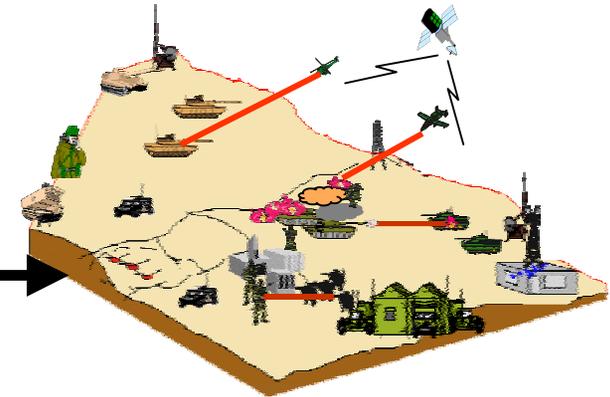




OTC's Support to Joint Events

Requirements



Test-specific "wrap-around" environments

Test Technology Conference
Mr. Frank Knight
Transformation Technology Directorate
Operational Test Command, Fort Hood, TX DSN:
738-1459 (254) 288-1459
April 2004

Operational Test Command



OTC's Mission

OTC plans and conducts independent operational testing and experiments in order to provide essential information for the decision making process.

MTOE Units

Wartime Tempo

Soldiers, not equipment, accomplish missions and win wars.

Networks

**Modeling/
Simulation/
Stimulation**

Instrumentation





Supporting the Army's Transformation



Situation

- Rapidly changing technology
- Systems of systems more complex
- Size and scope of T&E increasing



