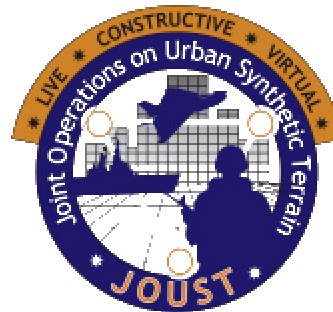




# Joint Operations on Urban Synthetic Terrain (JOUST)

## Project Overview



*The Joint Urban Training and Testing Solution*

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# The Challenge



- The U.S. has proven its combat superiority on open terrain.
- How will adversaries counter U.S. combat superiority?
  - Shift the balance of power by moving the confrontation to the urban environment.
    - They have no qualms about non combatants – we do
    - They have the advantage of knowing environment – we don't

**The enemy's mission:** To achieve military and/or political victory over the U.S. by shifting the battlefield to urban environments.

**Our challenge:** Provide training to maintain our combat superiority during urban operation missions.





# The Solution--JOUST



- Develop a comprehensive Joint Urban Operations training and testing capability
- Integrate live, virtual, and constructive simulations
- In a distributed synthetic range concept
- Reusing previous software and simulation investments

## JOUST solves:

- Limited training and testing facilities
- Lack of Joint tactics, techniques, and procedures (TTPs)
- Lack of interoperability, situation awareness, and training data
- Lack of data collection methods to validate urban models and simulations





# What is JOUST?



- Provides value-added training for Joint and Service warfighters by
  - Dynamically adjusting the operational scenario via tactical command and control
  - Adding complexity to the event through randomness
  - Using live, virtual, and constructive (L,V,C) simulations
  - Separating simulation logic from integration logic
  - Reusing software and simulations, even if they don't have compatible protocols
- Enables the warfighter to
  - Conduct urban training and testing at the home station or on range to avoid additional deployments
  - Conduct training and testing on complex terrain
  - Conduct more complex operations on small facilities
  - In a safe training environment





# JOUST Team



JOUST is a project sponsored by

Joint Forces Command (JFCOM)

Dismounted Battlespace Battle Lab (DBBL)

Office of Naval Research (ONR)

Distributed Mission Operations Center (DMOC)





# Team Roles



- Defense Modeling and Simulation Office (DMSO)
  - JOUST Program Management
  - Lead Technology Integrator - integration responsibilities, in coordination with DMSO, for integrating technologies, prototype design, and demonstrating JOUST concepts
    - System Integration
    - JOUST Framework and Applications Development
- Office of Naval Research (ONR)
  - Naval Gun Fire Support Simulator for JUO
    - Live: NSWC, Dahlgren, VA
- USAF Distributed Mission Operations Center (DMOC)
  - Close Air Support Simulator for JUO
  - Integration into Virtual Flag 04-2 Exercise





