U.S. Army
Redstone Technical Test Center

Distributed Simulation & Test Activities and Capabilities at Redstone Technical Test Center (RTTC)

Overview for:

25 June 2003

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RTTC Command Structure

Assistant Vice Chief of Staff of the Army
AVCSA ☆☆☆

Army Test and Evaluation Command
ATEC ☆☆

Developmental Test Command
DTC ☆

Operational Test Command
OTC

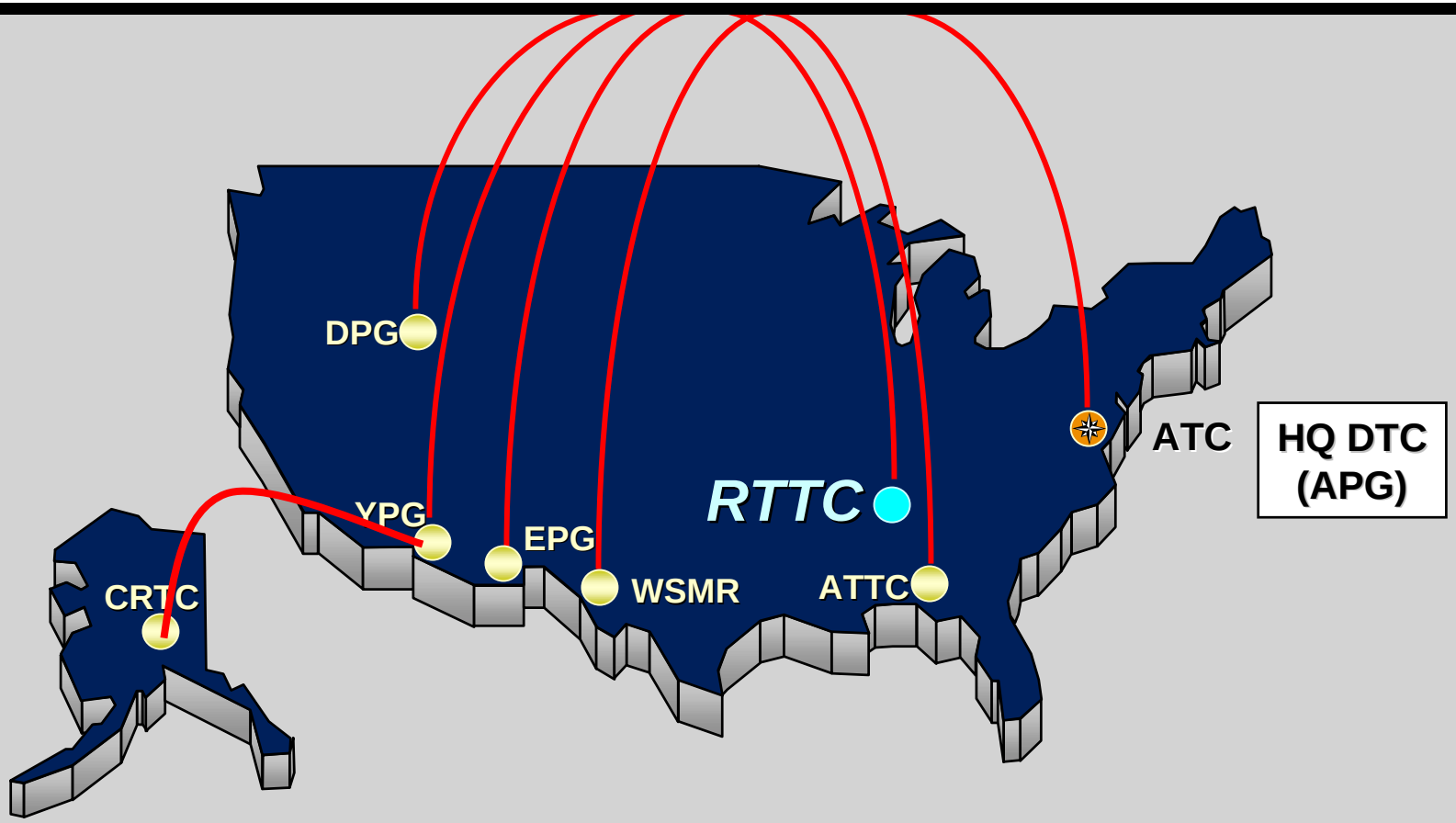
Army Evaluation Center
AEC (SES)

DTC Test Centers

Aviation Technical Test Center (ATTC)
Aberdeen Test Center (ATC)
Cold Regions Test Center (CRTC)
Dugway Proving Ground (DPG)
Electronic Proving Ground (EPG)
Redstone Technical Test Center (RTTC)
White Sands Missile Range (WSMR)
Yuma Proving Ground (YPG)

RTTC Location

Developmental Test Command (DTC)
(All Centers are linked via the DREN and/or other networks)



