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JOINT DISTRIBUTIVE VIRTUAL COMBAT RANGE

Mark R. Kroona TSM JSTARS / PM DCGS-A

LTC Donald J. Fontenot JSTARS TEST FORCE

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Joint Distributive Virtual Combat Range

- Purpose of JD VCR
- Background
- Components of JD VCR
- Virtual Flag Joint Exercises
- Schedule
- Lessons Learned
- Value Added



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Purpose of Joint Distributive Virtual Combat Range

- To provide realistic and recurring training opportunities at homestation for Common Ground Station (CGS) operators and the staffs they support using modeling & simulation.
- To enable the Warfighter to develop, refine and practice TTPs for the CGS and the targeting process.

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Background

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Background

CGS/JD VCR significant events

- **Apr 98** **CGS IOTE** (training deficiencies noted)
- **Mar 00** **CGS LUT** (improvement in training noted, however sustainment training still an issue)
- **Jul 00** **MS III**
- **Aug 00** **ATEC SER/DOTE OTER** (T&E identify need for sustainment training using M&S)
- **Sep 00** **PM initiates M&S concept for sustainment training**
- **Dec 00** **CGS M&S IPT discovers TACCSF**
- **Apr 01** **1st demo of JD VCR concept at TACCSF**
- **Sep 01** **Demo canceled due to 9/11**
- **May 02** **2nd demo of JD VCR** (using GuardNet)
- **Nov 02** **3rd demo of JD VCR** (using Warfighters; ** concept moves from ppt to substance)
- **Jan 03** **4th demo of JD VCR** (using AFATDS/FireSIM)



Background

- **CGS Test & Evaluation identified need for Distributed Mission Operations to support sustainment training using Modeling & Simulation.**
 - **“The CGS has shown improvement in areas, including reliability and operator proficiency, since IOTE.....The performance with respect to baseline taskings demonstrate that improvements are still required in staff, team chief, and sustainment training, and that a viable simulation is needed to support training”** (*ATEC System Evaluation Report, Aug 2000*)
 - **“The key to fully exploiting the capabilities of the CGS and the sensor data it receives is adequate training of the CGS operators, non-commissioned officers, crew training, and staff leadership....However, the operators and their leadership were less proficient in the integration of the CGS into the tactical operations and therefore, the units were not realizing the full capability and potential of the CGS.....A viable and constructive simulation is needed to support and sustain training for operators and staff in addition to robust training events with an E-8C.”** (*DOE Operational Test and Evaluation Report, Aug 2000*)



Background

Factors leading to difficulties in CGS sustainment training

- **E8 is a High Value Asset with Limited Availability and training capabilities.**
- **CGSs are geographically dispersed CONUS/OCONUS**
- **Major exercises occur every 12-18 months**
- **Infrequent staff/function integration training -- Coordination of frequent realistic training events between multiple systems/functions (i.e. CGS, ASAS, AFATDS, UAV, etc)**
- **Reserve Component training cycle -- (1 weekend a mo; 2 weeks a yr)**

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JD VCR Components

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JD VCR Components



The Joint Hub – TACCSF (Provides Virtual Combat Range)



The Outstations (Fielded Common Ground Stations (CGS) at home station)

— — · The Network (Connects Hub to Outstations – GUARDNET XXI)



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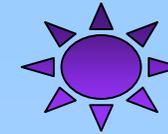
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JD VCR The Joint Hub



Theater Aerospace Command & Control Facility (TACCSF)



KIRTLAND AFB, NEW MEXICO

WHY THE TACCSF?

- Cost-Effective and Available NOW!!!!
- Half Billion Dollar, State-of-the-Art Infrastructure
- Seeking Ground Force Participation
- Supports Joint Training, Testing and Mission Rehearsals
- Plenty of Room for Expansion
- Integrate C2ISR and the shooter in Distributed Operations

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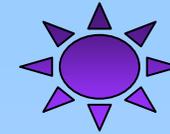
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JD VCR The Joint Hub



TACCSF Present Capabilities

Virtual Combat Range

- Scenario Driver (JCATS)
- All air and ground environment generation
- Voice Comms (ASTi and ModIOS)
- Simulations and Federates
 - MTI/SAR/FTI (VSTARS manned by 93rd ACW)
 - UAV (AFSERS)
 - MCE (Manned by active Guard Units)
 - PATRIOT (Manned by 111th ADAB, NMANG)
 - EADTB (Scud Missile Sim)
 - F-15C (x4) (Offutt AFB)
 - AF Info Warfare Center (Red IADS)
 - Space System Simulator

Management

- Hosts quarterly Joint exercises (Virtual Flag)
 - Exercise C2 by real CAOC at Nellis AFB
- Creates Virtual Combat Range
- Builds realistic training scenarios
- Facilitates AARs
- Manages Training Schedule
- Provides White Cell (augmented)