Constraints

Soldiers, land, \$\$, time, equipment



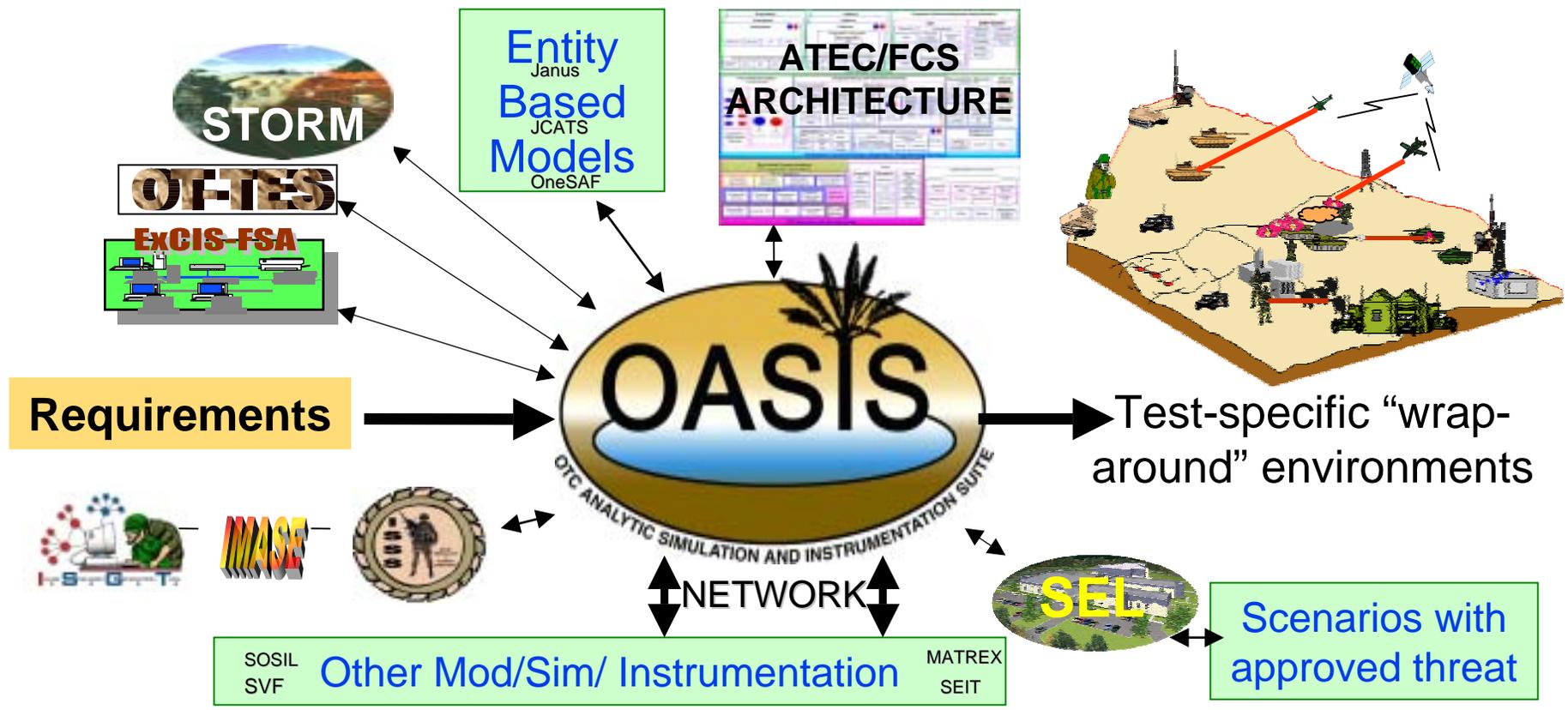
OTC's Technical Challenge

Providing robust synthetic operational environments in which to test the network centric system-of-systems of the Future Force.





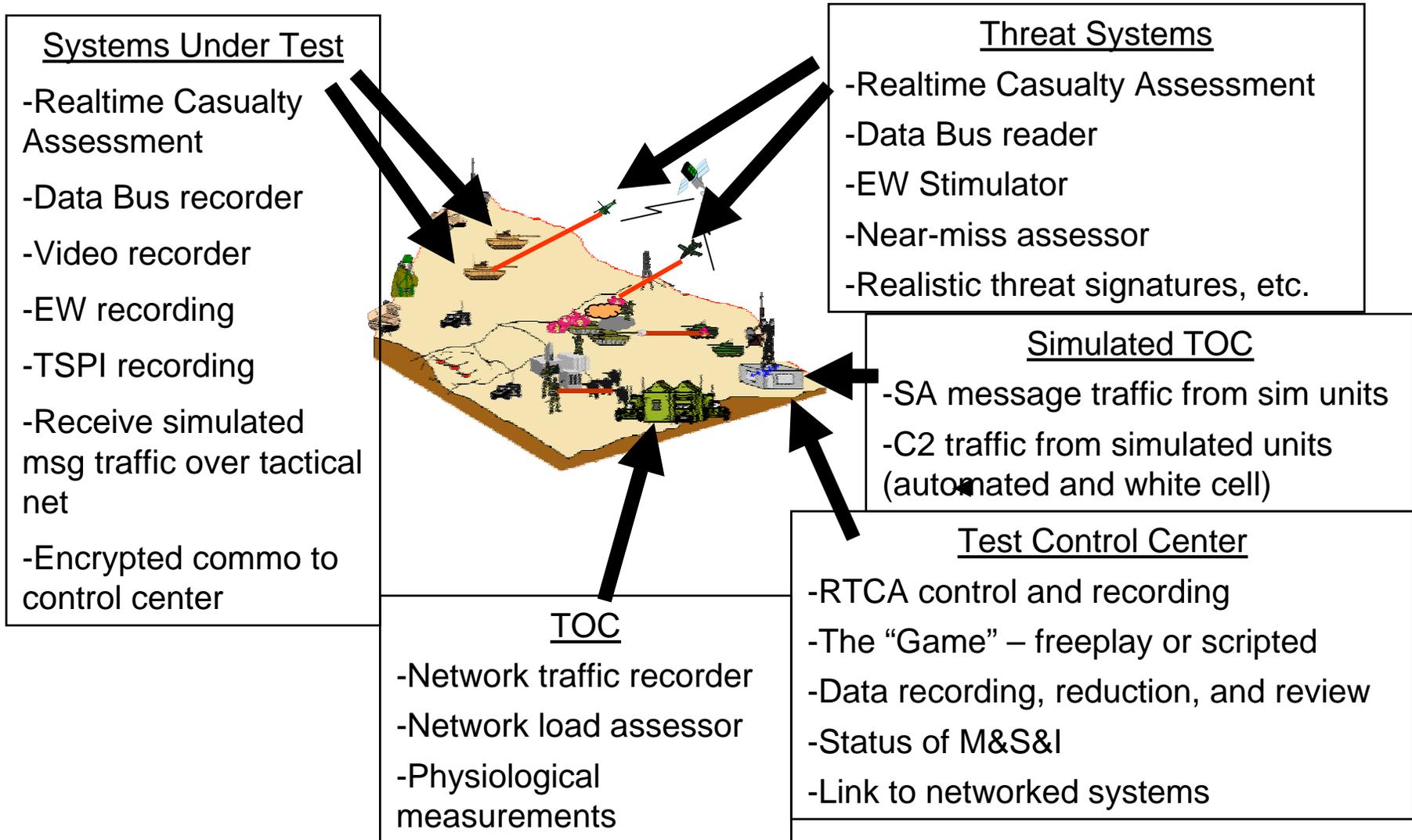
OTC Analytic Simulation and Instrumentation Suite