# Team Roles (cont'd)

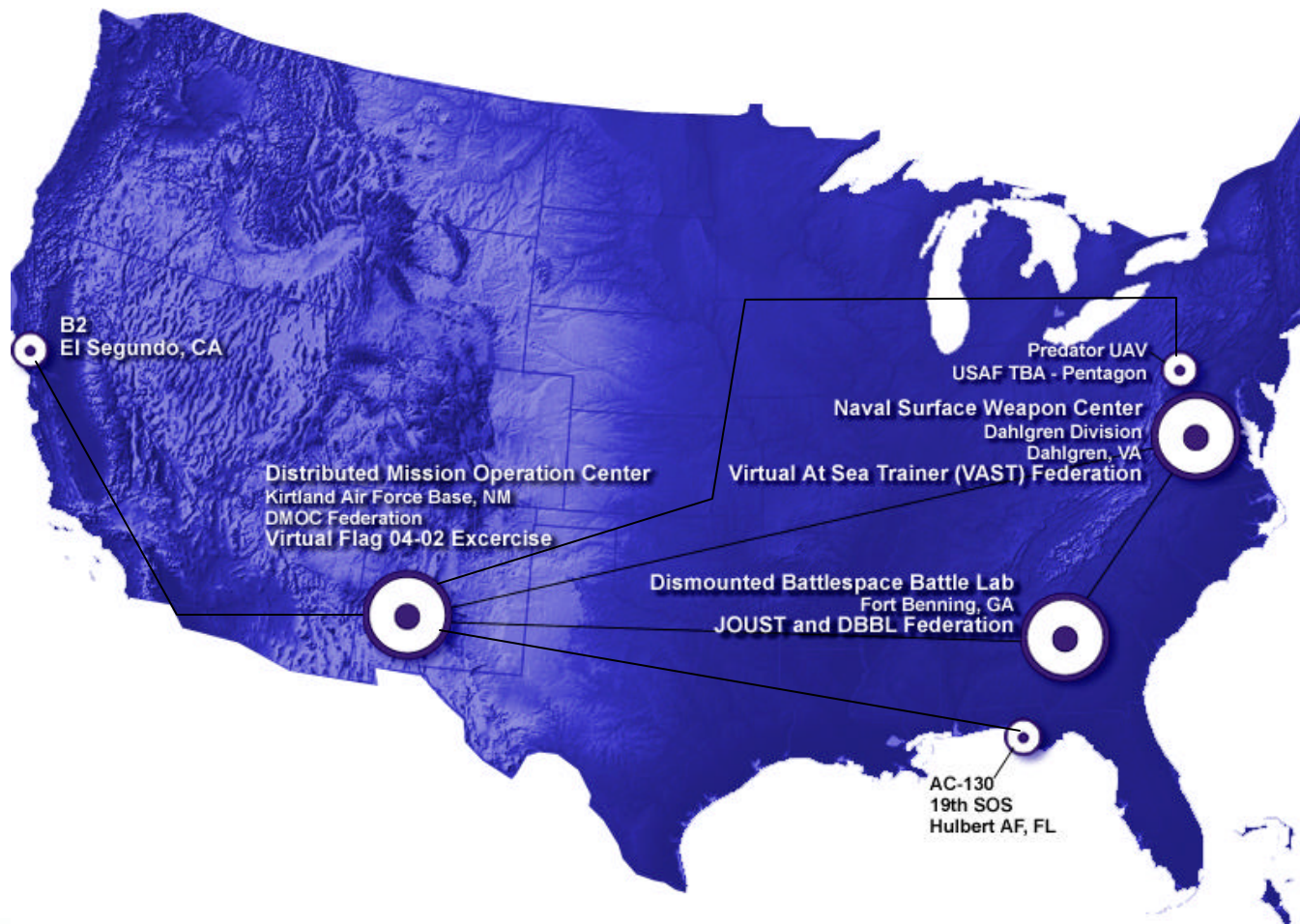


- USA Dismounted Battlespace Battle Lab (DBBL)
  - McKenna MOUT site (South half): Live platoon + live company commander
  - McKenna MOUT site (North half): SSE Squad + synthetic company (-)
  - Live Battalion HQ (minimal staff)
- Other role players
  - JTF Staff
  - Fire Coordination: SEAL, ANGLICO, FSCoord, TACP