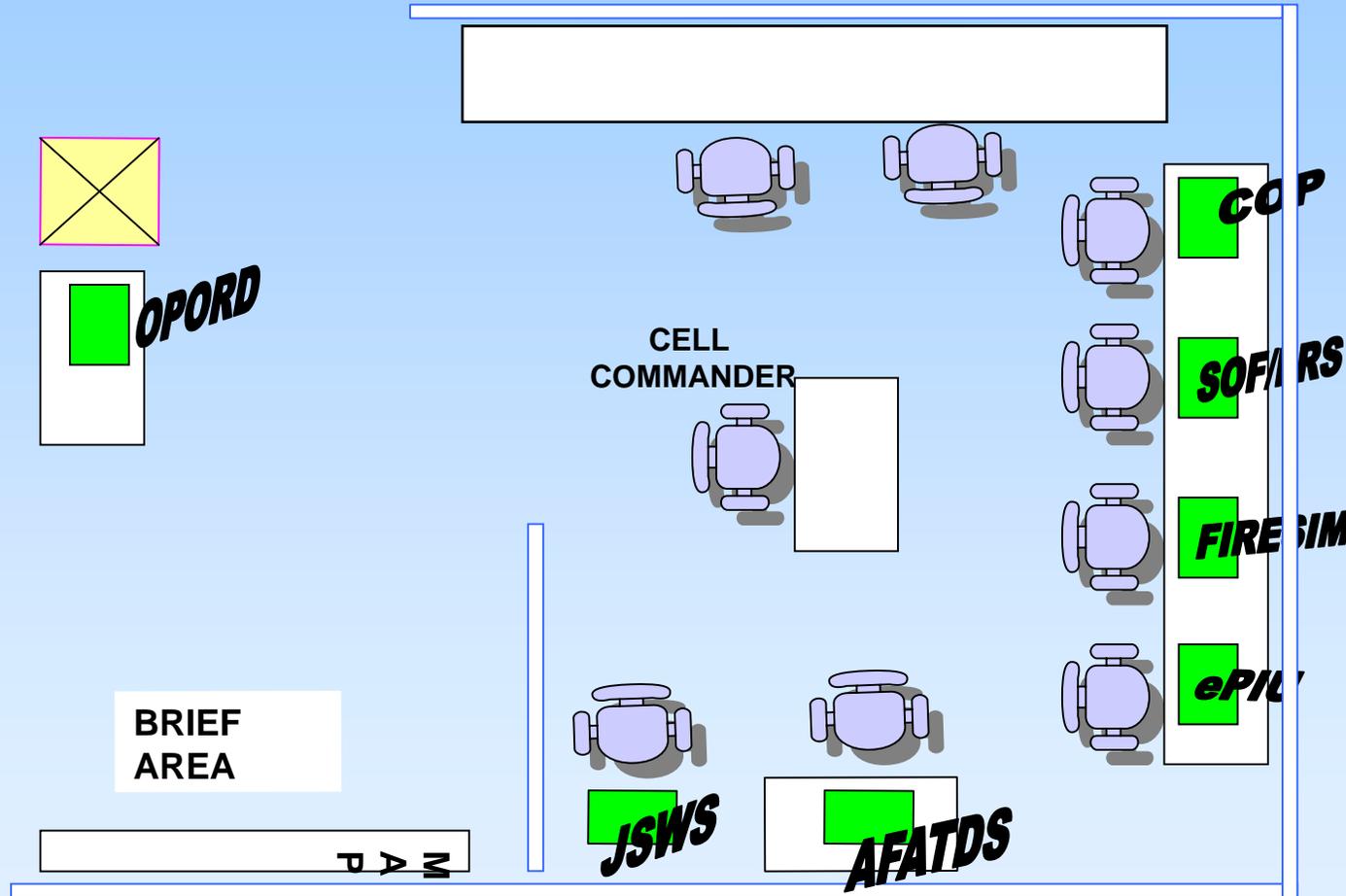
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TACCSF Army Cell Kirtland AF Base





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JDVCR

The Network

- Provide a means of connectivity between the HUB (Scenario Generation Center) and CGS Out-Stations
- Goal to reduce cost of connectivity over commercial T-1
- Attempt to leverage an existing infrastructure if possible

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JD VCR The Network

GUARDNET XXI

- **State-of-the-art national training program for Distributed Learning that connects classroom facilities in all 50 states and 4 US territories.**
- **Classrooms located near most CGS equipped units.**
- **T1/ DS3 Circuit Infrastructure**
- **Delivers integrated voice, video, data**
- **Shared Usage Concept**