Each Operational Test May Involve a Different Mix of Live, Virtual, and Constructive Simulation and Instrumentation.



Support to Complex Tests/Exercises





OTC Technology Expertise



- OTC's specialized expertise in two areas has strong application to Joint test and experimentation and to training exercises:
 - RealTime Casualty Assessment (RTCA)
 - Simulation Support to Digitized Battle Command Assessment
- The requirement to accredit any modeling/simulation used to support operational testing has led OTC to find and develop mod/sim systems and techniques that provide high fidelity at reasonable cost.



OTC Technology Expertise - RTCA



- RealTime Casualty Assessment (RTCA)
 - Direct, close engagement assessment (think MILES)
 - Long-range, non-LOS engagement assessment (Geometric Pairing)
 - Area effects (e.g. minefields, artillery attack, chem-bio)
 - Able to use embedded instrumentation & data taps (e.g. AF data pods)
 - Maximize non-interference with Soldiers and systems under test
- JOINT EXAMPLE: Provided TENA-compliant ground-to-air Geometric Pairing/RTCA capability in support of Jan 04 JFCOM Thrust 1 exercise.



RTCA Model

Collect, Report, & Store Data in Real-Time

Sense Engagement

- Instrument Triggers
- Monitor Data Bus
- Sensor Stimulus
- Monitor Simulations

Establish Pairing

- Laser Pairing
- Geometric Pairing
- Ballistic Model
- Fly-out Model
- Arbitration

Determine Outcome

- Attacker's Parameters
- Target's Parameters
- Ph/Pk Data
- Random Number Generation
- Endgame Model