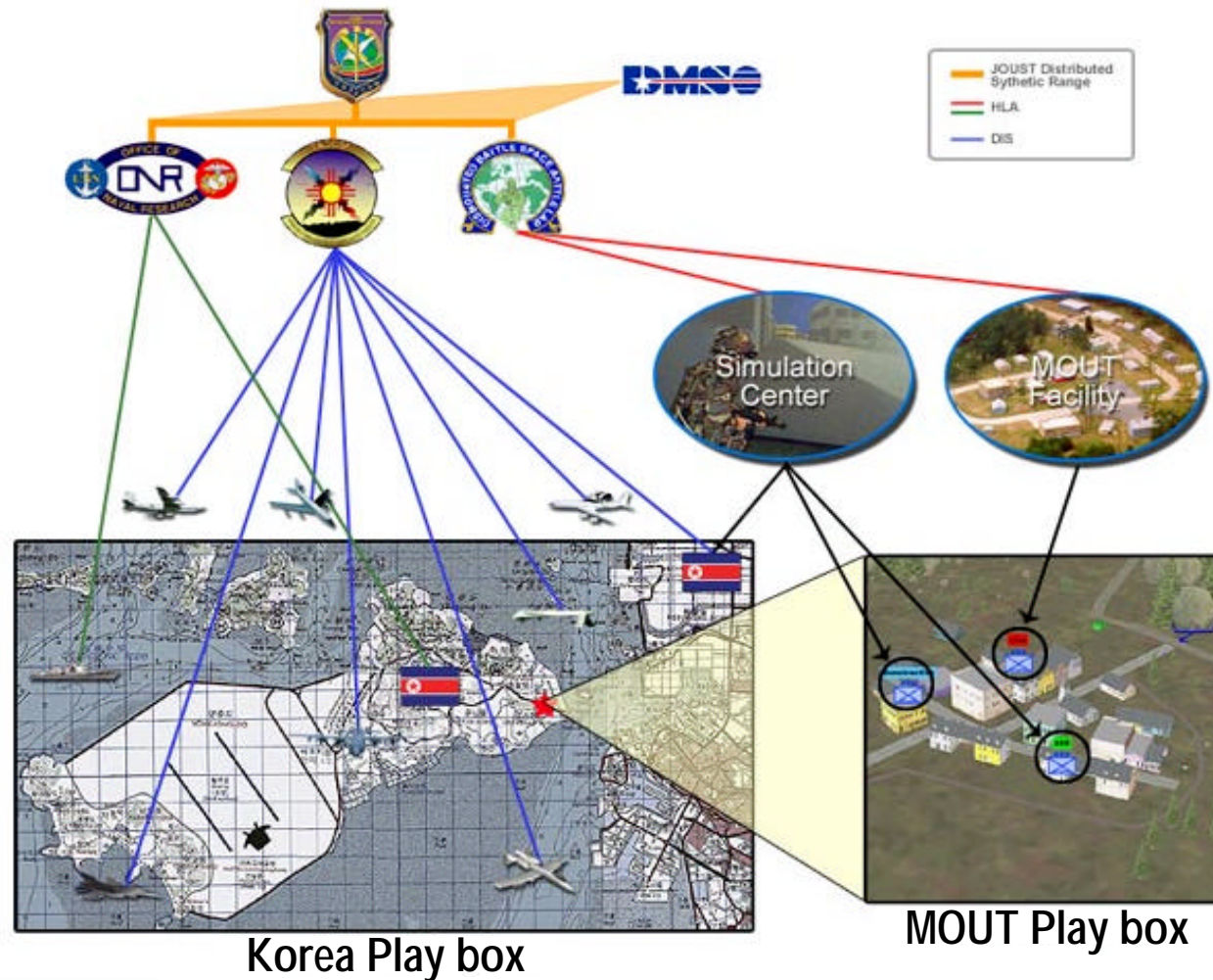
# Simulation Sites





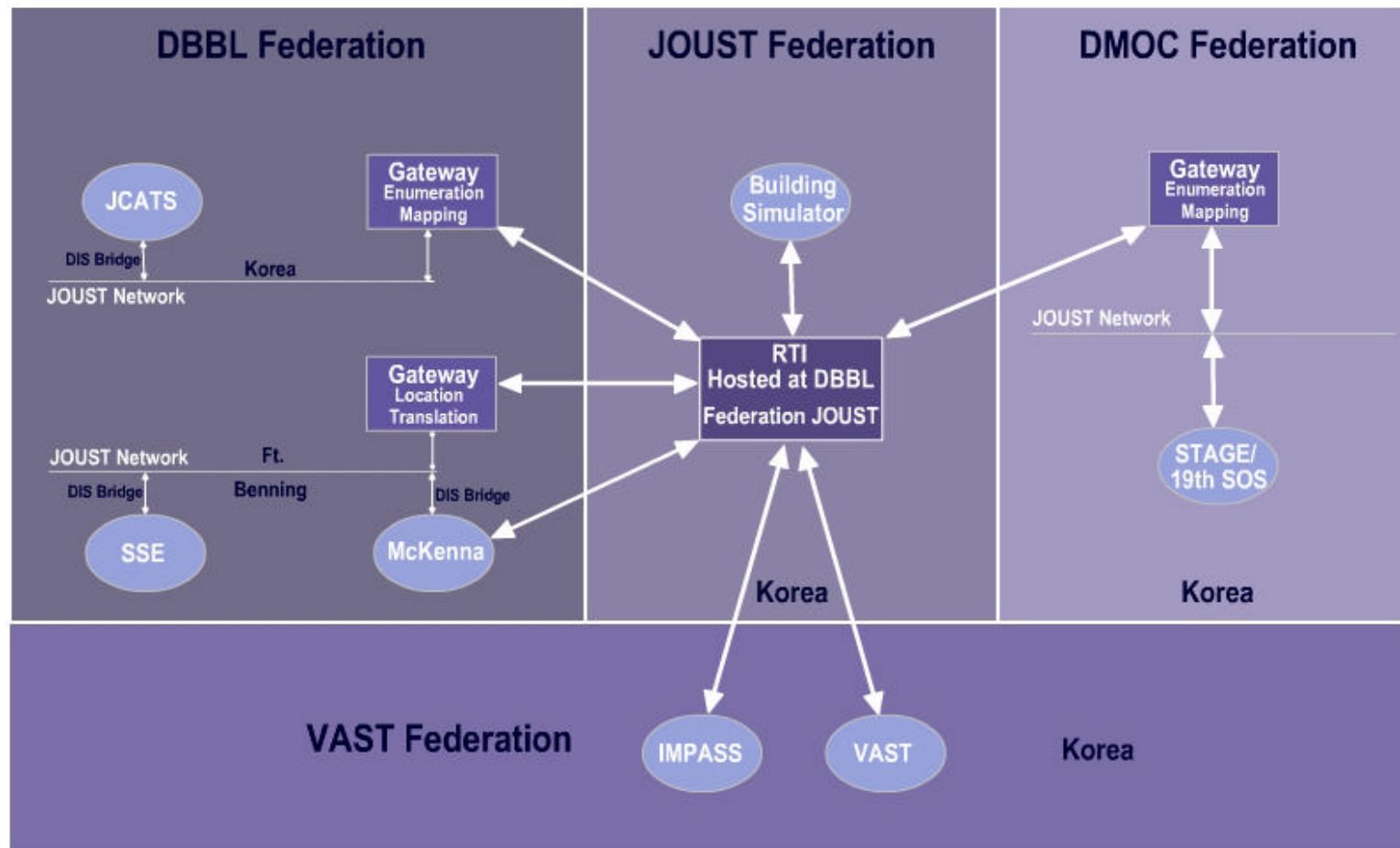


# JOUST Operational Arch



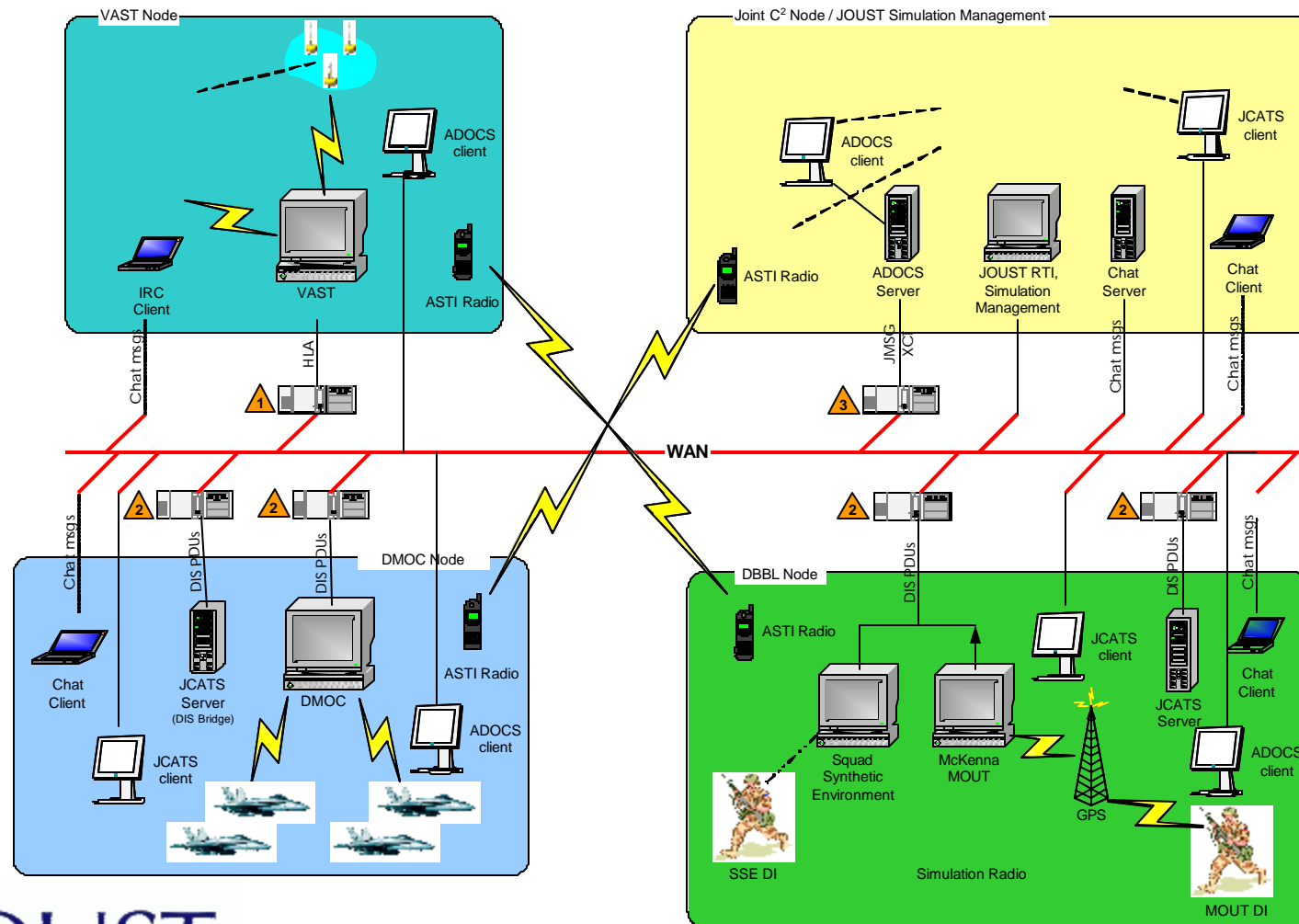


# Simulation Architecture





# Systems Description





# JOUST Challenges



- Live, Virtual, and Constructive integration
  - Different terrain locations (real terrain at Benning, synthetic terrain on island off Inchon)
  - Integration of weather and time effects
  - Minimize interference on players
- Enumeration Mapping: protocols, gateways, DIS/HLA
- Building Simulator
  - Initially for clutter, now handles interactions
- Limitations of legacy systems and existing gateways
- Classified network linking all players
  - Different classifications at different facilities
  - Arranging policies, protocols





# Who Sees What



- Constructive simulations see live, virtual, and constructive players
- Virtual players (Simulators, SSE) see live and constructive players
- Live players see only live, but receive situation awareness via messages and simulated events
  - Live players are instrumented only for transmission of their state to the simulations/simulators
  - Live players are not instrumented to see virtual or constructive entities