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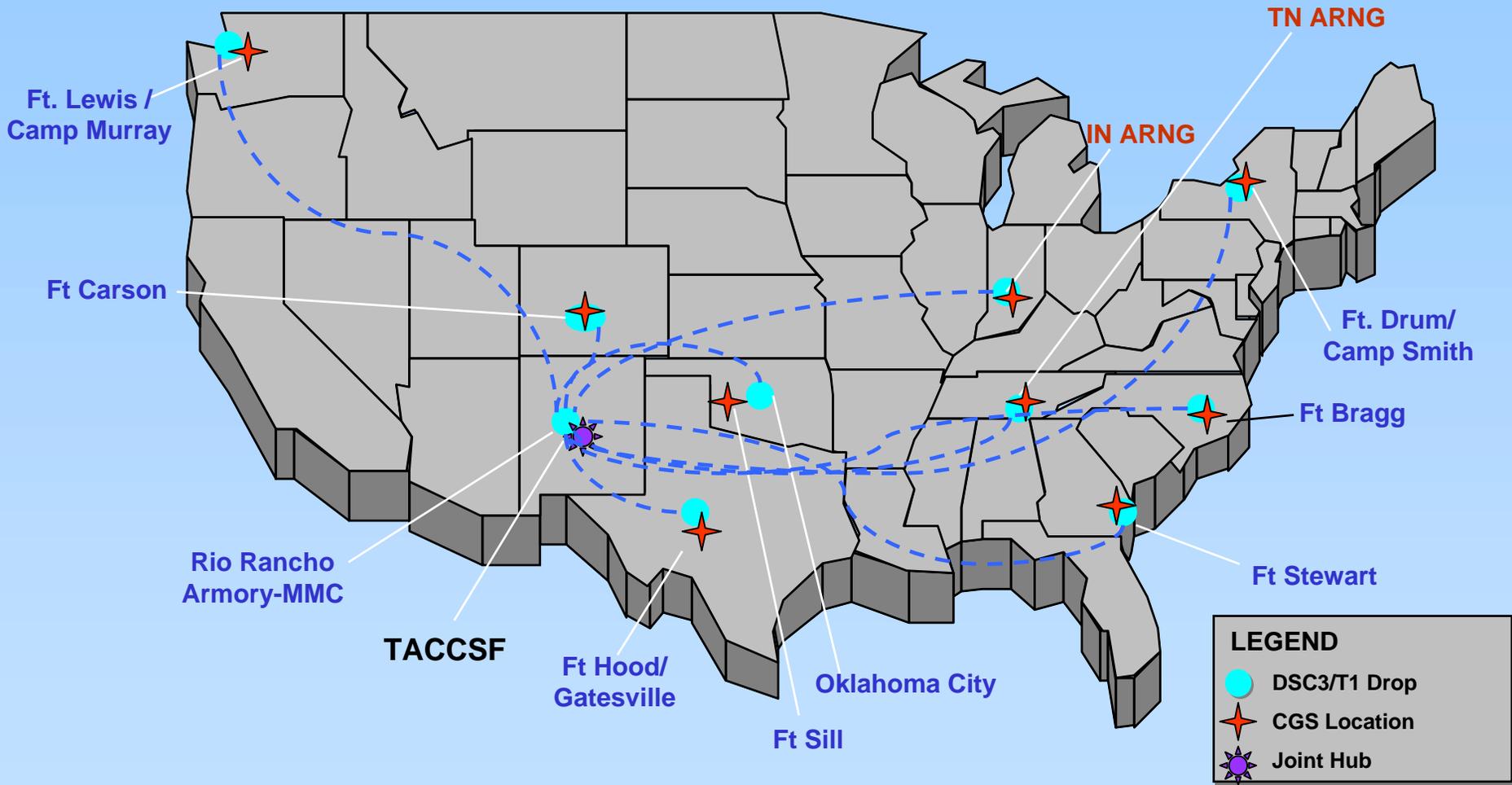


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JD VCR - The Network

GUARDNET DS3 Circuit/ T1 Line Co-Locations



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The Out-Stations CGS and System Configurations

- **Basic Out-Station Configuration (EOC and below)**

- Common Ground Station (CGS) or Joint Services Work Station (JSWS)
- Digital Voice provided by ASTI radio or ModIOS voice



- **Intermediate Out-Station Configuration**

- MUSE UAV System



- **Full Out-Station Configuration (TOC or Division)**

- AFATDS
- ASAS



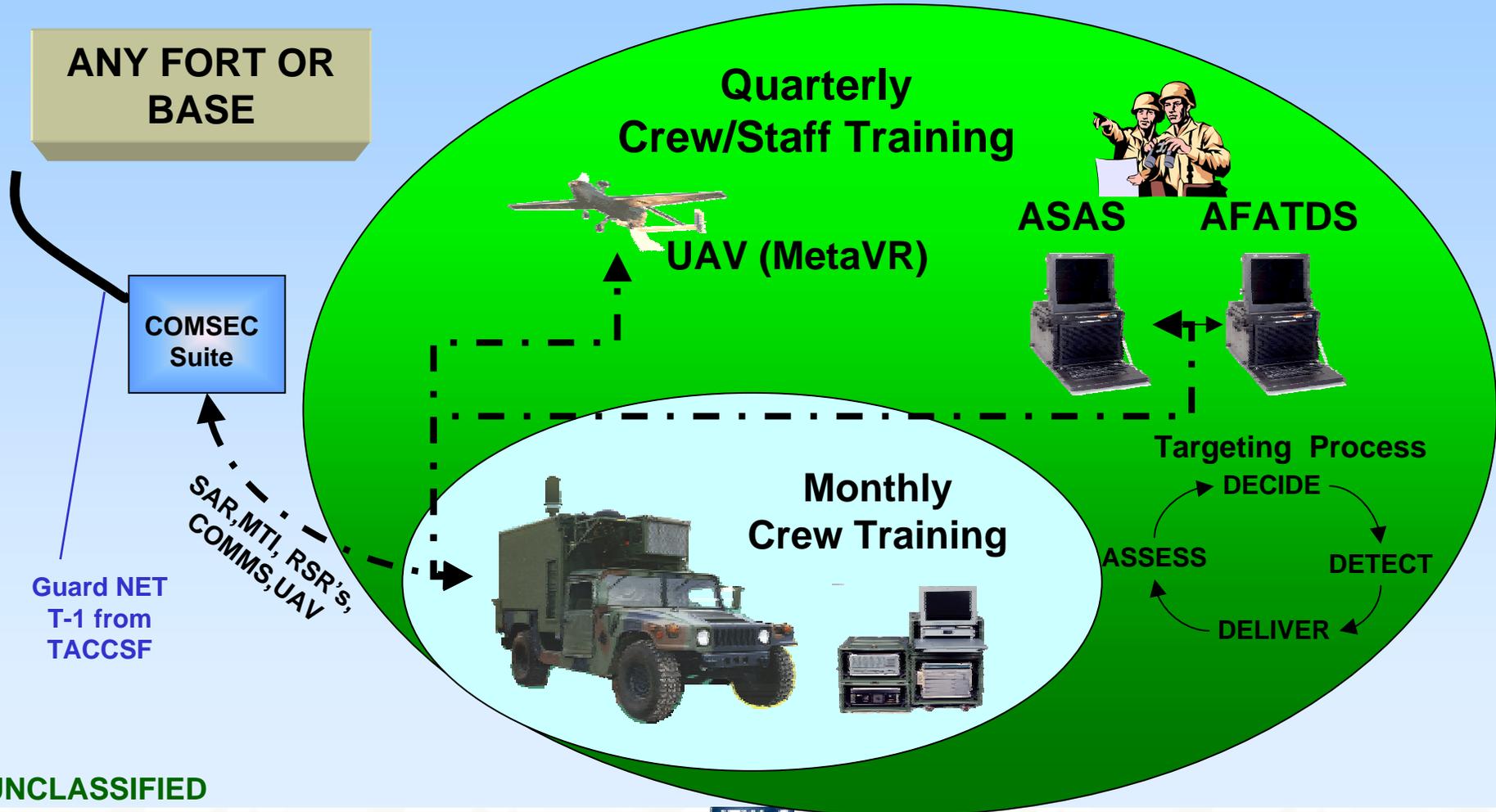
*Scalable Configuration Enabling
Simulation of Multiple Echelons*