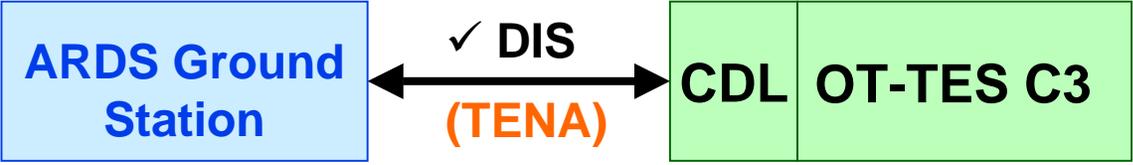
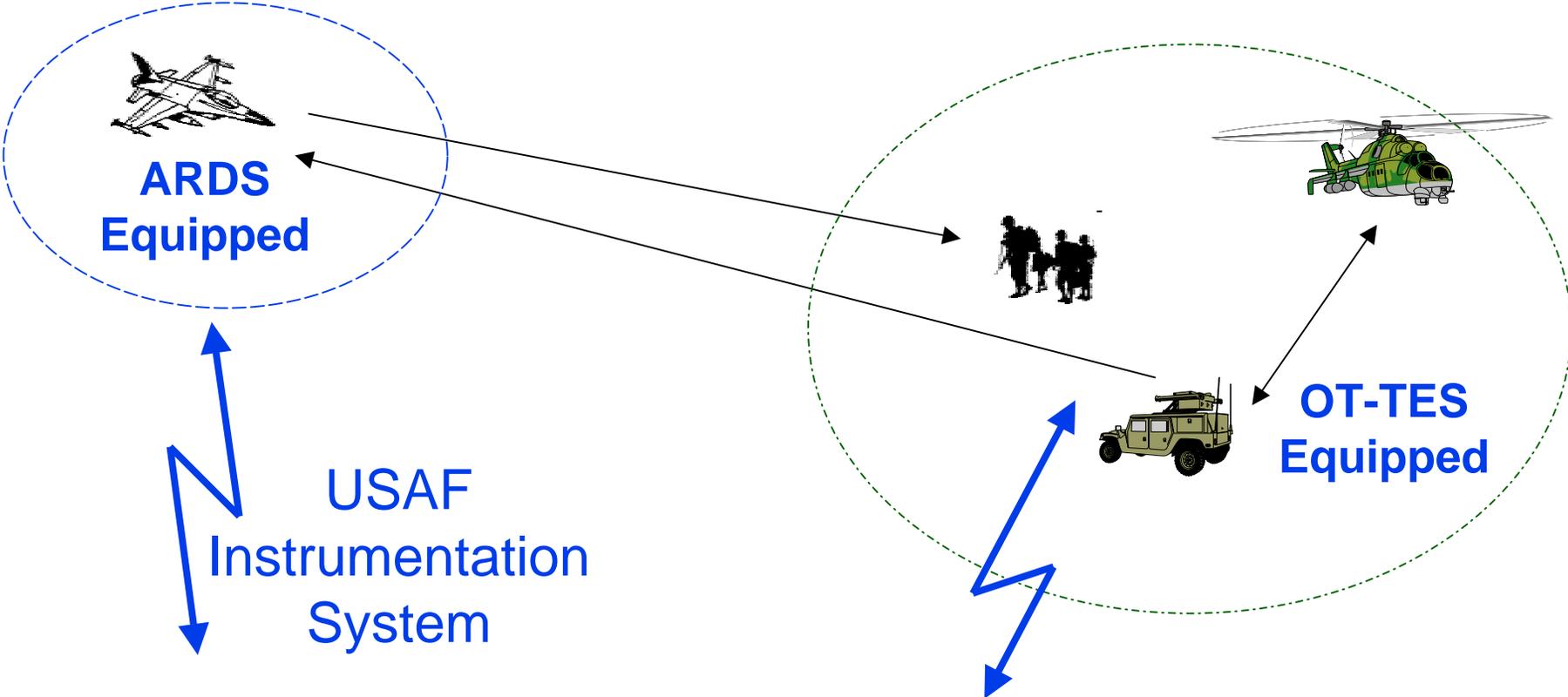
Simulate Effects

- Provide Feedback
- Activate Signatures and Cues (both Attacker & Target)
- Disable Weapons
- Degrade Network performance
- Battlefield Effects



Geometric Pairing

Interfaces with other Simulation/Instrumentation Systems



(Common Data Link)

Operational Test Command



OTC Technology Expertise



- Simulation Support to Digitized Battle Command Assessment
 - Simulate the message traffic of full units
 - Stay current with new tactical capabilities (e.g. Blue Force Tracking)
 - Provide traffic over tactical networks/devices
 - Provide instrumented tracking of traffic
 - High fidelity threat representation
- JOINT EXAMPLE: OTC provided simulation support for the May 2003 CERTEX/OE of the Army's first digitally equipped Stryker brigade combat team. The simulation allowed the commander to exercise the C2 structure of the entire 3,600 Soldier brigade under deployment conditions.