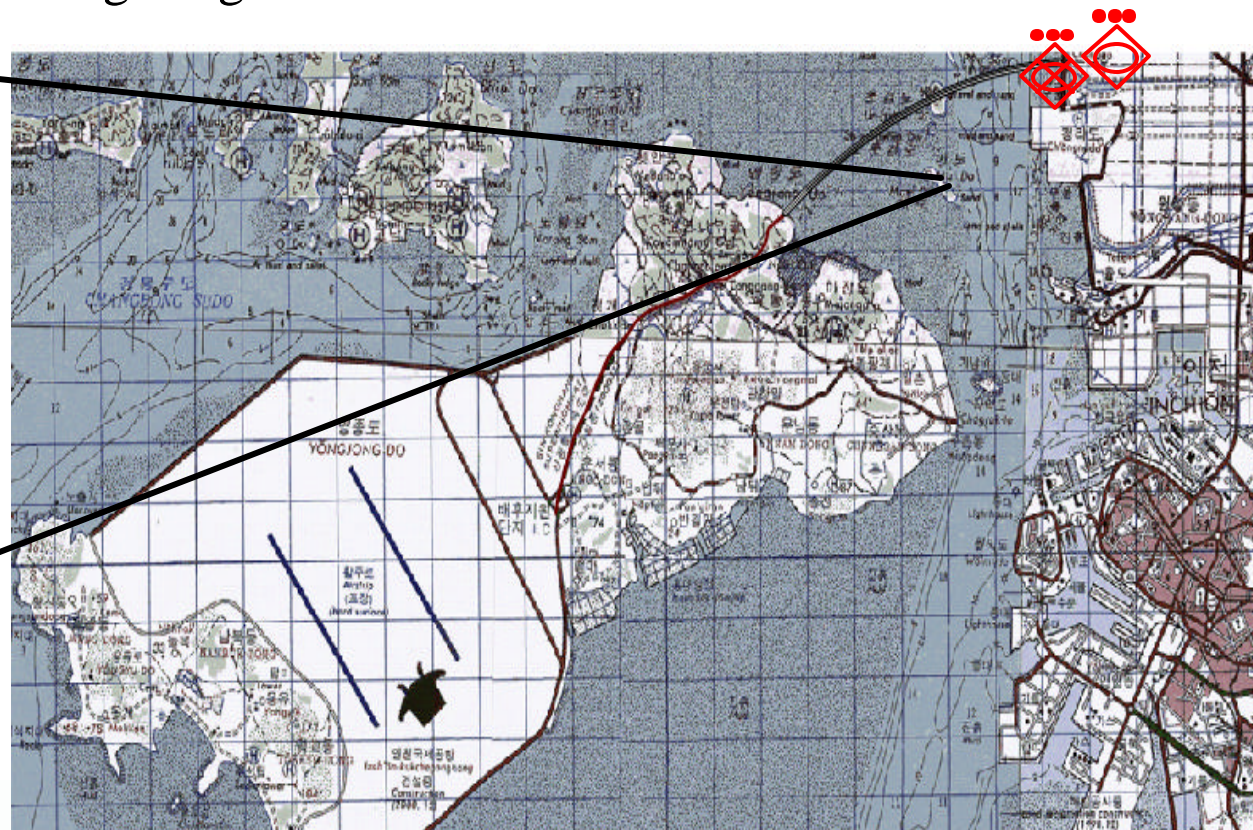


# Example of Joint Mission



## EVENT: Engagement of Enemy Counterattack Force

- Enemy counterattack force begins crossing bridge (JTF No Fire Area -- NFA)
- Seal team spots enemy force and reports to SOF LNO
- SOF LNO reports sighting to JFECC



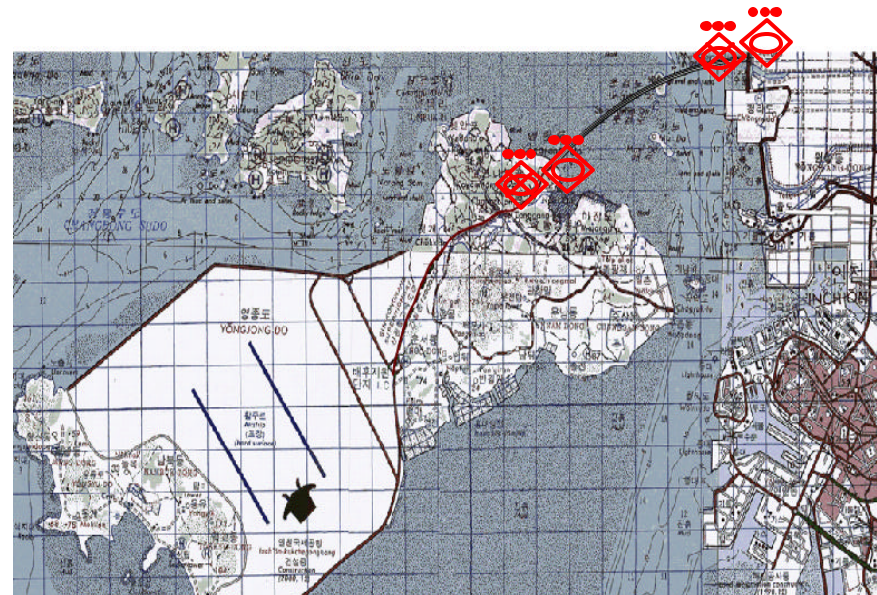
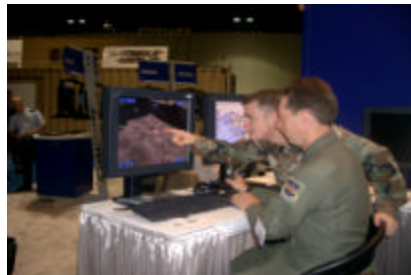