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JD VCR The Outstation



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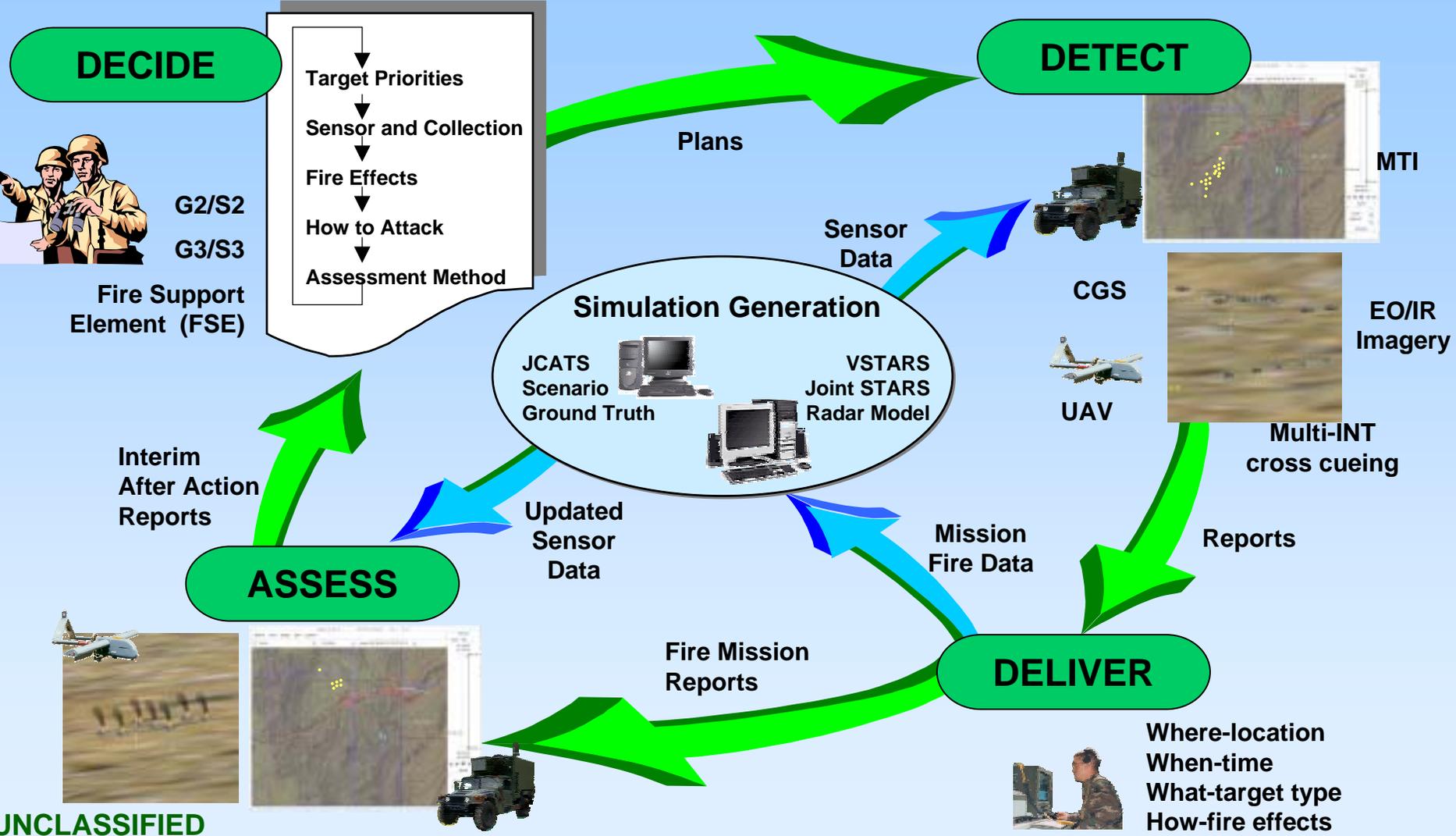
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JDVCR Simulation Operational Target Training



