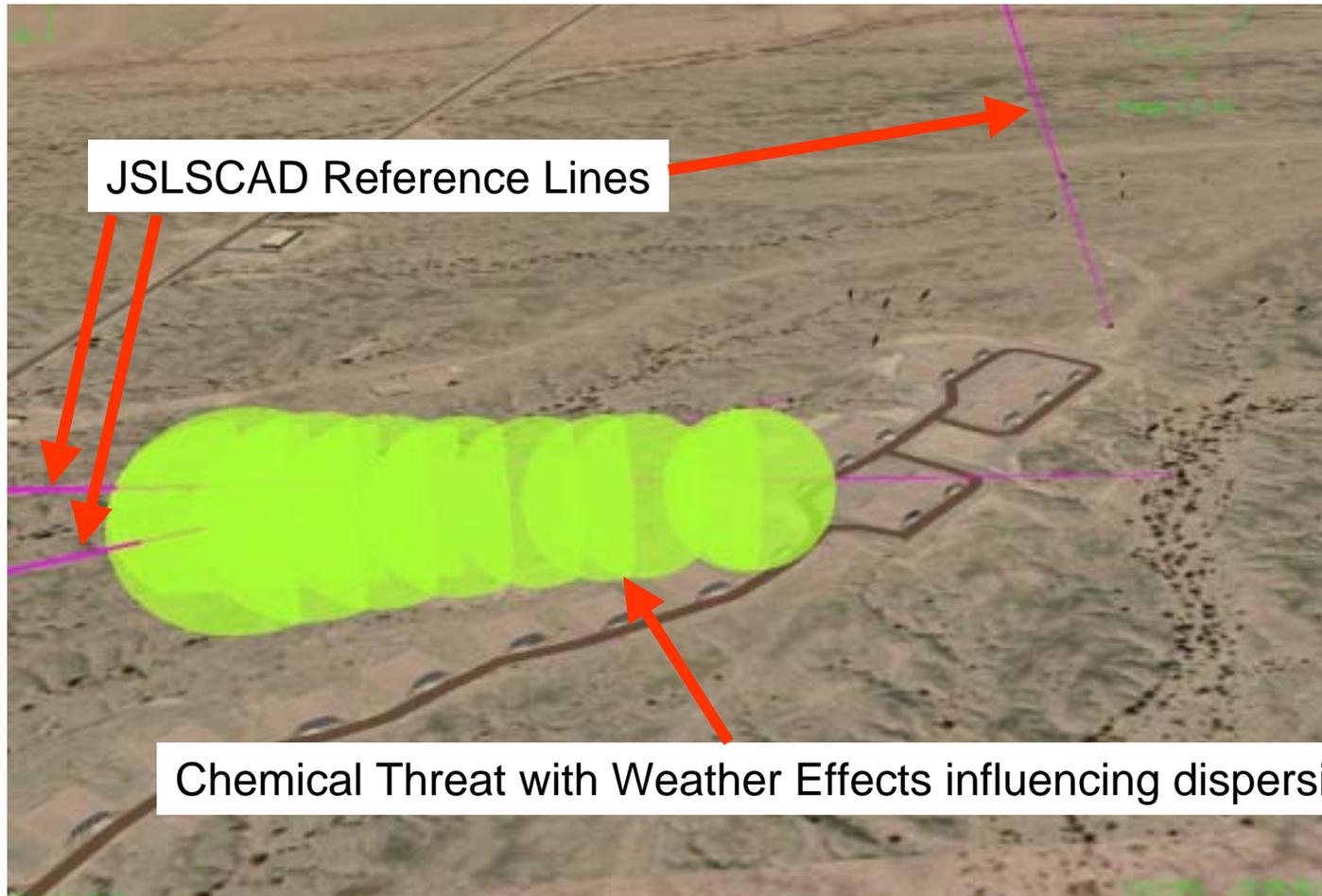
Visualized with Mak Stealth

Armed Reconnaissance Vehicle (ARV)