RTTC Mission

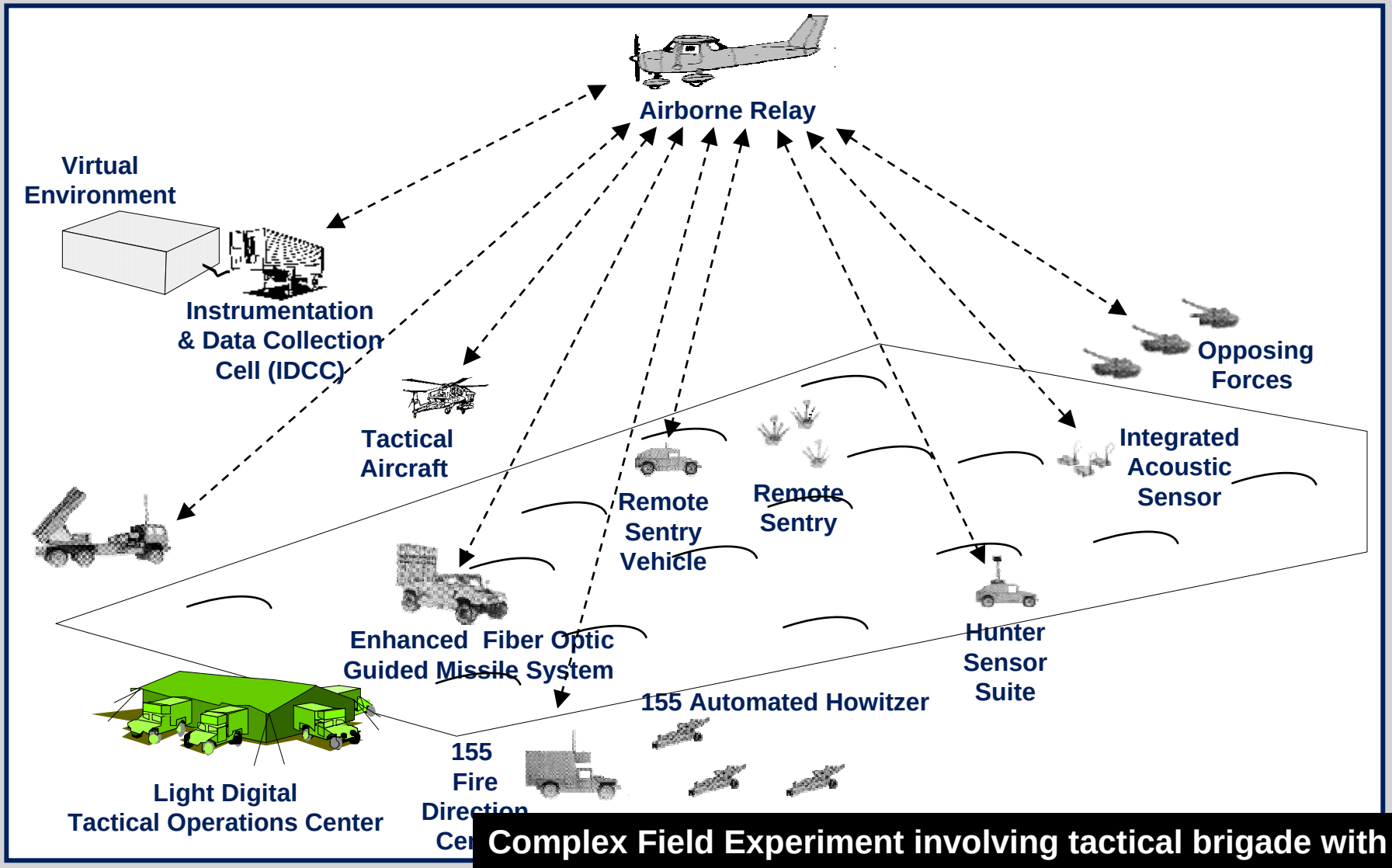
Provide Technical Test and Simulation Expertise and State-of-the-Art Facilities and Capabilities to Plan, Conduct, Analyze and Report the Results of Tests for Small Missile & Rocket Systems and Sensors, Components, and Subsystems of Rocket, Missile and Aviation Systems.

DS&T Activities

Representative Past Events

- **Rapid Force Projection Initiative (RFPI)**
- **Project Constellation**
- **Avenger Distributed Simulation and Test**
- **Cooperative Unmanned Ground Attack Robot (COUGAR)**
- **Cold Gas Facility Distributed Test**

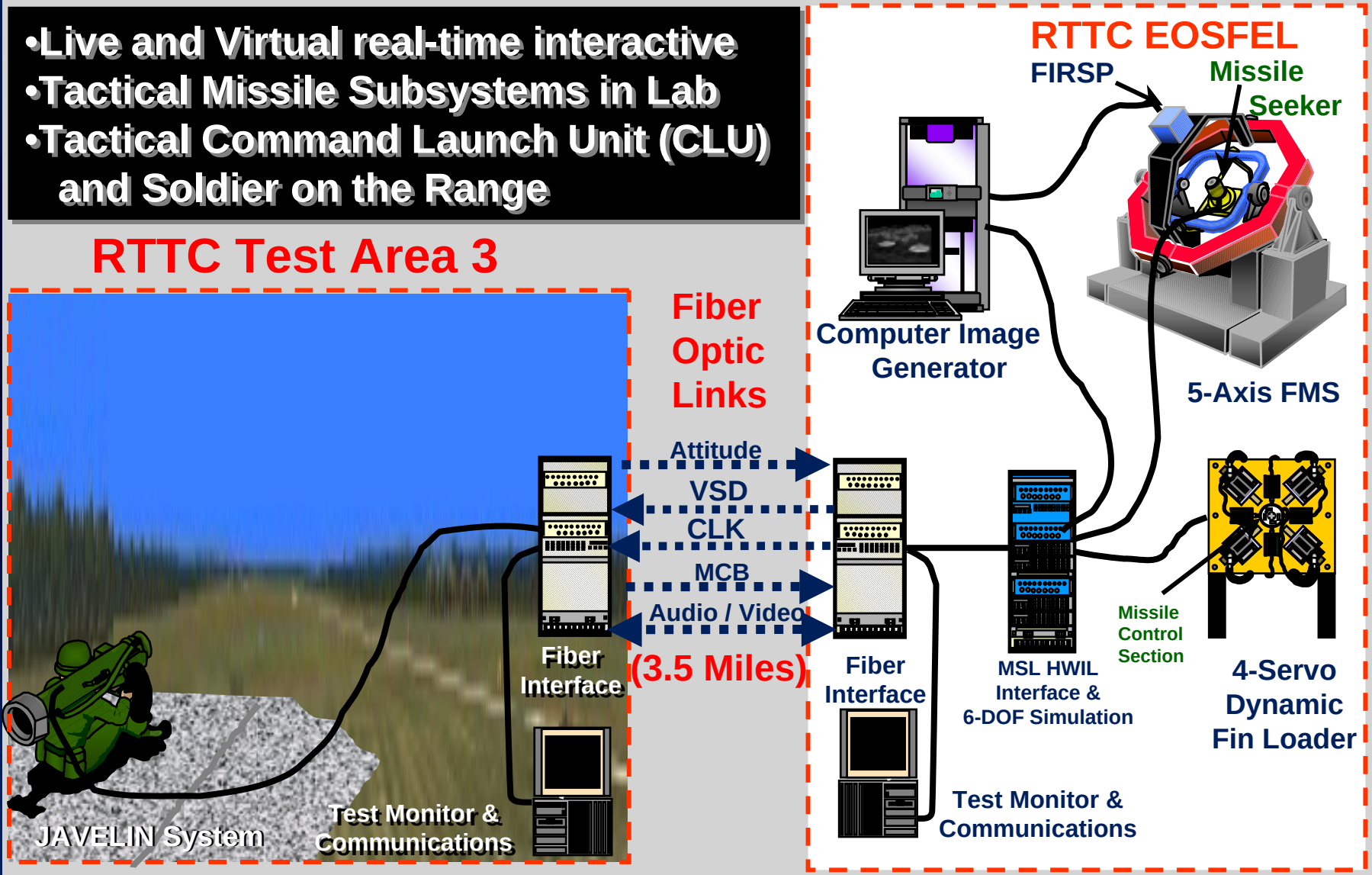
Rapid Force Protection Initiative (RFPI)
Advanced Concept Technology Demonstration (ACTD)