# Example of Joint Mission



## EVENT: Engagement of Enemy Counterattack Force

- JFECC nominates target in Automated Deep Operations Control System (ADOCS)
- JTF components determine status – No Fire Area
- Seal loses sight of targets
- JFECC tasks JFACC to find and fix
- JFACC determines JSTARS ineffective and tasks ASOC to use UAV or other asset
- Predator assigned task
- Predator picks up targets on Bridge (NFA)
- UAV reports targets leaving the NFA





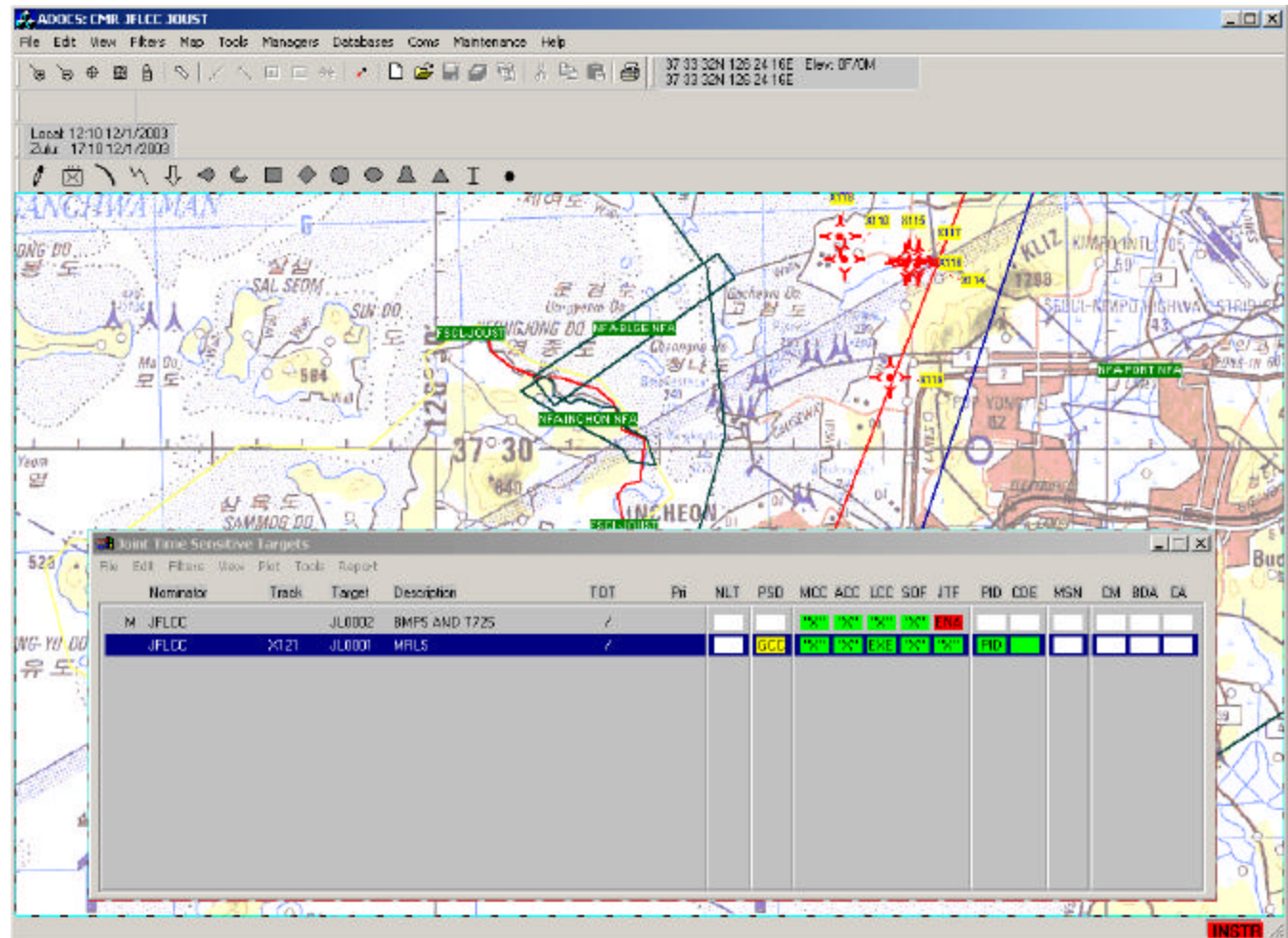


# Example of Joint Mission

## EVENT: Engagement of Enemy Counterattack Force



- In ADOCS JFMCC reports ability to prosecute target
- JTF commander and components approve Navy engagement
- JFECC tasks Navy to engage with ANGLICO/UAV support







# Example of Joint Mission

## EVENT: Engagement of Enemy Counterattack Force



- UAV provides targeting/BDA information to ANGLICO
- ANGLICO contact Navy Gunfire Liaison Officer (N-GLO), on the firing ship
- Target prosecuted
- Remaining OPFOR enters NFA.
- JFECC orders cease fire
- JFECC tasks JFACC to continue tracking target
- Target exits NFA and attacks McKenna Village
- Targets enter danger-close range for Navy gunfire and JDAM bombing





# Example of Joint Mission

## EVENT: Engagement of Enemy Counterattack Force



- JTF commander and JFECC authorize CAS mission
- JFLCC passes CAS mission to Army commander on ground
- JFACC coordinates CAS aircraft with Virtual Flag Combined Air Operations Center (CAOC)
- Unit commander on ground works with TACPs to execute CAS mission
- TACPs executes mission with CAS aircraft (normally AC-130s)





# Accomplishments



- Demonstrated Live, Virtual, Constructive interoperability
  - Linked in Fort Benning Dismounted Battlespace Battle Lab (DBBL)
    - Live soldiers at McKenna Military Operations on Urban Terrain (MOUT) Site
    - Live soldiers in simulation center's virtual trainers