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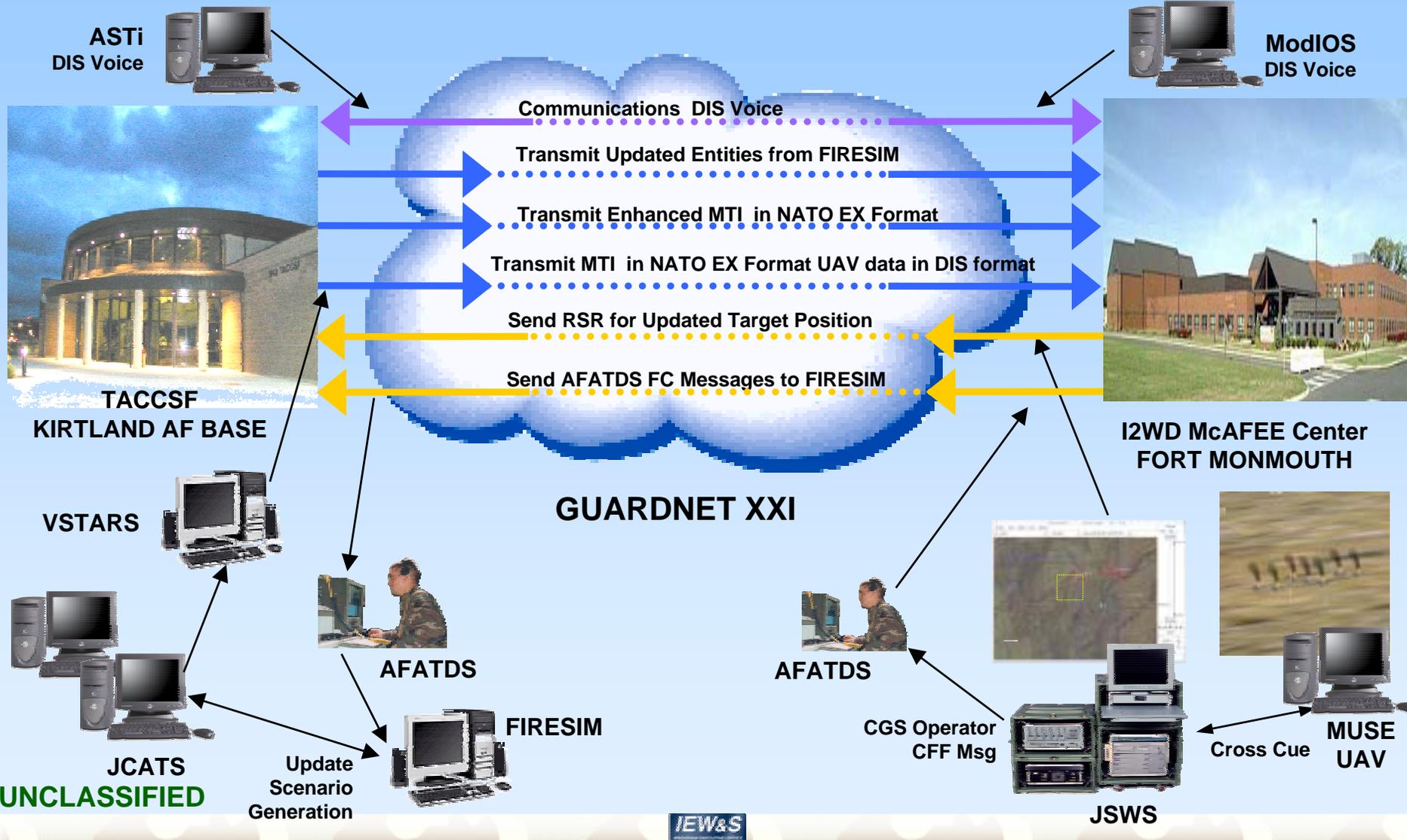
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Hub – Outstation Process Interaction



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Virtual Flag Joint Exercises

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Virtual Flag Exercises

- **Joint Distributed Mission Operation (DMO) exercise that integrates C2ISR and the shooter**
- **Conducted Quarterly**
- **Length of exercise is generally 4 days**
- **Each day consists of 1 x 3 hour “fights”**
- **Each session followed by an AAR**
- **Participants include Air Force and Army crews and staffs i.e JSTARS, Patriot, CGS, AWACS, F-15E, CAOC w/BCD, etc.,**

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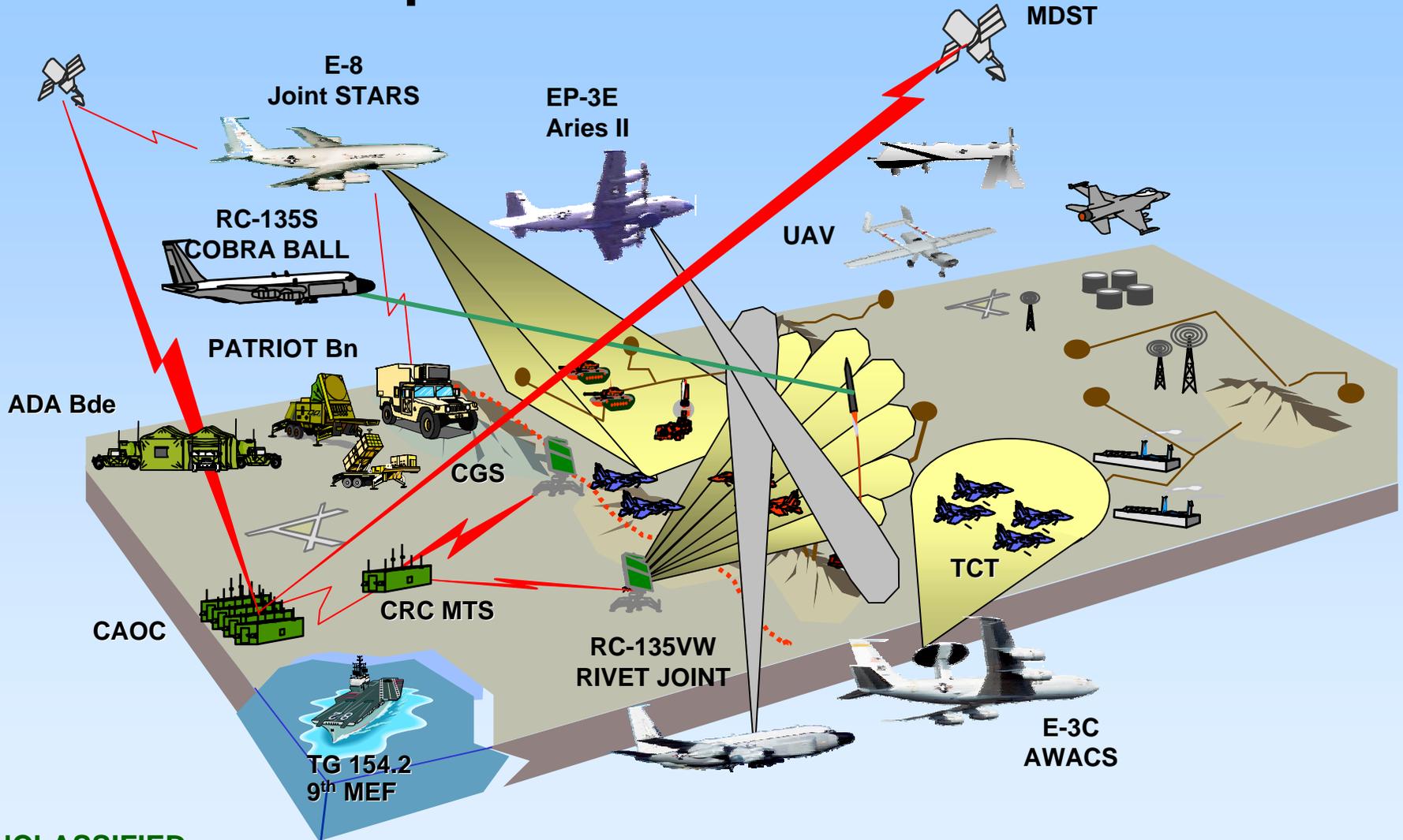
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Typical Virtual Flag Exercise Operational Architecture