Complex Field Experiment involving tactical brigade with Live/virtual/constructive Elements with full interaction

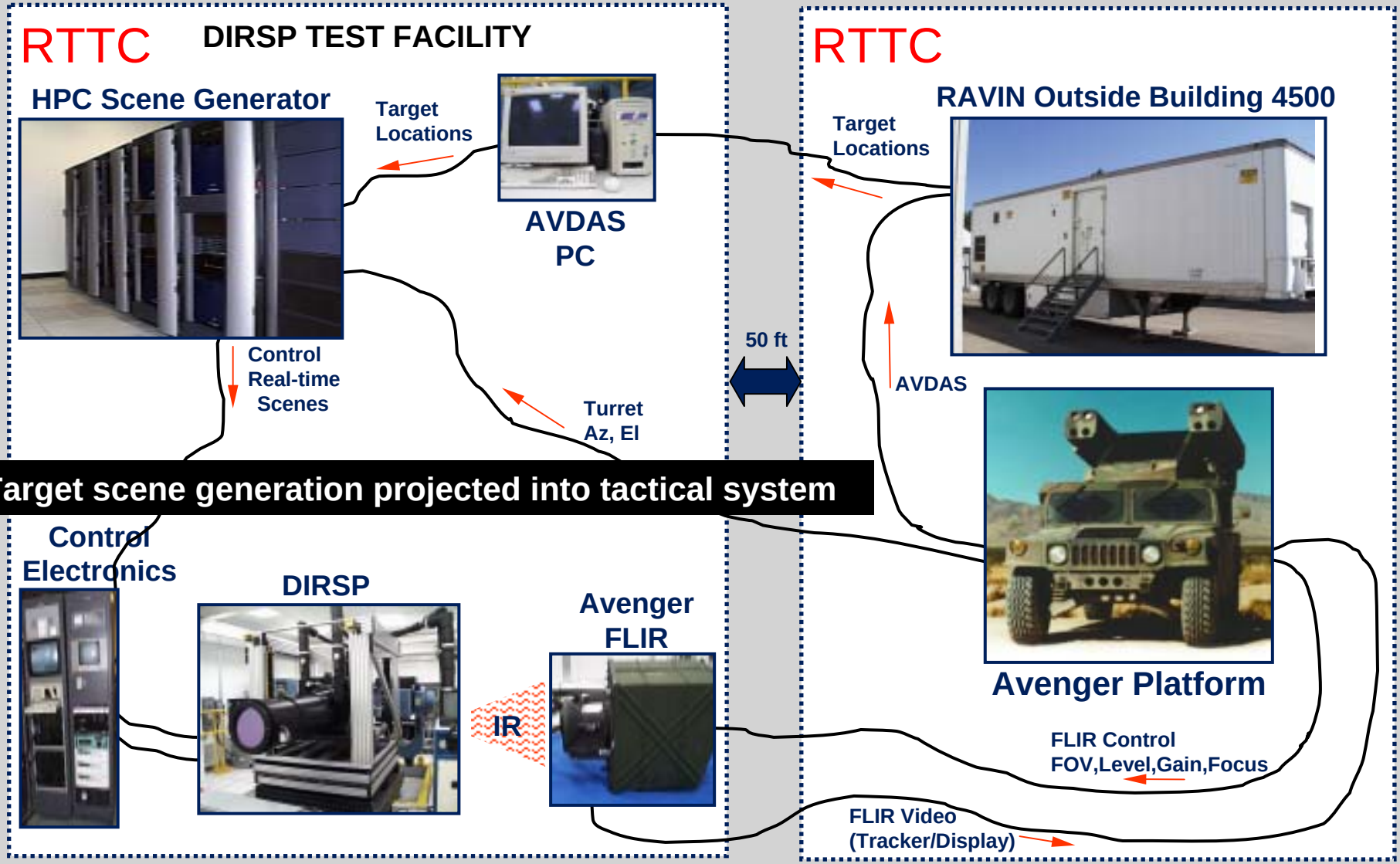
Project Constellation
Distributed Component Test Bed

- Live and Virtual real-time interactive
- Tactical Missile Subsystems in Lab
- Tactical Command Launch Unit (CLU) and Soldier on the Range