Making C4ISR Simulation Realistic



- Entity/message level resolution for simulations
 - ISSS IOT V&V - 107,000 entities, 120-scenario hours, 52M movement events. Remained realtime 80%+. When not realtime, less than 4 Min difference and caught up to realtime within the hour
 - STORM use for Stryker OE – 13-day event – 3,500,000 SA and 2,500 C2 messages sent by STORM and 700,000 SA and 1,500 C2 messages received by STORM.
- Simulations must appear realistic to the Soldier players
 - JCATS – Initially de-aggregation didn't retain locations – group function added
 - Messages arrive on tactical systems – “Live or Memorex”
 - STORM ‘On-the-fly’ live-sim conversions - “I’m at the transfer point” – “OK, turn on your antennae”
- Systems are used in their native environment
 - On/off switch problem found when Soldiers used the actual system



Simulation Must be Affordable Given the Benefit Provided



- Testing/Training/FCS teamwork for RTCA/TESS.
- Expert system reduces need for white cell Soldiers for STORM-driven events – uses TRADOC System Manager-defined triggers and conditions
- ISGT – reduces need for costly, manual scenario creation – FOC requirement is that work requiring 6 man-years be reduced to 1/2 man-year. Current IOC-level operation reduces 80 man-hour requirement to 12 man-hours.
- JFCOM Thrust RTCA demo required no ‘add-on’ instrumentation for Air Force aircraft – used system data bus information - TENA compliant



Our Ultimate Customer



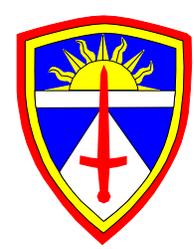
Our ultimate customer is the Soldier -- our sons and daughters -- who will judge our efforts with their lives and their mission accomplishment.

This is a sacred trust which will not be compromised.





BACKUP SLIDES



Acronyms



- **OASIS** (OTC Analytic Simulation and Instrumentation Suite) - Modeling & Simulation & Instrumentation (M&S&I) for Operational Testing (OT) and the supporting structure required to design appropriate synthetic environments for OT.
- **STORM** (Simulated Testing Operations Rehearsal Model) - Simulates FBCB2 (Force XXI Battle Command Battalion/Brigade and Below) functionality; provides realistic SA (Situational Awareness) and C2 (Command and Control) message load on the lower TI (Tactical Internet).
- **IMASE** (Intelligence Modeling & Simulation for Evaluation) – Intelligence, Surveillance and Reconnaissance (ISR) focus
 - **ISGT** – IMASE Scenario Generation Tool - Builds doctrinally correct scenarios
 - **ISSS** – IMASE Simulation & Scoring Subsystem - Produces realistic intelligence messages
- **RTCA/TESS** – realtime casualty assessment / tactical engagement scoring system
- **OT-TES** (Operational Test – Tactical Engagement System) – Provides Real Time Casualty Assessment, Position Location, Instrumentation Monitoring/Control, and Link from Live to Simulations.
- **ExCIS-FSA** (Extensible C4I Instrumentation System - Fire Support Application) - Emulates and stimulates Corps level indirect fires
- **SEL** (Synthetic Environment Lab) - Operational arm of OASIS - Test Control Center - Development lab
- **JCATS** (Joint Conflict And Tactical Simulation) - Entity based model developed by Joint Forces Command (JFCOM)
- **ATEC** - Army Test and Evaluation Command; **FCS** - Future Combat Systems; **VV&A** - Verification, Validation, and Accreditation; **EW** - Electronic Warfare; **TSPI** – Time-Space-Position Information