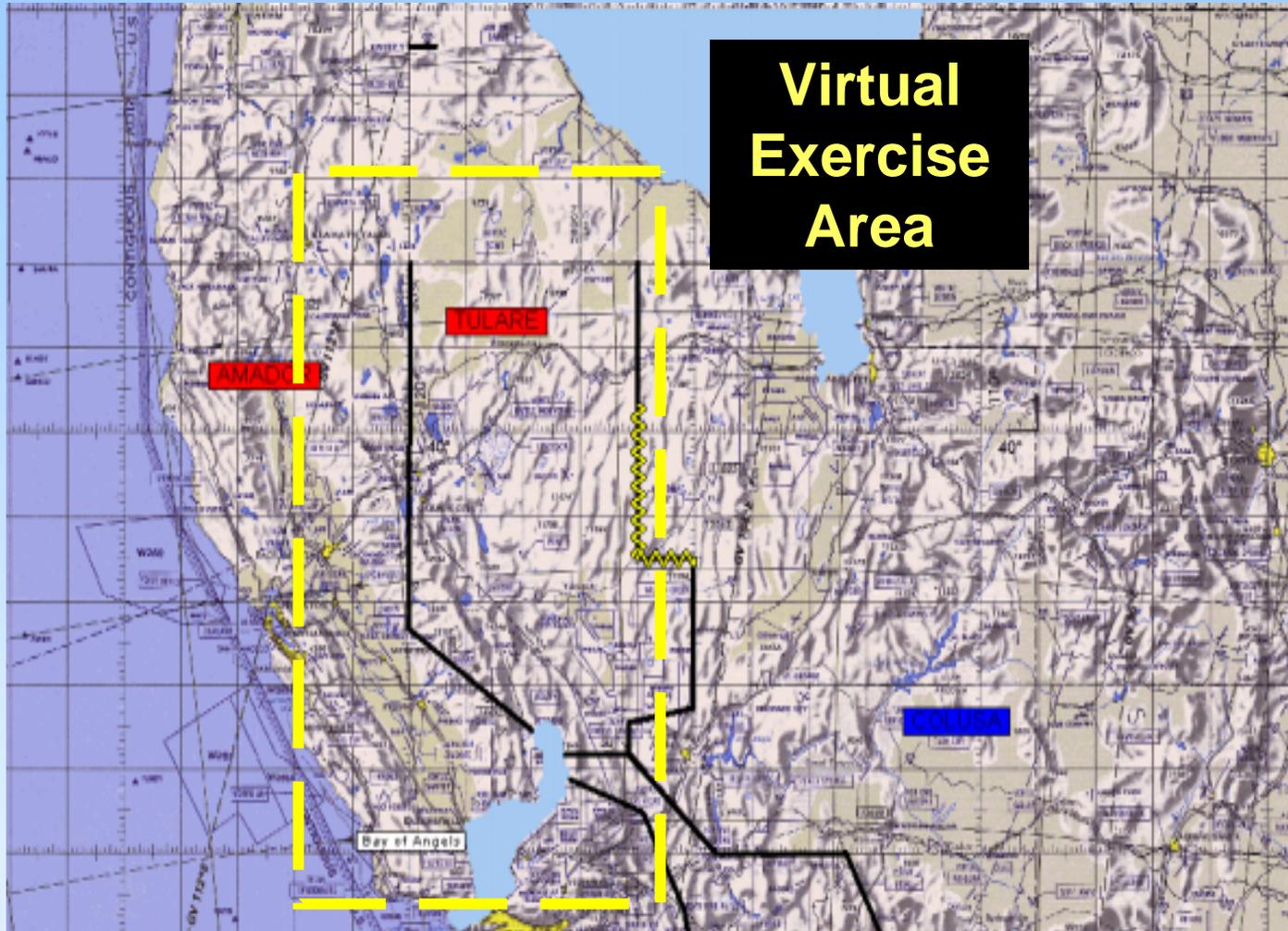
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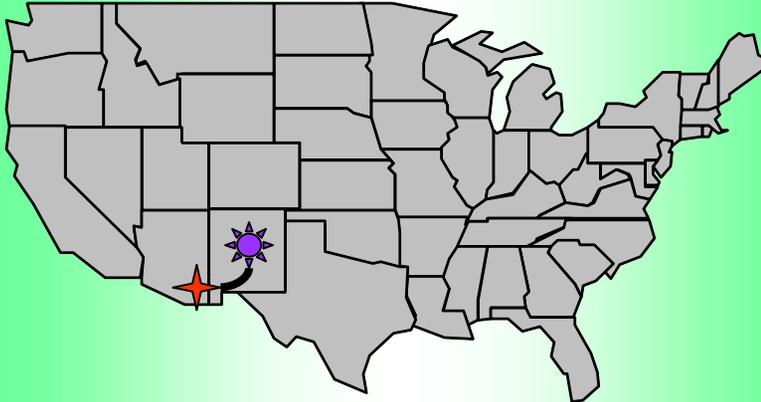
Virtual Flag Gaming Area