AVENGER Distributed Simulation & Test Bed

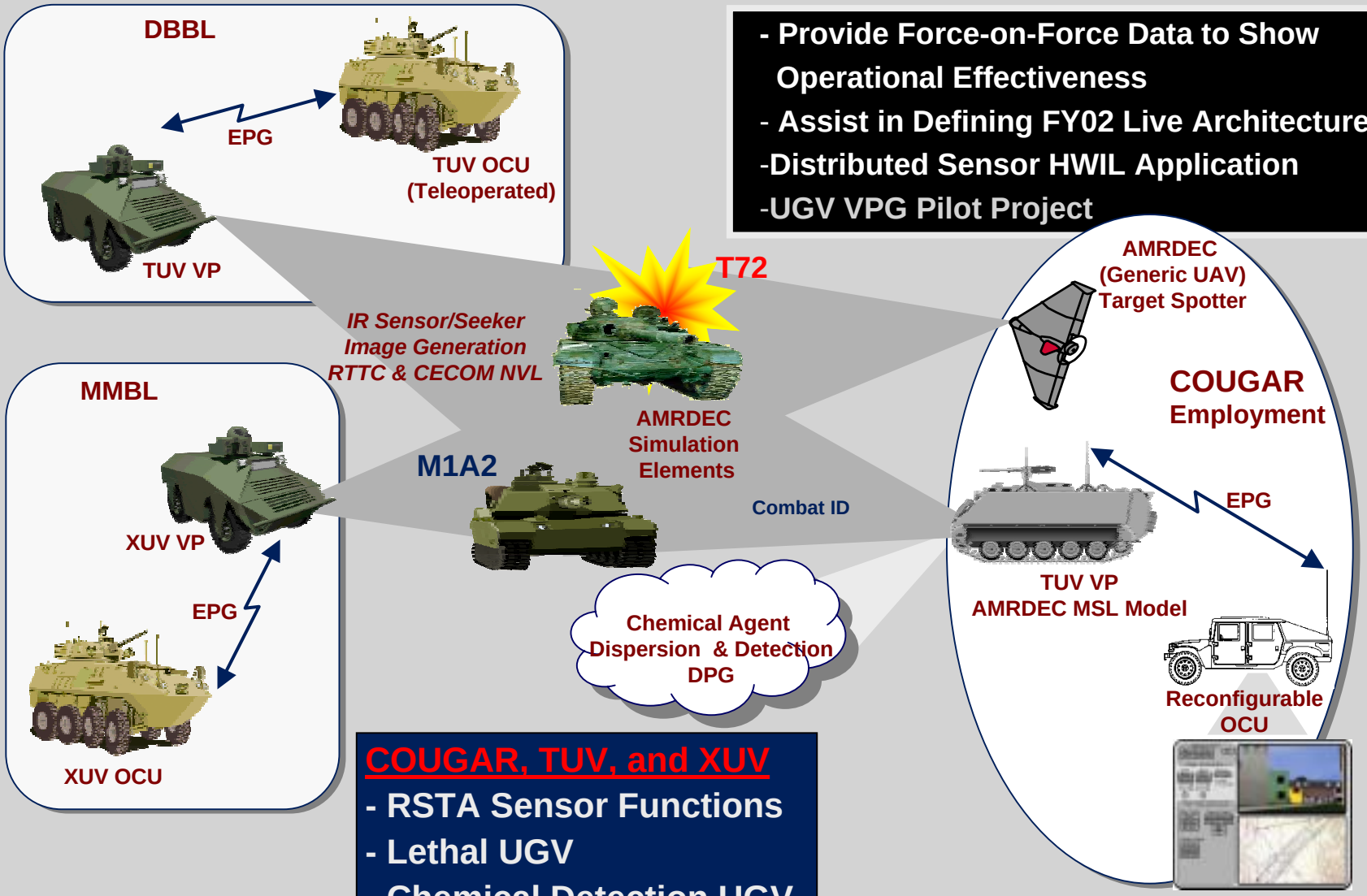
Closed-loop Facility Interface



FY01 UGV Based Distributed Simulation

Cooperative Unmanned Ground Attack Robot (COUGAR)

- Provide Force-on-Force Data to Show Operational Effectiveness
- Assist in Defining FY02 Live Architecture
- Distributed Sensor HWIL Application
- UGV VPG Pilot Project



COUGAR, TUV, and XUV

- RSTA Sensor Functions
- Lethal UGV
- Chemical Detection UGV

RTTC Cold Gas Facility (CGF) Distributed Test

CGF Federate

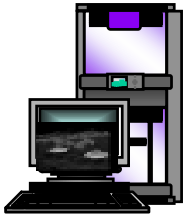
Test Stand with Rocket Motor

Test Control Data
- Nozzle Commands
- Range Safety
- Start/Stop
- Test Status

Test Control System

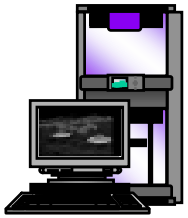
HLA Wrapper

Visualization Federate



Native HLA
Exercise Visualization and Logger

Simulation Federate



Native HLA
Missile Evaluation Simulation
- Sends Nozzle Commands for Guidance
- Receives Forces and Calculates Guidance