OT-TEST OV-1

Communication

Architecture
Encryption

NLOS/BLOS/AWE

Ind. Fire, Chem, Minefields

GPS

PL/Time Synch

Automated

Data Retrieval

Real Time

Monitor/Control

Direct Fire

Range Based
Instantaneous
TOF

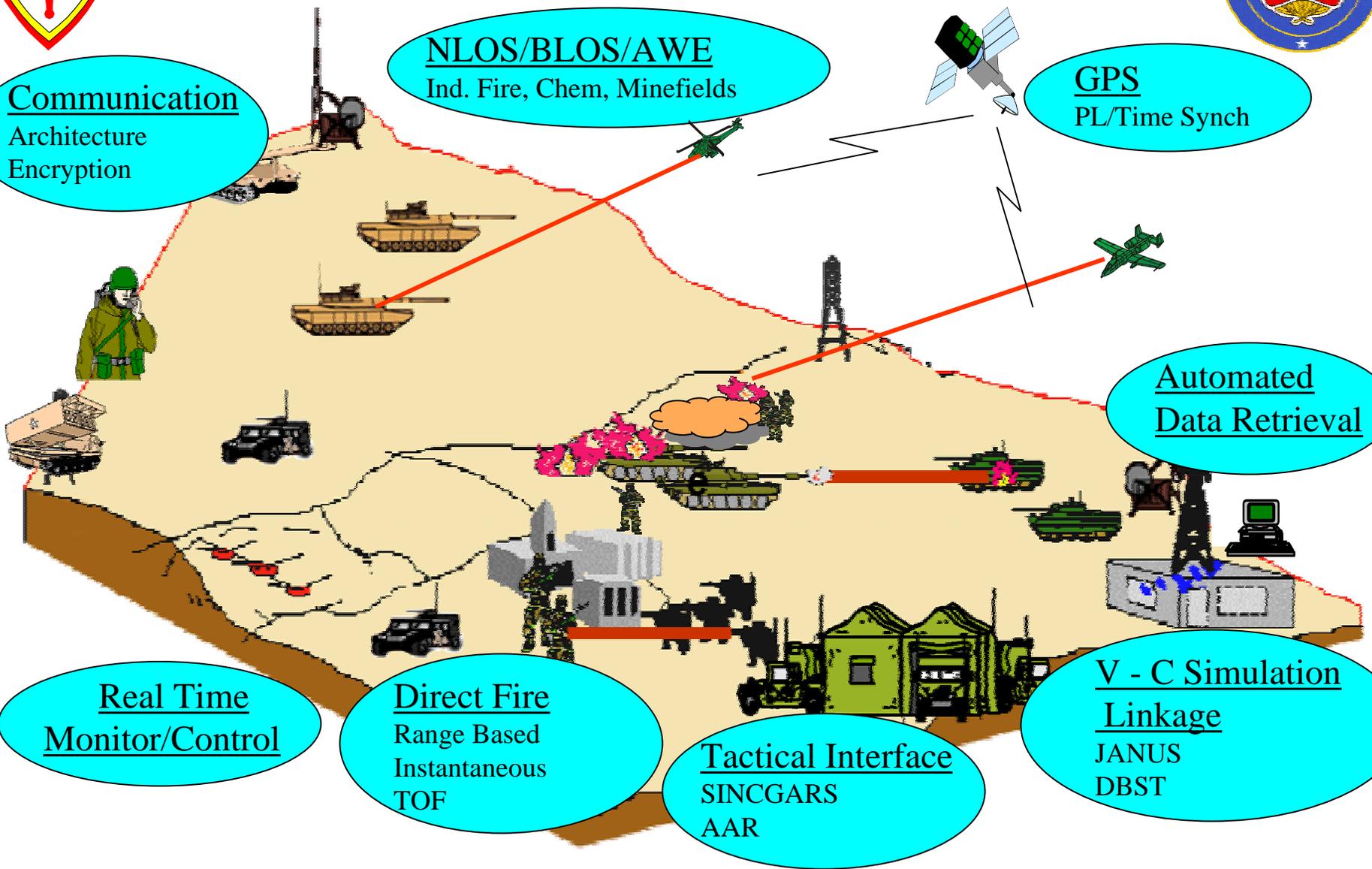
Tactical Interface

SINCGARS
AAR

V - C Simulation

Linkage

JANUS
DBST





CONIC SECTION APPROACH