What has been done

Desert Pivot 01-3 April 2001



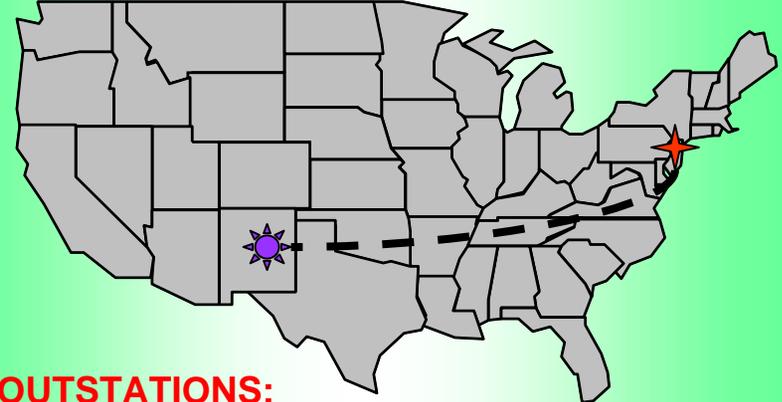
OUTSTATIONS: 5 x CGS at Ft Huachuca

NETWORK: Leased T1

CAPABILITIES:

- Sent RSRs
- Received MTI and FTI
- Received UAV video and telemetry EO/IR
- UAV controlled from TACCSF
- Voice Comms

Desert Pivot 02-1 May 2002



OUTSTATIONS:

- 1 x JSWS at Ft Monmouth

NETWORK:

- GUARDNET

CAPABILITIES:

- Send RSRs
- Receive MTI/FTI & SAR
- Receive UAV video and telemetry EO/IR
- UAV controlled from outstation
- Voice Comms
- AFATDS (CFF)





What has been done continued

Desert Pivot 03-1
November 2002

“Better training than we currently receive at homestation”
- 96H, 1 SBCT-



OUTSTATIONS:

- 1 x JSWS at Ft Monmouth (III Corps ARTY)
- 2 x CGSs at Ft Huachuca (1 SBCT, 312th MI BN)

NETWORK:

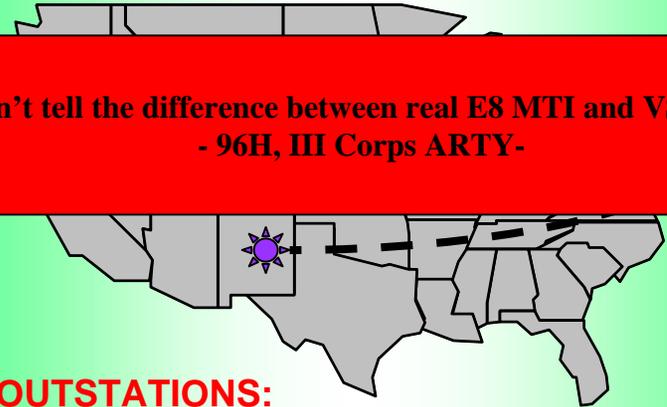
- GUARDNET

CAPABILITIES:

- Multiple CGSs/Multiple locations
- Send RSRs
- Receive MTI/FTI & SAR
- Receive UAV video and telemetry EO/IR
- UAV controlled from outstation
- Voice Comms
- AFATDS (CFF)

Desert Pivot 03-2
January 2003

“Can’t tell the difference between real E8 MTI and VSTARS”
- 96H, III Corps ARTY-



OUTSTATIONS:

- 1 x JSWS at Ft Monmouth (III Corps ARTY)

NETWORK:

- GUARDNET

CAPABILITIES:

- Send RSRs
- Receive MTI/FTI & SAR
- Receive UAV video and telemetry EO/IR
- UAV controlled from outstation
- Voice Comms
- AFATDS (CFF)
- FireSIM