    - Naval Gun Fire at Naval Surface Weapons Center Dahlgren Division (NSWC-DD)
    - Virtual aircraft provided by Distributed Mission Operation Center (DMOC)
    - Constructive entities by all three participants
  - Developed integration software (gateway) which provided
    - Location correlation
    - Entity mapping
    - Protocol translation





# Accomplishments



- Executed Joint Urban Operation (JUO) Vignette
  - Integrated with Virtual Flag (VF) 04-2 and Infantry Officer Basic Course (IOBC) training event.
  - Vignette was limited in scope but worked C2 procedures from tactical to operational events demonstrating feasibility
  - Completed 5 full runs of JUO vignette
- Conducted Secret Level Capstone Demonstration
  - Integrated Air Force, Army, and Navy capabilities over 3 locations using Defense Research Engineering Network (DREN)
  - Successfully executed required security documentations and Memorandum of Agreement (MOA) between Air Force, Navy, and Army sites





# Accomplishments



- Integrated Automated Deep Operations Coordination System (ADOCS)
  - Each participant site had an operating ADOCS station which was fed information provided by the simulation environment
  - Effectively used to support C2 decision making
  - Demonstrated effect of C2 decision process on operations
- Synchronized control and maintenance operations
  - Simulation integration was stabilized affording the ability to lose simulations without need to restart all federations
  - Monitored the status of all simulation and network traffic which provided Demonstration Director ability to adjust vignette activities as needed





# Summary



- JOUST is operational:
  - Creates synthetic environments to simulate real-world operational conditions
  - Integrates Air, Ground, and Naval forces with Joint staff to create stressing real-world conditions for Joint and service-level training and testing
  - Integrates voice and data for simulated Joint fire missions