Injection of live Test Hardware data into simulation in real time

Motor Test Data

Thrust-Vector Nozzle Commands

All Data

Motor Test Data

Thrust-Vector Nozzle Commands

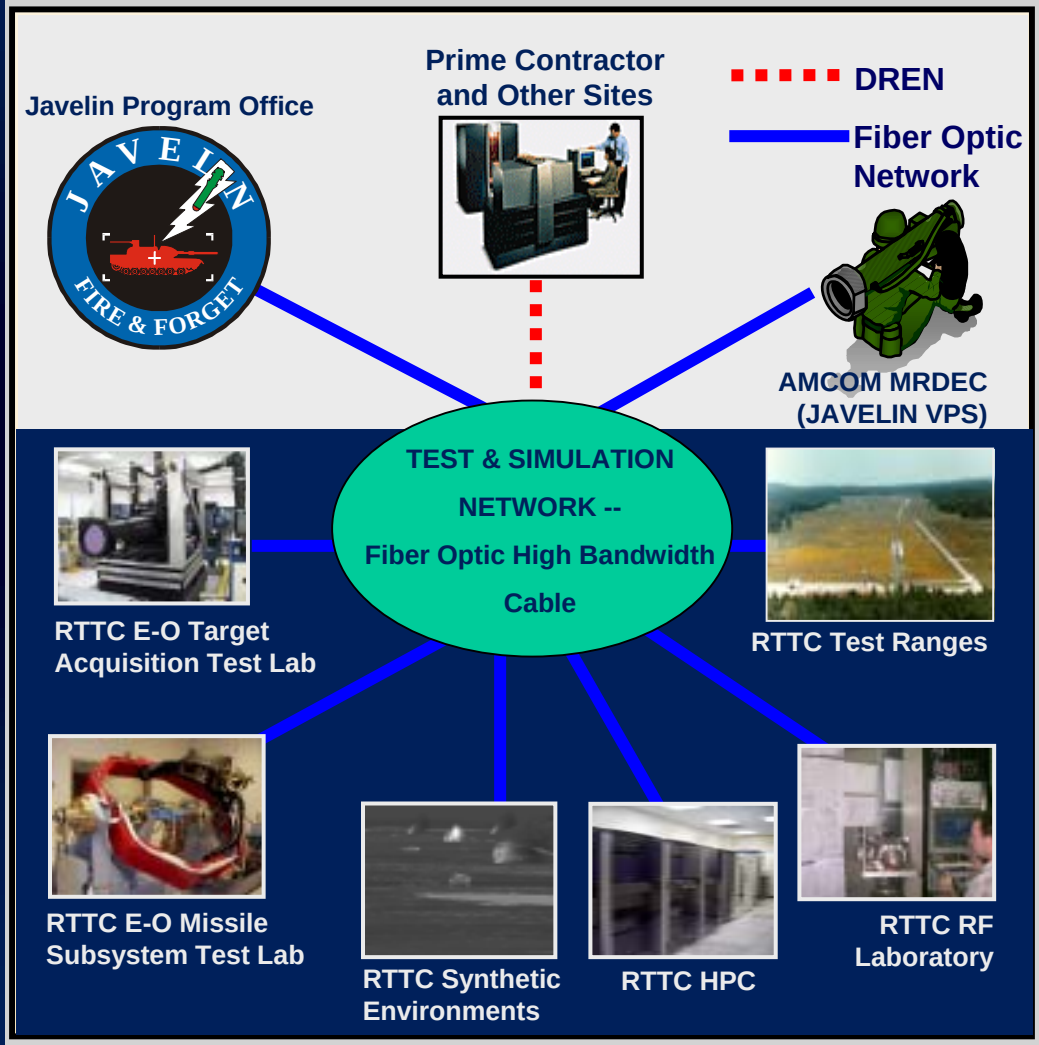
RTI

DS&T Activities

Recent - Current

- **JAVELIN Integrated Test & Simulation Network (JITSN)**
- **RDECOM Virtual Distributed Laboratory for Modeling & Simulation (VDLMS) 1st Application**
- **Synthetic Environments Integrated Testbed (SEIT) IOC 1**

JAVELIN Integrated Test & Simulation Network (JITSN)



The Connection of the Javelin Prime Contractor to the RTTC / Redstone Arsenal Test and Simulation Network through DREN

Capability

- Closed loop test activities between Tucson and Huntsville.
- Raytheon Access to RTTC and AMCOM RDEC Test Labs
- Raytheon Access to the RTTC High Performance Computer

Benefits

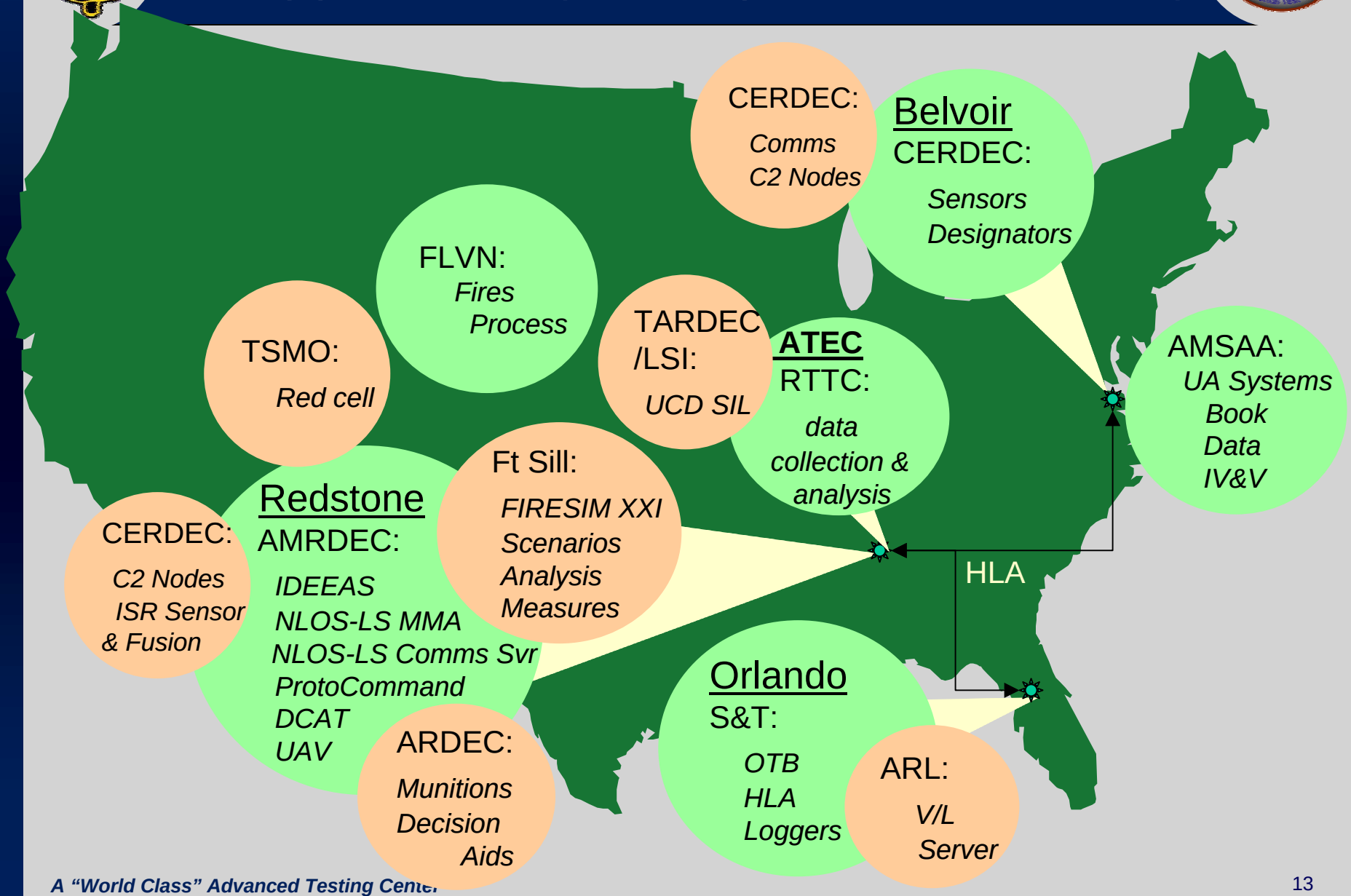
- Reduce Design and Development Time
- Data Sharing and Rapid Information Feedback into the Design Loop