Detection of Chemical Threat at Airfield



CB ISR DEMO



Detection of Chemical Threat at Bunkers

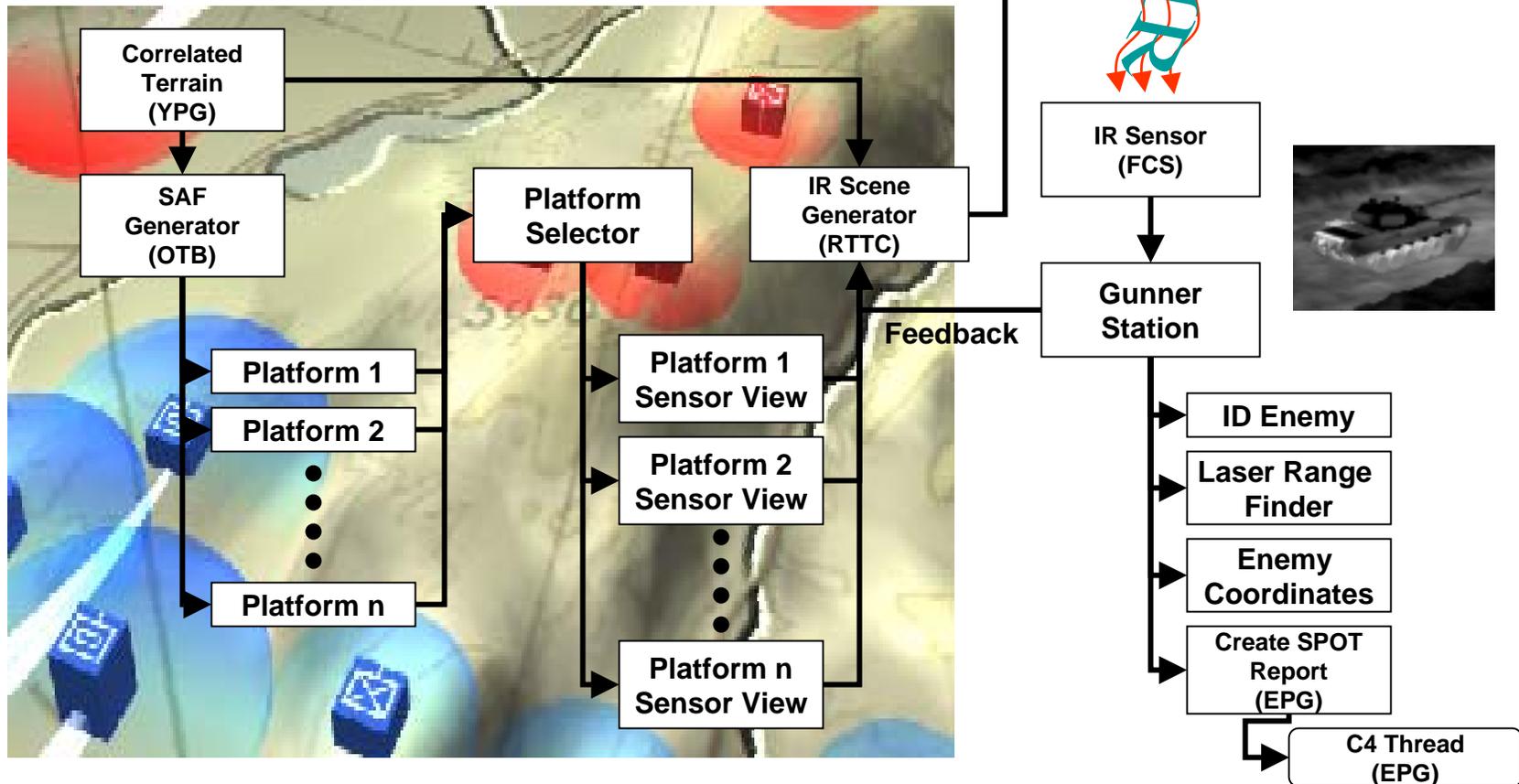


IR ISR THREAD



Purpose and Use for FCS Testing

- Exercise FCS Platform sensors in an operational environment with multiple perspectives for common operating picture development and sensor fusion
- Provide required Sensor ISR technical data to support FCS critical design and program decisions
- Reduce the cost and impact of Sensor ISR T&E on the FCS program schedule
- Support Sensor ISR engineering design, TTP formulation and training





IR ISR DEMO



GREAT ENGINEER!

Terminal to HPC computer creating IR Scene

Joystick used to pan battlefield, locate red targets, and initiate laser range finder

IR Sensor output

IR sensor detecting IR energy from scene projection test hardware

STORM RPWS station for SPOT report generation



SEIT IOC 1 ACCOMPLISHMENTS



- Built a SEIT Government/contractor team
- Established basis for overall SEIT architecture
- Established process for thread development and integration
- Documented process for SEIT IOC 2 and beyond
- Created Final Report and Demonstration Control Document (Interface Control Document)



FUTURE PLANS



- SEIT IOC 2 scheduled for 3rd week in August, 18-22 August
- Continue to enhance demonstrated synthetic environment capabilities - integrate FCS-specific test requirements
- Increase representation of synthetic environment to other threads
- Add additional live test assets and utilize more test infrastructure
- Create a “Battle Commander’s” view of the demonstration
- Begin dual-mode operation, co-located and distributed