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Schedule

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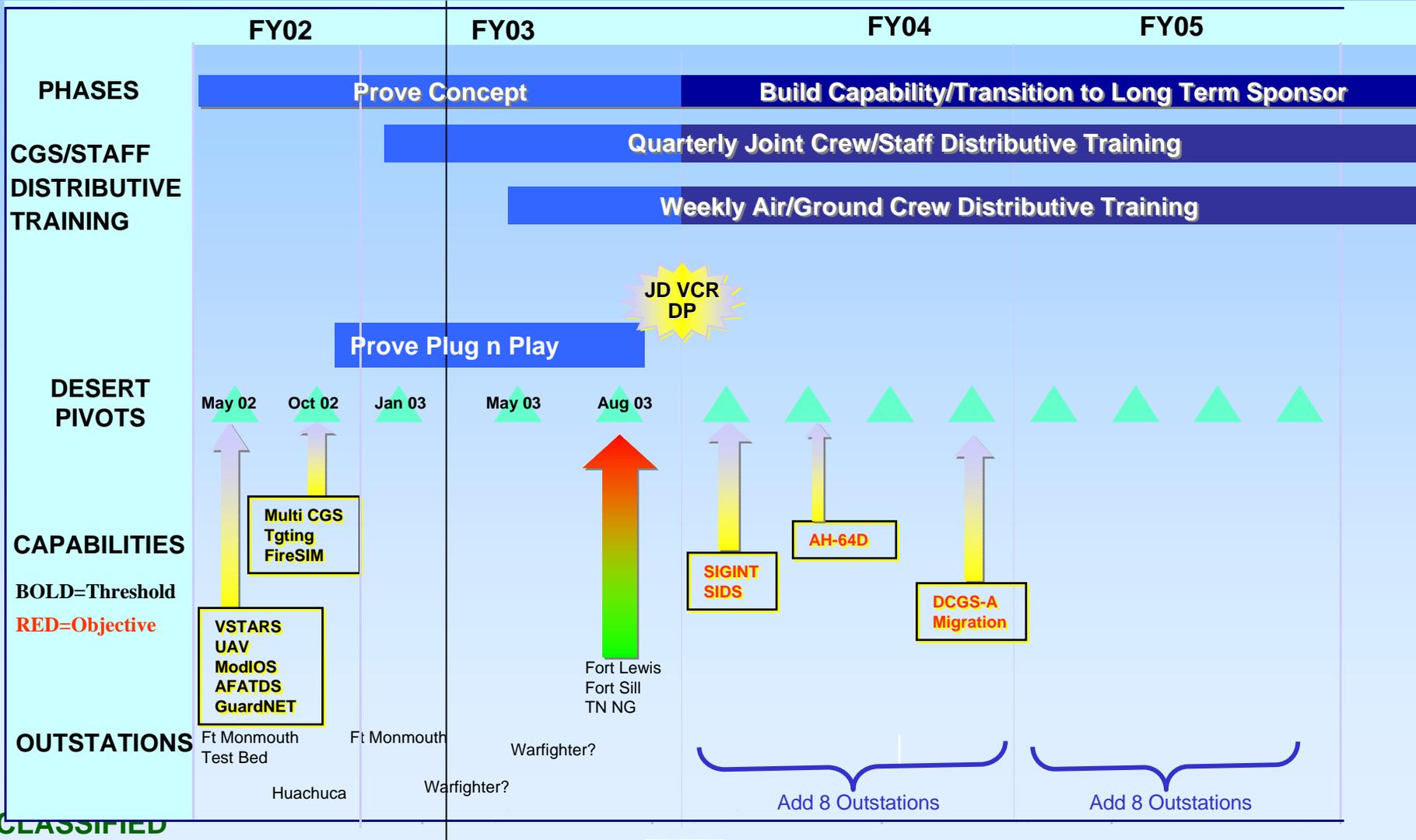


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JD VCR Schedule

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Lessons Learned

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Lessons Learned

- **Significant challenge using Asynchronous Transfer Mode (ATM) network vs. Point to Point (Peer to Peer) T-1 lines**
 - Quality of Service Issue using ATM network – went to Constant Bit Rate mode
 - Crypto issues with ATM broadcast and multipoint modes
 - Some operational system (ie AFATDS) LAN interfaces are IP not broadcast based
- **Synchronization of clock time required between simulations and operational systems**
 - Operational systems work on fixed ZULU time, simulation time set to anything
 - This impacts operational system databases incorrectly indexing timed events
- **Coordination through Fire Control Systems provides a more accurate depiction of timelines**
 - No instant gratification for operators in not seeing instantaneous BDA – not a video game
 - Timeline of fire missions vary as to munitions selected, denial of mission, etc.
 - Time required to re-task UAV to perform BDA mission
- **Level of realism anticipated was supported by operator comments**
 - “Better training than receive at homestation” – 96H, 1st SBCT
 - “Can’t tell the difference between real E8 MTI and VSTARS” - 96H, III Corps ARTY
- **Army C2 operational manning at TACCSF must mirror a Tactical Operations Center**

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Value Added

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Value Added

- **Potential Training Benefits**
 - Development/training/refinement of TTPs more frequently to better maintain proficiency
 - Multi-Echelon training (BDE-DIV-CORPS)
 - Multi-BOS training (Intelligence, Fire Support)
 - Multi-MOS training (CGS, AFATDS, ASAS, UAV)
 - Joint Training
- **Potential to support DCGS-A development**
 - Same factors that inhibit CGS sustainment training will inevitably effect DCGS-A sustainment training.
 - Experience gained and lessons learned in developing JD VCR will assist development of DCGS-A sustainment training.
 - CONOP development/evaluation for DCGS-A and proposed CGS enhancements.



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QUESTIONS

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Lessons Learned

- **Significant challenge using Asynchronous Transfer Mode (ATM) network vs. Point to Point T-1 lines**
- **Synchronization of clock time required between simulations and operational systems**
- **Coordination through Fire Control Systems provides a more accurate depiction of timelines**
- **Level of realism anticipated was supported by operator comments**
- **Army C2 operational manning at TACCSF must mirror a Tactical Operations Center**