Pathfinder

- Future Raytheon Weapon Systems:
  - ✓ Joint Standoff Weapon (JSOW)
  - ✓ Programs with the Missile Defense Agency (MDA)
- Common Missile RFP Requirement for SDREN

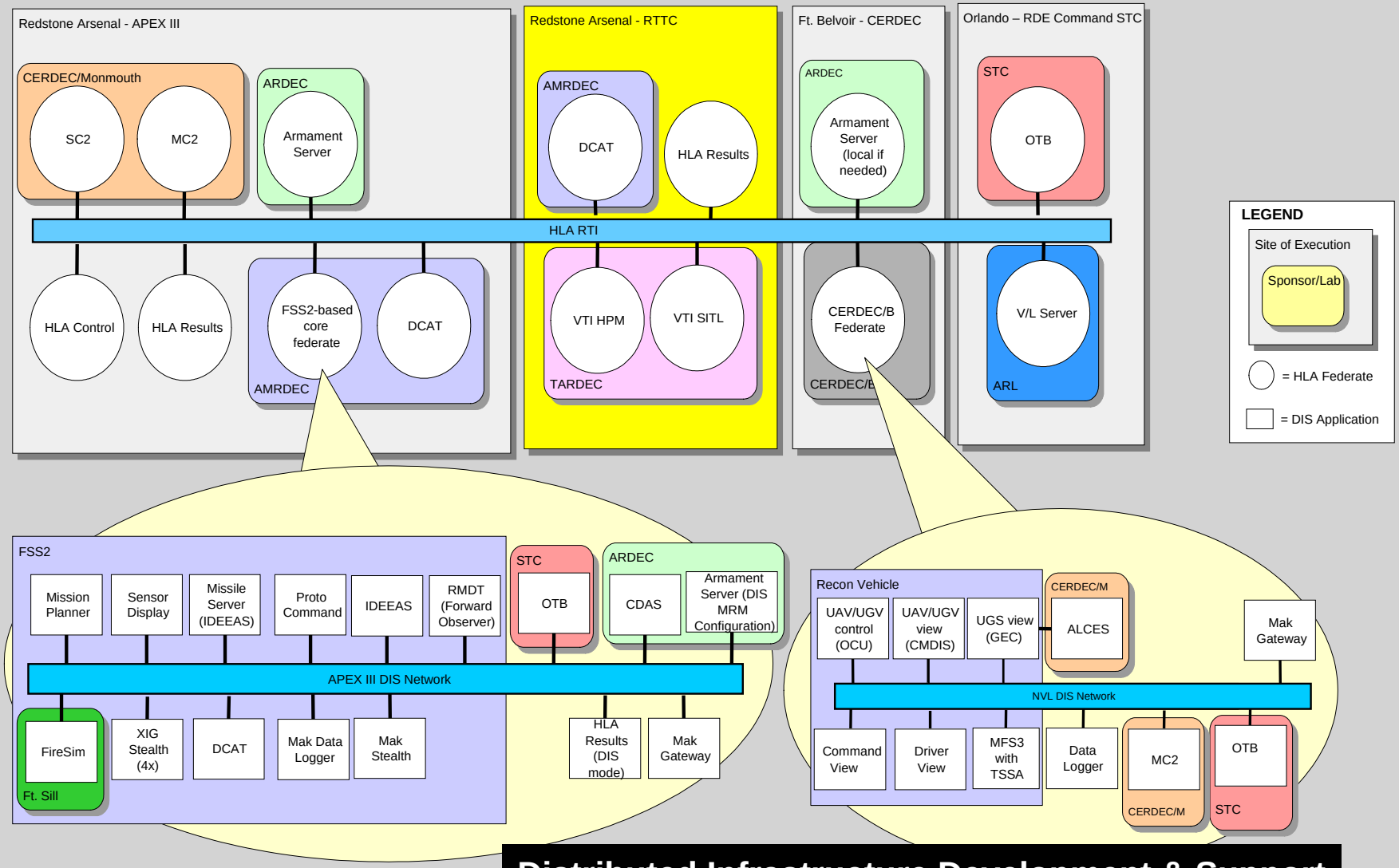
RDECOM VDLMS

1st Application (Participants / Locations)



RDECOM VDLMS

1st Application (Functional Breakdown)

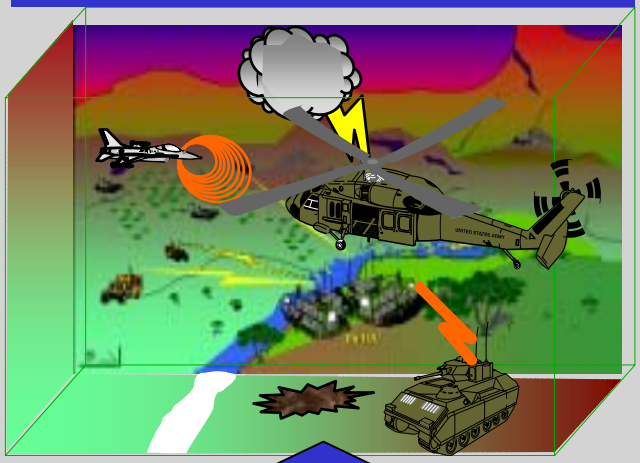


Distributed Infrastructure Development & Support
Distributed Data Collection

DTC Virtual Proving Ground (VPG) Synthetic Environment Integrated Testbed (SEIT) IOC 1

SE Core Areas	Mature Capabilities in IOC 1
Virtual Battlespace	STORM CBSNE / Dial-A-Sensor OneSAF Test Bed
Terrain	Standard Format & Interchange
Signatures	Scene Generator
Propagation	ORION
Human Effects	
Disturbance Env	
Weather	4DWX OASES
Stimulators	DIRSP

Synthetic Environment Integrated Test Bed (SEIT)



Deployability	Mobility
Lethality	Survivability
Sustainability	Interoperability
C4ISR	MANPRINT

FCS: Evaluation Focus Areas

Baseline capabilities for diistributed integration of VPG synthetic environments

RTTC DS&T Future Thrusts

- **Modeling Architecture for Technology Research Experimentation (MATREX) STO**
  - **Combination of VDLMS and JVB STO**
- **Synthetic Environments Integrated Testbed (SEIT) Events**
  - **IOC 2 and beyond**
- **ATEC Test Integration Network (ATIN)**
- **Distributed Operational Integrated Tools (DOIT) Events**

Preparing Distributed Simulation & Test capability to support Future Combat Systems (FCS) Development

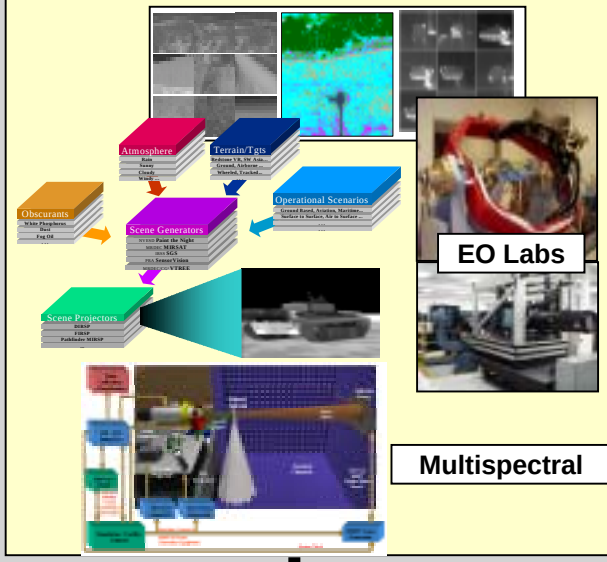
DS&T VISION

Linking All Areas For Distributed Test

Advanced Test Tools

Multi-Spectral Synthetic Environments

Laboratory Testing



Range Testing

Environmental Testing

Dynamic Simulation

Mechanical Simulation

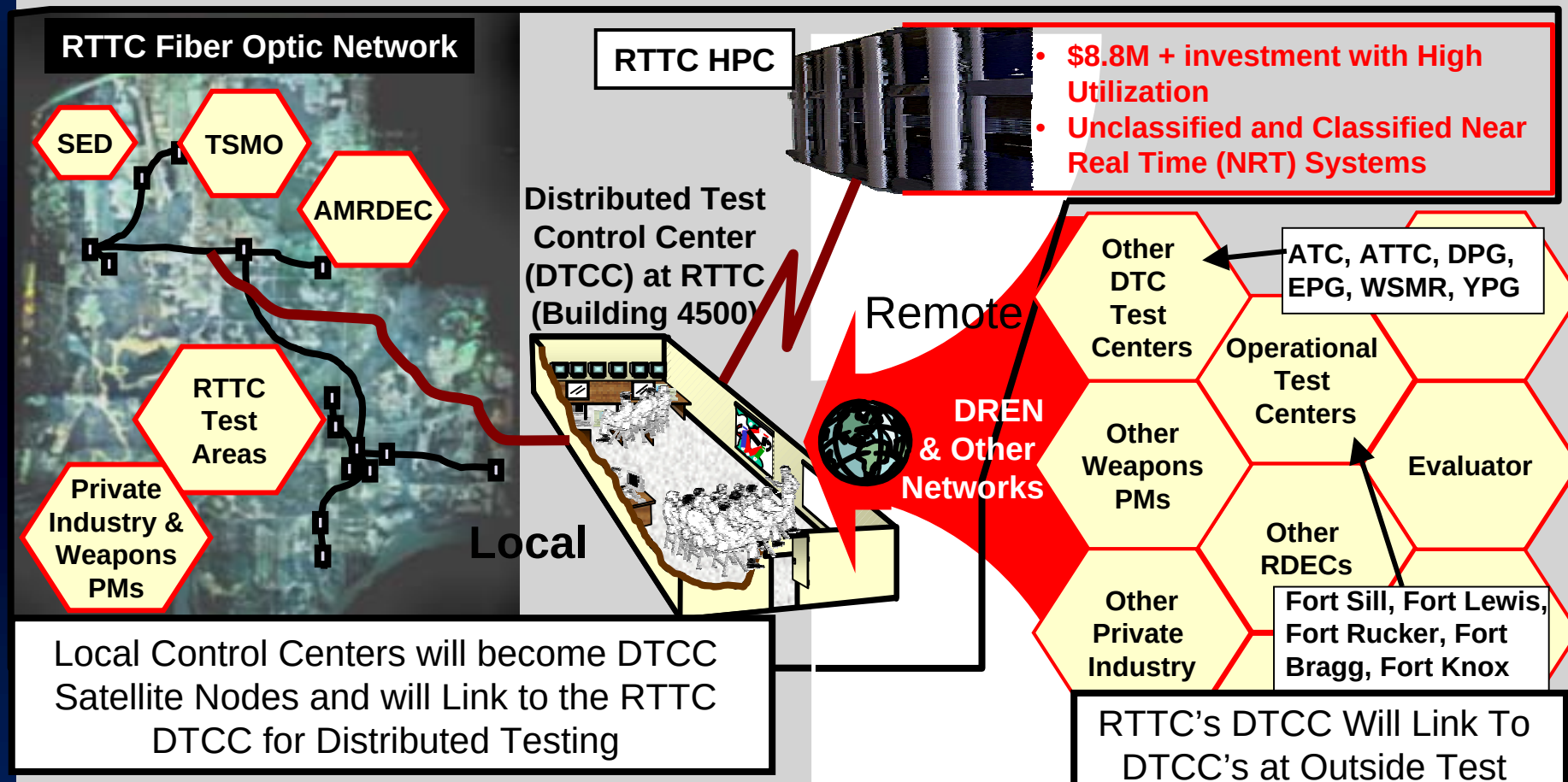
Range Architecture | Environmental Architecture | ILH

DREN

RTTC Distributed Test Control Center

Data Collection and Archive

RTTC
Distributed Test Control Center (DTCC)



- $8.8M + investment with High Utilization
- Unclassified and Classified Near Real Time (NRT) Systems

Local Control Centers will become DTCC Satellite Nodes and will Link to the RTTC DTCC for Distributed Testing

RTTC's DTCC Will Link To DTCC's at Outside Test Organizations

RTTC DTCC Currently Has Engineering Level Functionality and is in Use for Distributed Test Support

Range Operations Components for Integrated Testing (ROCIT)

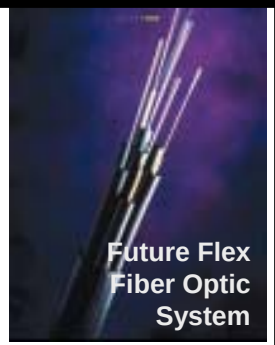
Modernizing RTTC Ranges Through ROCIT

- Implementing A Common Architecture
- Distributed Test Environment and Test
- Data and Visualization Tools for Test Planning, Set Up, Execution and Analysis
- Automated Reporting Tools
- Synthetic Environment Integration and Interoperability
- Seamless Interchange of Live and Virtual Elements
- Centralized Control
- Common Database Structure (ILH – VISION Compatible), Methodology and Recording System
- Real Time Data Distribution

The Cornerstones of ROCIT Development

Complete "Re-Engineering" of The Test Processes

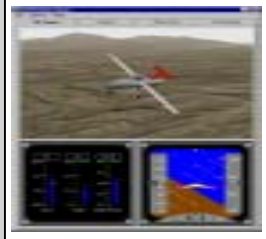
Infrastructure



Establishment And Implementation of a Common Architecture

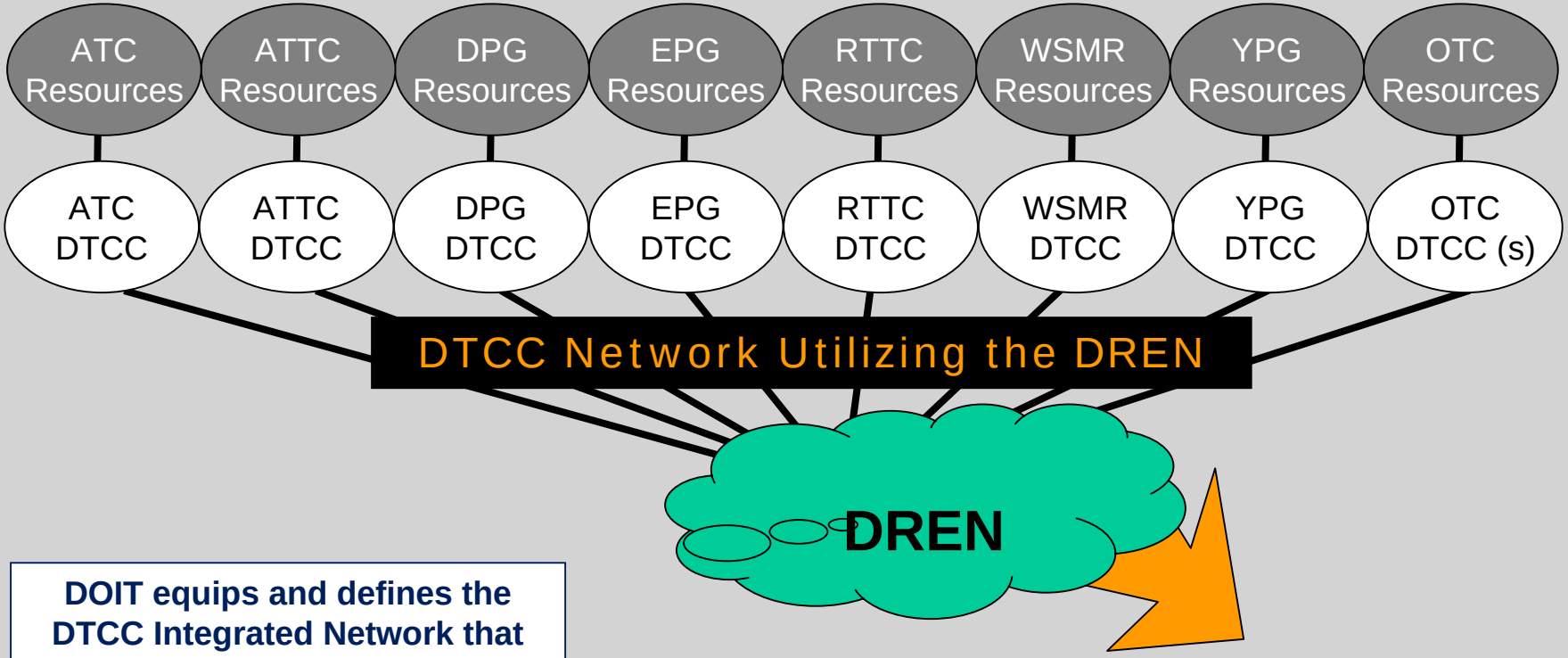
Microsoft

Acquisition and Development of Test Planning Execution and Analysis Tools



The collection of tools, connected through a common architecture and state of the art infrastructure that improves the flight test process in all phases of test.

DOIT Concept



DOIT equips and defines the DTCC Integrated Network that Joins Together Each Test Center for the Purpose of Creating a Distributed Test Environment

DREN Links Other Organizations

DOIT will Establish & Develop A Distributed Test Capability at Each Test Center that Provides for Test Execution, Procedures, Tools, and Functionality to Support System of System Testing (FCS)